A SMART CITY INITIATIVE:
A Case study of Porto Alegre 156

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ABSTRACT

Many cities around the world are investing in "smart" ways to manage the problems associated with urbanization and agglomeration of people. The challenge is how to implement initiatives to attend citizen's necessities aiming a better quality of life. The purpose of this paper is to describe the "156 Speaks Porto Alegre", channel driven to citizen municipal demands, and investigate its integration and relationship with the eight dimensions of the *Smart City Initiatives Framework:* technology, management and organization, policy context, governance, people and communities, economy, built infrastructure, and natural environment. The main findings show that coordination between agencies and departments are needed to achieve citizen better quality of life. They also demonstrate that the use of the right technology is really important and a smart city initiative must have mobility and easy interaction with citizen. Finally, interdepartmental collaboration and cooperation are considered central issues to achieve initiatives' objectives.

Categories and Subject Descriptors

H.4.2 [**Information Systems Applications**]: Type of systems – *e-government applications*

General Terms

Management, Performance, Human Factors, Standardization

Keywords

Smart city, Service integration, E-government

1. INTRODUCTION

People around the world are moving to cities in greater and greater numbers, according to the United Nations Population Found (UNPF) the world is undergoing the largest wave of urban growth in history and the number of people living in towns and cities is expected to increase to 5 billion until 2030 [19]. It is not easy to manage this growth and good governance is needed to find a *smart* way to attend the density of urban life. Nam and Pardo, complement [15]:

> "With the rapid increase of the urban population worldwide, cities face a variety of risks, concerns, and problems; for example, physical risks such as deteriorating conditions in air and transportation, and economic risks such as unemployment" (p.282).

Chourabi et al. [5] relate that the urgency around this challenge is triggering many cities around the world to invest in new "smart" ways to manage the problems conceptualizing smart city as a sustainable and livable city. The challenge is how to implement and integrate initiatives aiming to attend citizen's necessities.

Exploring an extensive array of literature from various fields, *a Smart City Initiatives Framework* was proposed by Chourabi *et al*. [5] identifying eight critical factors of smart city initiatives. This framework helps to understand city government-driven initiatives to make a city more efficient, effective, attractive, competitive, sustainable, equitable and livable.

The purpose of this paper is to analyze the initiative "156 Speaks Porto Alegre" in terms of integration and interoperability taking into account the eight dimensions of the *Smart City Initiatives Framework,* suggested by Chourabi *et al.* [5].

The integration and interoperability are fundamental issues to enable a service that seeks to be a contact channel for numerous municipal services from different departments. In the same way, the model proposed by Chourabi et al. [5] makes a deep analysis on smart city initiatives being a great instrument for this study.

Porto Alegre is the capital of the southernmost state in Brazil, Rio Grande do Sul, having 1.409.351 inhabitants [8]. In November 2012, Porto Alegre was recognized by IBM's "Smarter Cities Challenge Program Summit" as one of the 31 winning smart cities

around the world. In this summit, they reviewed innovative solutions to the major challenges faced by cities [7]. Starting by a case study of Porto Alegre's 156 (known by "156: Fala Porto Alegre"), a contact channel between the city and citizen, this paper aims to research its relationship with the Smart City Initiatives Framework [5].

This study is organized as follows: first, a review of the academic literature on smart city and an explanation of the *Smart City Initiative Framework*. The subsequent section explains the method of data collection and the case study. The following section reports the findings of the qualitative analysis of the data from semi-structured interviews in Porto Alegre. The final section presents concluding remarks and suggestions.

2. CONTEXTUALIZNG SMART CITY

There are a lot of studies to define and clarify the meaning of Smart City as well as researches proposing systematic understanding of initiatives that make a city smarter. The smart cities concept goes beyond the purely technological aspects of urban development. They are typically referred to as 'digital' or 'intelligent' cities, terms that encompass social and environmental dynamics [18].

2.1 Defining Smart City

Smart city reflects a city well performing in a forward-looking way in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive [5], independent and aware citizens [10], (p.11). Taking in account where do the investments are made, Caragliu *et al.* [4] define Smart City:

> […] a city to be smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance (p. 70).

Alwadhi *et al.* [2] provide definitions according to their interviewees: "a smart city is also about proactive service and government action internally as well as interaction with citizens" (p.1697). Their research also detected two elements in all smart city-related discussions: "(a) policy orientation along with the political will aimed at becoming smarter in government actions and interactions and (b) the reliance on modern information technology as a backbone and enabler for doing so" (p.1701). According to Nam and Pardo [15], a smart city is one city with a comprehensive commitment to innovation in technology, management and policy.

