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BOT-CITIZEN: SMART URBAN GOVERNANCE FOR COMMUNICATION WITH OPEN DATA

BOT-CIDADÃO: GOVERNANÇA URBANA INTELIGENTE PARA COMUNICAÇÃO COM DADOS ABERTOS

BOT-CIUDADANO: GOBERNANZA URBANA INTELIGENTE PARA LA COMUNICACIÓN CON DATOS ABIERTOS

ABSTRACT

Objective: To create a maintenance solution that seeks to overcome digital literacy problems in the peripheral areas of São Paulo and capture quality data for public administration.

Design/method/approach: To use the Design Science Research methodology, an iterative process that seeks to develop versions of a prototype to be validated by user testing, and based on the concept of SmartCities, to develop a participatory e-Gov technology.

Results: The study resulted in the creation of a prototype communication channel for urban maintenance issues using chatbots, specifically WhatsApp, due to its wide acceptance. The data were categorized to be efficiently captured by the robot and sent to the administration's Data Center for tabulation and optimization, cross-referencing them with other public databases. Tests with the target audience showed that the prototype overcomes digital literacy problems and maintains efficiency in data communication.

Practical implications: The implementation of this technology can significantly improve the efficiency of urban maintenance services, making them more accessible and inclusive.

Social implications: The proposed technology promotes digital inclusion and citizen participation, especially in peripheral areas, empowering the community.

Originality / value: The value of the study lies in the innovation of using common chatbots like WhatsApp to overcome digital literacy barriers and improve communication between the population and public administration, demonstrating an effective path for smart urban governance.

Keywords: Big Data. Smart Cities. e-Gov. digital literacy.

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RESUMO

Objetivo: Criar uma solução para zeladoria que busca superar problemas de literacia digital nas áreas periféricas da cidade de São Paulo e captar dados de qualidade para a administração pública.

Design/metodologia/abordagem: Utilizar a metodologia do Design Science Research, de processo iterativo que busca desenvolver versões de um protótipo a serem validadas por testes com usuários e, com base no conceito de SmartCities, desenvolver uma tecnologia de e-Gov participativa.

Resultados: O estudo resultou na criação de um protótipo de canal de comunicação para problemas de zeladoria urbana utilizando chatbots, especificamente o WhatsApp, devido à sua ampla aceitação. Os dados foram categorizados para serem captados eficientemente pelo robô e enviados ao Data Center da administração para tabulação e otimização, cruzando-os com outros bancos de dados públicos. Testes com o público-alvo mostraram que o protótipo supera problemas de literacia digital e mantém a eficiência na comunicação de dados.

Implicações práticas: A implementação dessa tecnologia pode melhorar significativamente a eficiência dos serviços de zeladoria urbana, tornando-os mais acessíveis e inclusivos.

Implicações sociais: A tecnologia proposta promove a inclusão digital e a participação cidadã, especialmente em áreas periféricas, empoderando a comunidade.

Originalidade / valor: O valor do estudo reside na inovação de utilizar chatbots comuns, como o WhatsApp, para superar barreiras de literacia digital e melhorar a comunicação entre a população e a administração pública, demonstrando um caminho eficaz para a governança urbana inteligente.

Palavras-chave: Big Data. SmartCities. e-Gov. Literacia digital.

RESUMEN

Objetivo: Crear una solución de mantenimiento que busca superar problemas de alfabetización digital en las áreas periféricas de São Paulo y captar datos de calidad para la administración pública.

Diseño/metodología/enfoque: Utilizar la metodología de Design Science Research, un proceso iterativo que busca desarrollar versiones de un prototipo para ser validadas mediante pruebas con usuarios, y basado en el concepto de SmartCities, desarrollar una tecnología de e-Gov participativa.

Resultados: El estudio resultó en la creación de un prototipo de canal de comunicación para problemas de mantenimiento urbano utilizando chatbots, específicamente WhatsApp, debido a su amplia aceptación. Los datos fueron categorizados para ser capturados eficientemente por el robot y enviados al Centro de Datos de la administración para su tabulación y optimización, cruzándolos con otras bases de datos públicas. Las pruebas con el público objetivo mostraron que el prototipo supera los problemas de alfabetización digital y mantiene la eficiencia en la comunicación de datos.

Implicaciones prácticas: La implementación de esta tecnología puede mejorar significativamente la eficiencia de los servicios de mantenimiento urbano, haciéndolos más accesibles e inclusivos.

