Building a Reference Model and an Evaluation Method for cities of the Brazilian Network of Smart and Human Cities

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ABSTRACT

Smart Cities theme has evolved in the last years, leading the cities to implement initiatives related to technical aspects to improve quality of life. Another focus on this theme is how to measure the added value of these initiatives to the population. The Brazilian Network of Smart and Human Cities (RBCIH) was created in order to join both approaches in Brazil, putting together members from academy, private initiative and local (municipality) government. Nowadays, RBCIH is composed by 350 Brazilian cities (in a universe of 5570 cities), indicating that a long-term work has to be executed by RBCIH in Brazil. Two purposes of RBCIH are presenting good practices and evaluating how smart and human a city is. In this work, a methodology is presented for constructing a Brazilian reference model and an evaluation method for smart cities, adherent to the Brazilian reality.

CCS CONCEPTS

•Applied Computing → Computers in other domains → Computing in government

KEYWORDS

Smart Cities, Governance, Indicators.

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1 INTRODUCTION

The RBCIH is a national movement that brings together professionals, researchers, entrepreneurs and students from the academic, private and public sectors, in order to exchange information and experiences for the development of cities in the economy of the 21st century. It was created in 2013 within the National Front of Mayors - which brings together the 350 largest Brazilian cities - and congregates secretaries and municipal officials of science, technology and innovation, and economic development. In order to create a common concept with Brazilian specificities, it also connect universities and private sector to build a document titled: "Brazil 2030: Smart and Human Cities", which has guided its actions throughout the country. This publication presents a methodology for an annual evaluation of the municipalities that are part of the RBCIH. In order to define the methodology, the concept of Smart and Human Cities (SHC) is presented, based on consolidated indicators for the evaluation, as well as the used metrics for collecting the indicators information. The methodology is coordinated by the RBCIH Indicators Department. The presented methodology will allow certificating the cities, with criteria for visualizing the weaknesses and strengths of public services, and the proximity with the expectations of the population after its implementation, contributing in this way to its permanent evolution and alignment. The methodology also addresses the processes used to define the indicators and the publication of Recommendations Report, aiming at the continuous improvement of public services and SHC policies. To achieve the methodology, a project is ongoing, intending to contemplate as main contributions:

- The definition of a Brazilian reference model, adherent to the Brazilian reality, based on studies and discussions with several stakeholders, and an evaluation method for smart cities, which can be used by the cities and evolved by multidisciplinary teams;
- The definition of a common language for discussion among cities, about actions to implement smart cities in terms of the specificities of each dimension, to be established by the model;

2 BACKGROUND

One of the definitions of Smart City is grounded in six main dimensions [1, 2]: Smart Economy, Smart Mobility, Smart Environment, Smart People, Smart Life and Smart Governance. Giffinger et al. [3] present several indicators, based on these dimensions, considering some factors such as economic, social, business, retirement, education, culture and others. City-rankings have become a central instrument for assessing the attractiveness

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of urban regions over the last 20 years [3]. In these comparative studies, cities are evaluated and ranked, regarding to different economic, social and geographical characteristics in order to reveal the better (and the not so good) places for certain activities. Consequently, cities themselves should use these ranks to sharpen their profile and to improve their position in the competition of cities: a top-rank in a highly reputed city ranking helps to improve the international image of a city, and can, therefore, play a central role in its marketing strategy. Comparisons of public decisions and efforts and analysis of these comparisons may also benefit from these city ranks. Therefore, rank strategy turns possible to maximize the use of public resources, allowing increasing quality of life and life expectation over the city.