Smart City is also used to discuss modern technology and the usage of new channels of communication for the citizens as e-Governance and e-Democracy. This reflects the relation between city government, administration and its citizen allowing good and smart governance. Various aspects referring to life in a *smart* city are also necessary like ICT, modern transport technologies, logistics, new transport systems which improve the urban traffic and the inhabitants' mobility [10].

2.2 Smart City Integrative Framework: Components

Chourabi *et al.* [5] identified eight components or critical factors of smart city initiatives, based on the exploration of a wide and extensive array of literature from various research fields such as e-government, local government administration and management, and information systems. The eight clusters of factors include: (1) management and organization, (2) technology, (3) governance, (4) policy, (5) people and communities, (6) the economy, (7) built infrastructure, and (8) the natural environment. The Figure 1 illustrates the framework and the factors interrelations.
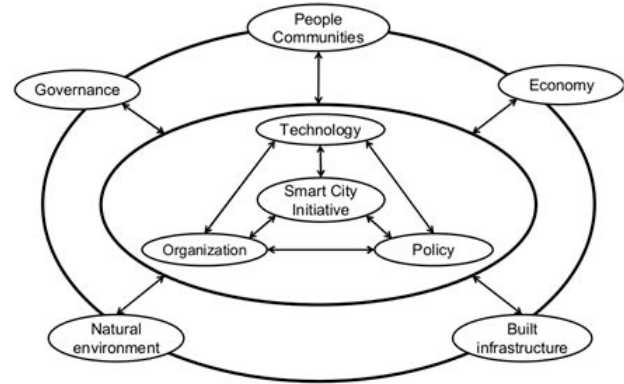

Fig 1. Smart City Initiatives Frembork (Source: Chourabi et al., 2012).

According to Chourabi *et al.* [5], all factors should have a two-way impact in smart city initiatives (each likely to be influenced by and is influencing other factors), at different times and in different contexts [5]. Also, there are two different levels of influence, outer (governance, people and communities, economy, infrastructure and natural environment) and inner factors (technology, organization and policy). As the name *says* this is an *integrative* framework in which the attributes have a connection.

2.2.1 Management and organization

Organization is one factor under the Integrative Framework proposed by Chourabi *et al.* [5] that has a direct connection with *technology* and *policy* factors. Interdepartmental collaboration and cooperation through sharing information and the role of communication and interaction are central to proceeding, managing and organizing smart city initiatives [1].

Gil-Garcia and Pardo [12] listed strategies for initiatives grouped into five categories being *Management and Organization* , whose challenges are: "project size, manager's attitudes and behavior, users or organizational diversity, lack of alignment, multiple or conflicting goals, resistance to change and turf and conflicts" (p. 191) Managerial and organizational strategies for meeting those challenges suggested by Gil-Garcia and Pardo [12] are good communication, adequate training, previous process improvement end-user involvement, planning, project team skills and expertise, well-skilled IT leader (technical and social skills), clear milestones and measurable deliverables, adequate and innovative funding, current or best practices review (p.194).

2.2.2 Technology

Smart cities should use the technology to better connect seven critical city infrastructure components and services: city administration, education, healthcare, public safety, real estate, transportation, and utilities. Washburn *et al.* [21] (p.2) emphasis technology in this smart city definition: "What makes a city a smart city is its use of Smart Computing to deliver its core services to the public in a remarkably efficient manner...".

Smart city initiatives involve adopting new systems and the government has new opportunities from emerging technologies. Having different contact channels, like social media and smart phones [1] are vital to improve efficiency and effectiveness of service delivery and information provision [18].

Nowadays the usage of *smart* means innovative and transformative changes driven by new technologies [15] but traditional challenges around technologies still exists, like: under-equipped conditions; cost of upgrading back-office technologies; timing of investment of the right technology at the right time; lack of staff and budgetary constraints; lack of interoperability and also technological complexity and incompatibility [1, 12, 17].

Taking in account the importance of technology and all the opportunities it provides, having a good computing infrastructure is a key component of a smart initiative. A plan containing solutions to address all possible challenges is also needed.

2.2.3 Governance

Governance [13] (p. 523) involves the "relationships control and accountabilities of shared services organizations is diverse [...]. The term governance structure is used to outline the hierarchy of committees, boards, bodies, or forums that execute the management".