Implicaciones sociales: La tecnología propuesta promueve la inclusión digital y la participación ciudadana, especialmente en áreas periféricas, empoderando a la comunidad.

Originalidad / valor: El valor del estudio radica en la innovación de utilizar chatbots comunes como WhatsApp para superar las barreras de alfabetización digital y mejorar la comunicación entre la población y la administración pública, demostrando un camino efectivo para la gobernanza urbana inteligente.

Palabras clave: Big Data. Smart Cities. e-Gov. alfabetización digital.

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INTRODUCTION

If we think of the city as a complex tangle of information and each citizen as a social actor capable of generating valuable data for the efficient governance of their community (Habermas, 2008, p. 14), how could the public authorities harness this force to capture, compile, and return all these data possibilities to the population in the form of public services?

The citizen should be an ally of government administrations in detecting problems and maintaining public services in the city, feeding the system with information to help achieve quicker and more efficient resolutions, and directly benefiting from exercising their citizenship. However, what often happens is that the poor quality of access to public services due to political, administrative, and technological issues ends up making the citizen a silent and distrustful enemy, as the population feels abandoned.

Technology, which theoretically should facilitate communication between communities and public authorities, is largely exclusionary, as research has shown difficulties in handling it and frustration among the population, already burdened by severe issues in transportation, healthcare, and security management.

Worse still, the service that does not cater to citizens is paid for with public money, the tax money of each person who was frustrated while trying to perform a simple registration in the system to report and seek a resolution for a common problem, such as a pothole in front of their house or a broken streetlight, or even a more serious problem that would deserve more immediate attention from the public authorities. An aggravating factor in this scenario is that at least 23 million people do not have access to the internet in the country (IBGE, 2022), an issue that the public authorities will need to address in the coming years.

The present study is based on the following research question: how can we improve methodological deficiencies, slowness, and intermittency of the current technologies used in maintenance services? To address this, a prototype communication channel for urban maintenance issues in the city of São Paulo (Brazil) was implemented using chatbots, specifically via WhatsApp. It was tested with the defined target audience—the population of peripheral areas of the city.

During the research, it was discovered that the technologies used in the city of São Paulo lack scientific methodology in their development, making them less functional. The 156 application, used as an entry point for the population to report problems in their regions, was found to be so complex that a portion of the population in the most peripheral areas simply does not know how to use it—highlighting the chronic lack of digital literacy.

In this context, better use of ICT can help bridge this gap and make access to public digital government services (e-Gov) more inclusive and functional for the community. This does not necessarily mean more technology, or more advanced technology, but rather, technology that is understood and perceived as useful by the communities, as referenced by the globally pursued concept of Smart Cities. In light of this, the next section, the theoretical framework, is dedicated to exploring the accumulated experience in the literature of similar cases, as well as highlighting the theories and concepts that support the developed study

THEORETICAL FRAMEWORK

Since the end of the last century, the advent of Big Data has brought an unprecedented capacity for data storage and compilation, with computer networks capable of receiving, storing, and managing millions of data points simultaneously. With this immense data management capability, concepts of e-Gov and Smart Cities emerged (Rizzon, Bertelli, Matte, Graebin, & Macke, 2017), where technology would serve as the bridge efficiently connecting citizens and the government in a fast, effective, productive manner with direct community participation.

Within this concept, information is no longer vertical but a flow that must be fed by the social microcosm (Allam & Dhunny, 2019), by each person from every neighborhood that makes up the metropolis, generating direct impacts on governance and bringing the population to the center of decision-making in their communities.

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But this enormous capacity to gather and analyze information gained a new dimension with the increase in connectivity in large urban centers. Data generation has become decentralized, and today this flow is fueled by information from microcosms, such as microrregions or neighborhoods (Allam & Dhunny, 2019). Through Artificial Intelligence, these data can be collected, analyzed, and redistributed, generating tangible impacts on the governance of large metropolises.

> If the process of datafication is creating a new economy, another factor that must be highlighted is the public empowerment generated and sustained by digital means. This has created an explosion of data emitters, akin to a city opening wide avenues, generating volume and speed in data circulation in an unprecedented manner, especially with the dissemination of mobile devices as access technology. (Santos, 2019, p. 148).