3 CONCEPT AND THEMATIC AXES OF SHC

Despite the RBCIH recognizes the potential of ICT as a tool for urban management, "Smart and Human" is pointed out as the most relevant aspect for cities, as they are constructed, organized and lived by people. So, citizen participation must be pursued in this scenario. Thus, the actions regarding SHC aim to articulate how citizens can engage in the participatory process, what are their needs, regarding access to information, and how cities can humanize the use of ICT, in order to improve the quality of life in urban centers. The concept evolves from Smart Cities to SHC, based on their collective capacity to understand and respond to challenges in an integral and sustainable way, thus guaranteeing the consolidation of the precepts of the Democratic State of Law. The concept of SHC that the RBCIH consider is an integrated approach between two fundamental aspects: technology and the human being, in the sense of creating an urban vision, committed to the understanding of urban anthropology, the process of shared construction of urbanism and the quality of urban life. In summary, the concept adopted by the RBCIH [4] is outlined below:

> The SHC are those that sustain their own continuous evolution, having as goals the well-being, the quality of life and the empowerment of the citizen and the local communities, supporting their development in actions, projects and public policies that promote (in an egalitarian way) collaboration between community, public authorities and civil society for mediation and conflict resolution, as well as promotion of local creativity. These cities use advanced social interaction technologies and a resilient, interoperable and transparent technological infrastructure for the generation and management of data in an open and accessible way and in constant improvement and evolution, which allows improving, increasing and automating the functions of the city in an efficient, integrated, sustainable and relevant way for the population.

3.1 Indicators

One of the purposes of the RBCIH is to consolidate indicators, which allow quantifying and/or qualifying the dimensions that form the concept of SHC synthesized in this document. Each indicator is classified as either following the proposal of ISO 37120-2014 or a new indicator, and belongs to each of the following dimensions: 1) Governance, encompassing issues related to policies, public participation, public services, transparency, access to information, urban public policies, digital democracy, legislation, PPPs, etc. 2) Architecture, Urbanism and Anthropology, encompassing anthropological and urbanistic criteria, socio-economic, territorial and spatial, informational, critical city, emerging actions, complex thinking, Digital Master Plan, etc. 3) Technology, encompassing connectivity, networks, ICTs, issues related to innovation in education and teaching, etc. 4) Safety, encompassing issues related to effective personnel in public safety devices (police), fire and accident prevention (fire) and crimes against property.

3.2 Key Elements of the RBCIH

Based on the elements proposed by Gil-Garcia, Nam and Pardo [5] and the definition of SHC, the concept that the RBCIH proposes and wants to stimulate involves the following dimensions: Human Factors, Technological factors and Institutional factors. The Figure 1 presents the dimensions and their key elements.

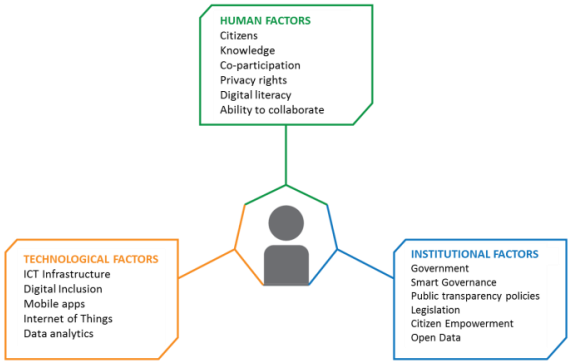

Figure 1: Key elements of Smart and Human Cities

3.3 Methodology

For the operationalization of the indicators of the SHC, the RBCIH Working Group structured the methodology in seven stages. 1) Elaborate a reference model and an evaluation method aligned to the expectations of the Brazilian government entities and some frameworks already internationally tested. 2) Select the municipalities to be evaluated either by secondary data (IBGE Data, Municipal Human Development Index) or by the analysis of their institutional portals. 3) Process and analyze the data. 4) Develop the Ranking. 5) Assign an RBCIH certificate to the best placed municipality. 6) Store the generated data that can be exported for analysis in open format (CSV). 7) Generate graphs and comparative reports that allow the constant improvement of the services provided by the municipal entity.

4 CONCLUSIONS

This paper provides an overview about the main objectives and outcomes that the RBCIH has been developing in SHC theme, strongly related to innovation and transformation in government. Also, this paper briefly describes the indicators and the method for cities annual evaluation in Smart Cities Context.

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