Governance structures, according to Alawadhi *et al.* [1], are embedded in all stages of any project: starting from conception of a smart city initiative, through initiation, through design, construction, and closeout (or maintenance in permanent projects). There is no uniform governance model for smart city initiatives, they could be participatory, hierarchical, and/or hybrid models. In same way, there are diverse organization forms that lead an initiative like committees (having strong authority to command and manage the initiatives) or one particular city agency or departments taking the lead to organize a smart city initiative.

Chourabi *et al.* [5] defined, from literature review, a list of *governance* factors as collaboration, leadership and champion, participation and partnership, communication, data-exchange, service and application integration, accountability and transparency.

2.2.4 Policy Context

In reference to the Smart City Initiatives Framework the policy context comprises political components (city council, city government, and city major) and institutional components (law, regulation, code, and intergovernmental agreement) [5]. According to Alawadhi *et al.* [1] the policy context of a smart city initiative is represented by interdepartmental agreements and this context are shaped by executives' directions.

2.2.5 People and Communities

A smart city should know citizens' wishes and needs and their opinions as many initiatives request their ideas and feedback on governmental efforts [1]. In this way, People and Communities factors indicated by Chourabi *et al.* [5] are participation and partnership, communication, education, quality of life, accessibility, digital divide(s), information and community gatekeepers.

2.2.6 Economy

In the context of urban economy: "smartness indicates overcoming economic challenges, creating new jobs and businesses, and increasing regional attractiveness and competitiveness" [1]. According to Chourabi *et al.* [5] economic outcomes include business creation, workforce development, and retention, and improvement in productivity. Smart city initiatives should find more innovative ways and solutions using limited resources effectively in order to overcome economic challenges such as budget cuts and financial recession across countries.

2.2.7 Built Infrastructure

Information and communication infrastructures are fundamental because they create capacity to deliver city services seamlessly to residents and businesses. Chourabi *et al.* [5] ensure that ICT infrastructure is essential but it depends on some factors related to its availability and performance. Challenges associated to this dimension are indicated into three categories: (1) IT Infrastructure; (2) Security and privacy; and (3) Operational cost.

2.2.8 Natural Environment

Green infrastructures and green building practices are important and wanted nowadays. Alawadhi *et al.* [1] attest cities' responsibility affirming that they are socially responsible to make various options available in order to be able to remain green and environmentally sustainable. Energy saving and environment protection are a tag for smartness in one city. Became a greener city or go green is included in the cities' strategic goals.

2.3 Service Integration

The technology needed to manage transactions and technology infrastructure to support the whole system of an initiative such as "156: Fala Porto Alegre", needs an effective integration to ensure perfect coordination and delivery of services within appropriate levels. This need is due to the multiplicity of actors involved as initiative's user, attendants, employees from agencies that execute the service requested, program managers, etc.

In the technology context, database integration is an important differential that provides the governments' economy of scale, improve repositories of equipment and reduction of transaction costs "that must be the starting point to make business processes more effective and increase citizen satisfaction with the products offered" [3]. Moreover, integrating databases of different formats, which serve different requirements, belonging to various public entities, represent significant obstacle to your success [14].

E-government, the system of government that seeks, through the use of information technology improve processes and services delivered to citizens, the public administration, democratic and social development mechanisms [11], it is closely related to smart cities, may this is considered the first subfield. From the perspective of e-government, integration can occur in two forms: vertical and horizontal. In the vertical plane, integration involves different levels of government such as city and state, for example, while the vertical is within the integration of services and databases, for example, many of the same governmental' s core [14].

In a survey conducted among the employees of the city of Seattle on the concept of smart city, the results obtained showed that the integration of information in terms of technology and services featuring a smart city management [2]. One of the approaches of smart city approximates the electronic government position as it relates to the topic, since it involves the integration of infrastructure and municipal services through information and communication technology [15]. The concept presented by Aldama-Nalda et al. [23] reinforces the arguments:

A smart city can be understood as the use of smart technologies to build and integrate critical infrastructures and services of a city and it denotes the important cities' efforts to catch the diverse benefits from technology use, such as increases in efficiency, effectiveness, transparency, convenience, and sustainability (p.1).

The model of Elementary Components of Smart City [and] establishes three key factors - human, institutional and technological - which in turn are realized by three principles: learning for human factor, governance of institutional factors and integrations of technology factor. From the view of the latter principle, the smart city concept is linked to an organic network that involves the integration of technology, systems, infrastructure, services and capabilities [15].