All this flow of information, analyzed through algorithms, tabulated and cross-referenced, should form patterns to help the manager make decisions that are less casual and more data-driven, more quickly, and even preventively. However, data analysis must not fall into the trap of becoming a standardized decision-making system instead of a tool for evaluation and management (Clarke, 2016). Nor should it risk becoming merely another technological marketing concept. The concept of Smart Cities should be a socioeconomic commitment at its core, aimed at delivering quality services to society.

The risk of using technology as a political tool, rather than a management tool, becomes even more severe in a society with such an enormous gap in internet access and, consequently, digital literacy. Added to this problem is the fact that technology changes at a speed that even the most "prepared" risk becoming obsolete from the standpoint of digital proficiency.

Therefore, to achieve the concept of Smart Cities, digital literacy must be universal, as it is the only way to enable the active and critical exercise of citizenship (Oliveira & Giacomazzo, 2017).

Indeed, the millions of data points generated by thousands and thousands of stakeholders, and in the case of Smart Cities, each information-generating unit (citizen), can be interpreted by artificial intelligence in a differentiated manner. The algorithm can learn from this data and thereby simulate future patterns that can be used as tools for public governance (Allam & Dhunny, 2019).

It is undeniable that algorithm technology plays an increasingly important role in a world where the paradigm is the collection, analysis, storage, and return of information deemed relevant to each individual.

In a world where technologies quickly emerge and become obsolete, the reception of individually relevant data has become a fundamental aspect of our participation in public life.

> We live in a historical moment where, more than ever, almost all public activities include the storage of extensive records, cataloging, and archiving of documents. We do this even more on communication networks designed in such a way that every entry, every page viewed, and every click leaves a digital trail. (Gillespie, 2018, p. 99).

No matter how intricate this methodology of data collection and analysis is, most people can't even conceptually separate algorithms and databases, which for them are the same mechanism. Algorithms are inert "machines", just codes, if not combined with the capacity of Big Data.

> A sociological study of an algorithm must always take into account the databases to which it is connected. Not doing so would be like studying what was said at a public protest without noticing that some protesters were barred from entering the park. (Gillespie, 2018, p. 97).

In practice, these interconnected and inseparable technologies provide us with data on "trends", on discussions and issues that permeate social networks. Not only do they help us find information, but they also provide us with mechanisms to participate in social and political discussions within groups and in our community.

These algorithms are called algorithms

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of public relevance and are capable, through purely mathematical procedures, of producing and certifying knowledge. If correctly oriented, they can help large centers with thousands of people to connect and participate on equal terms in discussions and resolutions regarding public matters.

The disorderly growth of large metropolises leads managers around the world to investigate daily into new technologies in search of assistance in addressing the problem of the exponential increase in population and the urgency of meeting their needs.

Basically, information, or data, has ceased to be a pile of dusty papers stored in millions of folders indexed alphabetically, waiting for some external incident to remove them or for the obsolescence of these data to consign them to incineration or the trash. Instead, they are now stored, updated, and optimized frequently, and this availability has given rise to new, previously unimaginable concepts.

One of these concepts is e-Gov, whose foundation, accepted by some authors, is the "use of Information and Communication Technologies (ICT) as a tool to achieve better government" (OECD, 2003, p. 23). The creation of this concept was the initial step towards the widespread adoption of management tools for public administrations to communicate with society.

Guidelines of e-Gov and Smart Cities in the European context (Rizzon et al., 2017) advocate that technology should become the bridge that efficiently connects citizens and the government in a manner that is fast, effective, and productive for both sides. This bridge should be built collaboratively with the community and using scientific methodologies.

For some authors who have studied the subject, the concept necessarily implies the holistic, visionary, collaborative, and transparent management of resources, substantiated by public-private partnerships, digital systems, the dissemination of open information, the prioritization of human capital, integrated platforms, and the participation and collaboration of citizens.

A smart city uses technology to provide urban services more efficiently, improve people's quality of life, and transform the relationship between local entities, businesses, and citizens, offering a new way of living in the city (Cunha, Przeybilovicz, Macaya & Santos, 2016, p. 28).

However, a smart city that disregards the digital competencies and skills of its citizens is of no use—in this sense, to avoid becoming exclusionary, technology must be paired with a process of developing digital literacies. Digital literacy can be understood as part of informational literacy, referring to the ability to use technologies in general, but not limited to that (Blignaut & Els, 2010). According to UNESCO (2011), it can also be understood as the ability to use computers and digital media, process and retrieve information on social networks, create and share data and knowledge broadly through the network.