The seminal model of smart city initiatives from Chourabi et al. [5], which describes itself as "integrated conceptual, framework to guide future 'smart city' studies", relates the integration in technological areas - hardware, software and network technologies -, governance in terms of services and applications, and economics, in relationship to the local and international markets, demonstrating the relevance of the topic within the smart concept of governing municipals.

The manifestation of the academy regarding the integration leaves no doubt about the importance of the subject in the realms of e-government and smart cities. Important therefore to examine, through the testimonies of the respondents, the "156 Speaks Porto Alegre", which meets the level of integration, an initiative whose characteristics may be presumed that this is one manifestation of smart.

3. METHOD

The initiative 156: Speak Porto Alegre, which is analyzed in this paper, was selected due to increasing importance of service integration in Porto Alegre and a whole world. The integration, therefore, is the core of what is intend to be investigated, and the Smart City Integrative Framework is the instrument used to implement the research.

The purpose of qualitative research is to understand social phenomena of multiple realities from respondents' perspectives. This paper uses qualitative case study methodology to understand the city initiative. This type of case study is used to explore those situations in which the intervention being evaluated has no clear, single set of outcomes [22]. Accordingly, should be noted by Dubé and Paré [6] that claim:

> Case research, in its versatility, can be used with any philosophical perspective, be it positivist, interpretivist or critical. It typically combines several qualitative data collection methods such as interviews, documentation, and observations, but can also include quantitative data such as questionnaires and time series (p.598).

3.1 Data Collection

The initiative's coordinator, as an initial informant with a comprehensive knowledge of the organization, was asked to recommend others who have sufficient information and knowledge in various aspects of 156's operations. The coordinator provided a list containing suggestions of staff employees to be interviewed. Key informant interviewees are qualitative in-depth interviews with people who know what is going on in the initiative.

The participants were selected in three steps: 1) review of coordinator's list; 2) relationship between profiles and research objectives; 3) selection of suitable profiles. The interviewees were from functions such as initiative coordinator, manager, attendant and technology expert from Data Processing Company of Porto Alegre (PROCEMPA) and are mentioned as: interviewee 1, interviewee 2, interviewee 3, interviewee 4 and interviewee 5 in this paper.

The interview protocol was originally created by the "Smart Cities Service Integration" project team, constituted by several universities worldwide and managed by the Center for Technology in Government (CTG), linked to the University of Albany, USA. The interviews occurred from August to September 2013 and each face-to-face interview lasted between one and a half and three hours. The technique's advantages are that it provides a free-exchange of ideas, and lends itself to getting more detailed responses. Each session was recorded and transcribed and additional information was collected through follow-up email communication.

3.2 Case Description

The 156: Speak Porto Alegre initiative sits in the SMGL (Municipal Secretariat of Local Governance). The structure was established by the Law 9.693 dated December 29th, 2004 and also Decree 14.816, dated January 27th 2005. The "156" is a unique channel to attend population demands and non-emergency services, available every day. All requests for transit services, tree pruning, water, sewerage, street lighting, street paving, garbage collection, tourist information, municipal taxes, among others, can be routed via 156.

The 156 started on September 1984, but the population still had to know the number of each call centers specialized like traffic agent, municipal guard, etc. Since 2011 the 156 is the central channel for city services request. The citizen just needs to remember one number and select the option (1-9) according to their needs. The 156 option 9 is called "Speak Porto Alegre" and works from 7 AM to 11 PM. According to interviewee1 the 156: Speak Porto Alegre really wants to give the message "Population: speak through the 156".

In the beginning there were just eight employees and today there are 62 people working in the 156: Speak Porto Alegre (option 9). There are 52 attendees and 10 supervisors (managers, coordination) divided in three shifts (morning, afternoon and night). As this is a public service, all employees were hired through public selective exam.

Any citizen can request a service using the telephone or the Internet. If using telephone, the citizen calls 156 and select the option '9' to talk to one attendee. The attendee asks questions about the service request/information and opens a "request" in the system. According to the service type, it is automatically routed to the specific agency. When this initiative started, there were like 20-30 city services. Currently, there are around 349 types of services and more than 20 organizations involved in this initiative.

Each request by phone or Internet generates a protocol number to track the service resolution. In the last year the 156 received 1,6 M calls and option 9 alone received 440.000. From this amount, 368.000 requests were open and routed.

4. DATA ANALYSIS AND DISCUSSION

A smart city, according to interviewee 1, should have mobility, information access, facility and agility: "You should look for something and it might be easy, not complicated. A smart city needs to have a place where you can get anything you need (services) in a simple and easy way". The interviewee 2 believes that a smart city should have an infrastructure able to interact with the citizen in any contact channel at any time. There is a need of mobility: "the citizen should be able to notice a street hole and instantly open a request to have it fixed, upload pictures at the time". See below the initiative analysis divided in the eight components of smart city integrative framework.

4.1 Management and Organization

Some interviewees believe that there are management issues in 156: Speak Porto Alegre. The service still takes too long to attend the demands. By the other hand, the system has created an approximation between secretaries and agencies, in accordance with interviewee1. Due to organization changes, today it is possible to know where the service delay is. The city administration can access the queue of every agency, as reported by interviewee 5. As each request has a protocol number, this number is used to track requests progress.

According to interviewee1, nowadays about 90, 95% of the agencies and departments are integrated with the 156. The few services that are not integrated yet need to be engaged by email or letter.

One of the biggest challenges faced by 156: Speak Porto Alegre is staffing. According to interviewee1: "People who came here is not familiar with email and we need to improve how we are educating and training staff; Take time to train them and investment in people is a critical factor for succeeding". The 156 employees (attendees and coordination) are government employees. The attendees have the function of administrative assistance and in order to be able to get the job they took official exams. It is not like a selection process to select people profiles to work with people.

Interviewees believe that a lot of improvements took place since the beginning of the initiative. As described by interviewee1:

> Before the integrated and online system we needed to create labels for each request. [...] It used to take from 5 to 7 days to get to the destination [...] Nowadays, we register the demand and it is directly routed to the responsible agency.

The agencies that execute and receive the requests need to have a good structure and staff as well. As reported by interviewees, they don't have a great structure and not every agency has access to the system and still needs to go in person to check requests or go to another agency that have the system installed to take the list of services requests to be completed.

According to interviewee1:

> Besides facilitating the lives of citizens, the system allows you to evaluate the service provision, and in particular the reduction of time in service and consequent user satisfaction". But, as reported by interviewee5 there is no process to check the quality of the service provided, as 156 does not provide any survey to track customer experiences yet.

4.2 Techonology

Interviewees identified two programs/systems as the information and communication technology (ICT) being used in this initiative. One is the *Speak Porto Alegre* system used to register, manage and route all demands and the other one is the program used to manage and receive calls, known as *Contact Center.* According to interviewee3 the *Contact Center* program is installed and used for all agencies integrated with the 156 since March 2011.

The calls do not pass through any telephone operator, meaning economy. For security, backups are performed every night so in the event of a fault or problem they can retrieve all the information from the systems until the day before, as remarked by interviewee 2.

The interviewees identified many barriers and challenges to use technology in this initiative. Interviews also revealed various opportunities and challenges of using technologies. According to interviewee 2 the city administration doesn't have the knowledge of what is possible to do with the use of technology. When a citizen calls to open a request it needs to take note of the protocol number. Nowadays, the only way used by the Municipality to report citizen that their requests were completed is regular letters or email.

All the interviewees mentioned the need of mobility saying that citizen should take pictures and send to the system via smart phones and easily open a service request everywhere and anytime. The current system Speak Porto Alegre does not support pictures upload and even worse, when opening a request by Internet the citizen can see the option "Upload picture" but when trying to upload a picture nothing happens.

The system Speak Porto Alegre used by the Porto Alegre 156 is not supporting the number of demands anymore and does not provide a great service quality. According to interviewee3 "even the technology part is not resolved yet". Interviewee4 related that: "the system is better than before, but sometimes it gets stuck and a request that could be registered in 2 minutes can take up to 10 minutes due to system performance.

4.3 Governance

The initiative governance model, according to 156 interviewees, is more participatory than hierarchical. When the 156 Speak Porto Alegre changed their structure and started using the system Speak Porto Alegre the coordination with other areas did a service redesign.

According to interviewee1, in 2010/2011 the 156 started as an integrated service having the city agencies and departments moved to the number 156. However, five years ago, the demand was not as big as it is today. Now, it is necessary to redesign the service again.

However, it could be observed that there are governance improvements. Since April 2013 the city governance created committees of services. This happens with vice mayor and secretariats to check what demands needed more attention. According to interviewee5 the city administration also started a project known as *city hall in your community* to attend those demands that are for a long time in the queue. This interviewee also mentioned that the 156 has not defined if it is a call center; contact center; attendance central or ombudsman. This is an important issue to be defined as soon as possible, since specific regulations must be followed.

4.4 People and Communities

According to interviewee1: "we didn't have a channel with the city administration before this initiative and to request any service was needed to go in person to the agency responsible for that service". The Speak Porto Alegre contributes for a better quality of life and for people participation

This initiative can help communities and also an individual. According to interviewee4, the 156 receives a lot of calls/requests asking information about courses, where to apply for workshops, documentation needed and vaccination campaigns. Interviewee1 affirms that the 156 receives requests from all social class and asking for simple requests, since urgent and serious ones, as well as calls to complain or give suggestions and improvements.

4.5 Policy Context

All interviewees notice that policy interests and mandate changes have an influence to this initiative. When every new government assumes the city administration, they make different actions impacting the initiative as related by interviewee2. According to interviewee5, the current government gives a lot of importance to *services* and the 156: Speak Porto Alegre is getting more visibility because of that.

According to interviewee3 there is a big relation between the initiative and policy context: "the quality of this service can determine the quality of the city administration. This is a way to measure how the city administration is going".

4.6 Economy

The interviewees believe that the initiative could help enhancing the city competitiveness, attract workforce and commerce. According to interviewee 5 the city administration should work in a more proactive way, using the information provided by requests (recurring ones) and work to fix the problem and avoiding recurrence. Interviewee 2 said, "[…] if we have a great service resolution and if we feel that when we need something, it is resolved quickly this could attract new business, commerce and people for the city".

Economy will also "spend less" and this initiative could reduce expenses. An example was given by interviewee 4: "we receive a lot of requests to remove a falling tree, if those requests were attended on time it could avoid this tree to fall over a house or injure people and consequently it would reduce the chance of having extra expenses with pension or to cover the damage of a destroyed house".

4.7 Built Infrastructure

According to interviewees, if the initiative works as it should be it could function as a CRM (*Customer Relation Management*) or a database of service requests and needs where information recorded could help the government knowing where to invest, what needs to be build, fixed, etc.. Interviewee 3 illustrates this idea: "…the administration should do a better use of the database, like a real CRM to check where we receive more requests and how invest in infrastructure".

The 156: Speak Porto Alegre initiative already has the infrastructure needed to integrate services. However, it is still needed to invest in the service executers' agencies to give them the adequate infrastructure to receive and track the 156' requests. As described before, not all agencies and department have access to the CRM system Speak Porto Alegre and according to interviewee 5 some agencies even doesn't have a computer and needs to go to other agencies to get the list of requests from the computer.

4.8 Natural Environment

This initiative also has a big relation to the city natural environment as it receives requests for garbage collection, falling tree, garbage sitting in unappropriated places are also sent via 156 which helps the environment and the transformation of a cleaner city,. Interviewee5 gives a list of requests types related to the natural environment like native forest and reserves monitoring, cleaning the edge, environmental preservation area and others. Interviewee3 believes that "… if we didn't have this contact channel where would the citizen claim for this service type of requests? Maybe they would need to go in person to the agencies. Table 1 summarizes the findings discussed up to this point.

Dimension	Analysis
Management and Organization	SMGL (Municipal Secretariat of Local Governance) Human resource management is a challenge (recruitment process) Request and referral via system Speak Porto Alegre system created an approximation between secretaries and agencies Now it is possible to know where is the delay Protocol number used to track request's progress City administration can access every agency's queue Difficult to 'manage' other agencies and departments (service executers) as they are not under the same organization The agencies that execute and receive the requests need to have a good structure and staff as well Not all agencies and departments are integrated yet
Technology	Speak Porto Alegre: system used to register, manage and route demands Contact Center: Call system Intranet: City information Integration between agencies System Limitations and slowness System does not support files upload (pictures) Does not send SMS Number of characters to entry additional notes under the requests is limited Need of mobility (Smart phone app) Requestor cannot access request details - need to call and ask the progress

Dimension	Analysis
Governance	More participatory than hierarchical Service executers (other agencies and departments) are not subordinated by the SMGL

Interdepartmental collaboration Need to redefine, redesign and qualify the service, giving internal conditions to meet the demands

Committees of services since April 2013

156: Call center? Contact center? Attendance central? Ombudsman? Service integration requires cooperation and coordination of multiple authorities from different government levels |
| People and Communities | People are getting more involved in smart city initiatives Communication channel between city and citizen The initiative does not collect participants information (to know their profile)

There is no satisfaction survey

Know people's wants and needs, |
| Policy Context | Political mandate has a deep influence Current government showed interest and recognized the importance of service The quality of this service may reflect the quality of the city administration" Interdepartmental agreements shape the policy context of the initiatives. Way to measure how the city administration is going |
| Economy | Attractiveness and competitiveness If the city has a great service resolution this could attract new business, commerce and people City administration could be more proactive - using request's information to know what is needed Reduce expenses (remove a falling tree avoiding damage) |
| Built Infrastructure | 156 has the infrastructure needed to integrate services, but the executers does not. The service records should be used as a database to collect information and find out where the city needs to invest

CRM (Customer Relation Management) |
| Natural Environment | This initiative collaborates and help to protect the natural environment - a channel to claim for services Requests for garbage collection, falling tree, garbage sitting in inappropriate places |

5. CONCLUDING REMARKS

The initiative 156: Speak Porto Alegre can be used as crucial part of the city administration's strategy to transform the city government into a smarter, faster and better city. The initiative is in the right way as great changes have been made in the last years. According to respondents, the 156 represents a breakthrough in enabling addressing the demands practically on time, a procedure that in the past was a personal communication that took 5 to 7 days to be addressed.

In terms of integration, some positive evidence worth mentioning, such as the number of services provided, which started with 10 different types and in 2013 brought together nearly 300 services; integration of demand for services by users on a single channel, 156, from 2011; and an installed infrastructure that allows, by means of integration, improved integration of services, allowing the recording of requests in two minutes, a procedure that took 10 minutes earlier.

Moreover, the testimonies point to underlying issues regarding integration: in terms of service-citizen relationship, the system does not allow the user to send/upload pictures, in order to demonstrate the object of his demand and assist the government in the problem identification; despite the growing number of services integrated to 156, the design of the service is the same as in 2008; proactivity absence, because the request's information are directed only to the resolution of one particular case, not generating inputs for the city administration; on the same line, but with distinct vision, another interviewee points out that the lack of integration and interoperability between generated by the lack of a unified database, as well as the absence of a system that acts in the manner of a CRM this is an impediment to improve the performance of the municipal management quality. The 156's infrastructure should be extended to the executing agencies of the service, integrating more effectively the registration of demand and it's implementation.

The program Speak Porto Alegre used to register and manage the requests received by the Porto Alegre 156 is not supporting the number of demands anymore and does not provide a great service quality. The city administration is aware of the necessity of having a better system and, according to several respondents, it will probably be replaced next year.

The interviewees point to other problems claiming that there is no user satisfaction survey and also attest that the requestor needs to take note of the protocol number because the system does not send SMS either email informing request information. Furthermore, in a global analysis, the interviewees believe this initiative helps transforming the city in a smart city, but the 156 needs to be better; mainly in technology, system and communication aspects. Moreover, metropolitan authorities demand an important flux of high quality information, which is usually generated among diverse offices. To be effectively managed, these fluxes should be integrated having a real CRM system.

In this paper, it was analyzed the integration and interoperability among "156" and the agency services. It was also suggested a preliminary understanding of the smart city initiative Porto Alegre' 156 based on the *Smart City Initiatives Framework*. This framework helps understanding and analyzing all areas of a city initiative. In the future, would be great to extend this study interviewing representatives from other departments (who execute the services). Further research could also focus on how the integration works on diverse cases of city contact centers and its

relationships with smart cities frameworks to create a comparative analysis.

5. REFERENCES

[1] ALAWADHI, Suha et al. Building Understanding of Smart City Initiatives. In: Proceedings of the 11th IFIP WG 8.5 International Conference, Electronic Government, Norway: Kristiansand, pp.40-53, September 2012.

[2] ALAWADHI, Suha; SCHOLL, Hans J. Aspirations and Realizations: The Smart City of Seattle. In: Proceedings of the 46th Hawaii International Conference on System Sciences, HICSS 2013, Wailea, HI, pp.1695-1703, 2013.

[3] ANDERSEN, Kim Viborg, and HENRIKSEN, Helle Zinner. E-government maturity models: Extension of the Layne and Lee model. *Government Information Quarterly* 23.2 (2006): 236-248

[4] CARAGLIU, A. et al. Smart cities in Europe. In: Journal of Urban Technology, v. 18, n. 2, pp. 65–82, 2011.

[5] CHOURABI, Hafedh et al. Understanding Smart Cities: An Integrative Framework. In: Proceedings of the 45th Hawaii International Conference on System Sciences, HICCS 2012, IEEE Press, Maui, Hi, USA. pp. 2289-2297. January, 2012. Available at: <http://www.ctg.albany.edu/publications/journals/hicss_2012_smartcities> Access: June 2013.

[6] DUBÉ, L. and PARÉ, G.. Rigor in information systems positivist case research: current practices, trends, and recommendations. MIS Quarterly, v. 27, n.4; pp: 597-636. 2003.

[7] FISHKIND, Ari. IBM Names Worldwide Recipients of 2013 Smarter Cities Challenge Grants to Improve Urban Life. Armonk, New York, November 2012. Available at: <http://www-03.ibm.com/press/us/en/pressrelease/39396.wss> Access: June 09, 2013.

[8] IBGE. Instituto Brasileiro de Geografia e Estatística. Censo Demográfico 2010. Available at: <http://www.ibge.gov.br/home/estatistica/populacao/censo2010/default.shtm>. Access: May 20, 2013.

[9] FLOERSCH, J., et al. Integrating thematic, grounded theory and narrative analysis. In: Qualitative Social Work, v. 9 n. 3, pp. 407-425. September 2010.

[10] GIFFINGER, R. et al. Smart cities: Ranking of European medium-sized cities. Vienna, Austria: Centre of Regional Science (SRF), Vienna University of Technology. 2007. Available at: <http://www.smart-cities.eu/download/smart_cities_final_report.pdf>. Access: May 2013.

[11] GIL-GARCÍA, José Ramón and LUNA-REYES, L. F. A Brief Introduction to Electronic Government: Definition, Applications and Stages. *Revista de Administración Pública* 116 (2008).

[12] GIL-GARCÍA, J. R.; PARDO, T. A. E-Government Success Factors: Mapping Practical Tools to Theoretical Foundations. Government Information Quarterly, v. 22 n. 2: pp. 187–216. 2005.

[13] GRANT, G. et al. Designing governance for shared services organizations in the public service. Government Information Quarterly, v. 24, p. 522-538, 2007.

[14] LAYNE, Karen and JUNGWOO Lee. Developing fully functional E-government: A four stage model. *Government information quarterly* 18.2 (2001): 122-136.

[15] NAM, T. and PARDO, T. A. Conceptualizing Smart City with Dimensions of Technology, People, and Institutions. In: Proceedings of the 12th Annual International Conference on Digital Government Research, College Park, Maryland, pp. 282 – 291. 2011. Available at: <http://www.ctg.albany.edu/publications/journals/dgo_2011_smartcity> Access: May 2013. (2011a).

[16] NAM, T. and PARDO, T. A. Smart City as Urban Innovation: Focusing on Management, Policy, and Context. In: Proceedings of the 15th International Conference of the 5th on Theory and Practice of Electronic Governance, pp. 185–194. 2011. Available at: <http://www.ctg.albany.edu/publications/journals/icegov_2011_smartcity> Access: May 2013. (2011b).

[17] NAM, T. and PARDO, T. A. Transforming City Government: A Case Study of Philly311. In: 6th International Conference on Theory and Practice of Electronic Governance, ICEGOV2012, pp. 22-25. October, 2012. Available at: <http://www.ctg.albany.edu/publications/journals/icegov_2012_philly311> Access: March 2013.

[18] NAM, T.; PARDO, T. A. Identifying Success Factors and Challenges of 311-Driven Service Integration: A Comparative Case Study of NYC311 and Philly311, 2013. In: Proceedings of the 46th Hawaii International Conference on System Sciences, HICSS 2013, Available at: <http://www.ctg.albany.edu/publications/journals/hicss_2013_philly-nyc311> Access: May 2013.

[19] UCLA. Center for Health Policy Research. Key Informant Interviews. Available at: <http://healthpolicy.ucla.edu/programs/health-data/trainings/Documents/tw_cba23.pdf> Access: October, 2013.

[20] UNPF. United Nations Population Found. Linking Population, Poverty and Development, 2007. Available at: <http://www.unfpa.org/pds/urbanization.htm>. Access: May 28, 2013.

[21] WASHBURN, D. et al. Helping CIOs Understand "Smart City" Initiatives: Defining the Smart City, its Drivers, and the Role of the CIO. Cambridge, MA: Forrester Research, Inc. 2010.

[22] YIN, R. K. Case study research: Design and methods (3rd ed.). Thousand Oaks, CA: Sage. 2003.

[23] ALDAMA-NALDA, Armando and GIL-GARCÍA, José Ramón. 2011. First Steps towards Studying Government Information Sharing and Integration in Metropolitan Areas. In: Proceedings of the 12th Annual International Conference on Digital Government Research, College Park, Maryland, pp. 351-352. Available at: doi:10.1145/2037556.2037621