Oliveira & Giacomazzo (2017, p. 155) present a similar concept, with a greater focus on the use of ICT as a means of economic, social, cultural, and technological development. To achieve this goal, they argue that literacy must be universal to enable the active and critical exercise of citizenship, "since to combat exclusion, whatever it may be, it is essential to know, reflect, and participate, and these seem to be transversal needs across different digital generations" (Oliveira & Giacomazzo, 2017, p. 155).

Several recent studies highlight the importance of chatbot tools as an opportunity to bridge the digital gap (Cortés-Cediel, Segura-Tinoco, Cantador & Rodríguez Bolívar, 2023) in public administration; reports indicate their success in various global contexts (Chohan & Akhter, 2021; Oyelami, Falana, & Erinfolami, 2023), including in Brazil (Batista, de Souza Monteiro, & Castro Salgado, 2022). Some studies suggest that the urgency for e-Gov solutions became even more evident with the onset of the COVID-19 pandemic (Goloshchapova, Yamashev, Skornichenko, & Strielkowski, 2023; Wasiuta, 2021), emphasizing the need for the development of e-Gov policies and the importance of Industry 4.0 in overcoming not only global emergency challenges but also historical issues.

New digital technologies bring with them

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an avalanche of information and data to be understood, as well as new modalities for using communication, education, commerce, health, and government, and even the information itself, thereby increasing the demand for creative human resources and lifelong learning (Bercovich & Vivanco, 2016).

It is a race that cannot be won, as the efficiency of technology companies imposes a pace impossible to be equally matched by all segments of society. From this perspective, it is possible to converge with McLuhan's (1964) analysis of the physical and mental effects that the information media and the volume of data from new technologies have on people's routines.

> Crises of nervous and mental exhaustion, in varying degrees, are a common result of the uprooting and accumulation caused by new information and new and endless informational structures (McLuhan, 1964, p. 336).

McLuhan was obviously addressing a different context, with informational media and volumes that cannot compete with today's reality, which could not have been imagined at the time.

In any case, it is no longer possible to pretend that we can live in what is considered the "social fabric" without having a reasonable mastery of digital technologies, simply because in a digitized society, we depend on them to exercise full citizenship (Gil, 2019).

The ability to access information through new technologies is a foundational element of e-Citizenship and brings with it the expansion of an accessibility culture: open data, data transparency, and the sharing of public information, which "constitute fertile ground for the emergence of new logics, new semantics, and new literacies" (Passarelli & Gomes, 2020, p. 255).

METHODOLOGY AND DEVELOPMENT

The purpose of this study was to create a new data entry channel between communities and public authorities for public maintenance purposes. The research was based on the channels used in the city of São Paulo by the 156 service, which includes the website, telephone, and application, as well as the difficulties the population faces in using these services efficiently.

In addition to the problems identified with the traditional channels, such as delays, technological errors, and poor service, the research process revealed another element that guided the development of the prototype: the low digital literacy among segments of the population living in the city's more peripheral regions. According to the research, a significant portion of this social stratum does not use the 156 application because they do not know how to use this technology.

Based on these findings, the objective was to discover a simpler, faster, and more direct way to connect the population with public authorities to resolve maintenance issues. This study also aimed to ensure that the collected data could be efficiently categorized and used by algorithms, allowing for cross-referencing and tabulation with other databases to create a more systemic view of the problem at a regional level. This approach would assist managers in making quicker and more reliable decisions.

The most viable development option identified was the use of chatbots as a platform for data entry into the public maintenance system of the city of São Paulo. This approach aims to facilitate and democratize access for communities since chatbots are widely understood across all social classes.

For prototyping purposes, WhatsApp was chosen. However, this simplification concept can be adapted to any existing chatbot mechanism with similar results.

The study aimed to systematize data entry so that the data could be used to generate new dashboards with better data visualization and higher information quality. These dashboards would create insights to help managers make more strategic decisions. The collected data can be cross-referenced with data from the Traffic Engineering Company (CET), the Secretariat of Works, and the Transportation Department, providing a "real-time" overview of what is happening in the city.

The methodology used to develop this study was Design Science Research (DSR) (Dresch, Lacerda, & Antunes, 2015). Created in the

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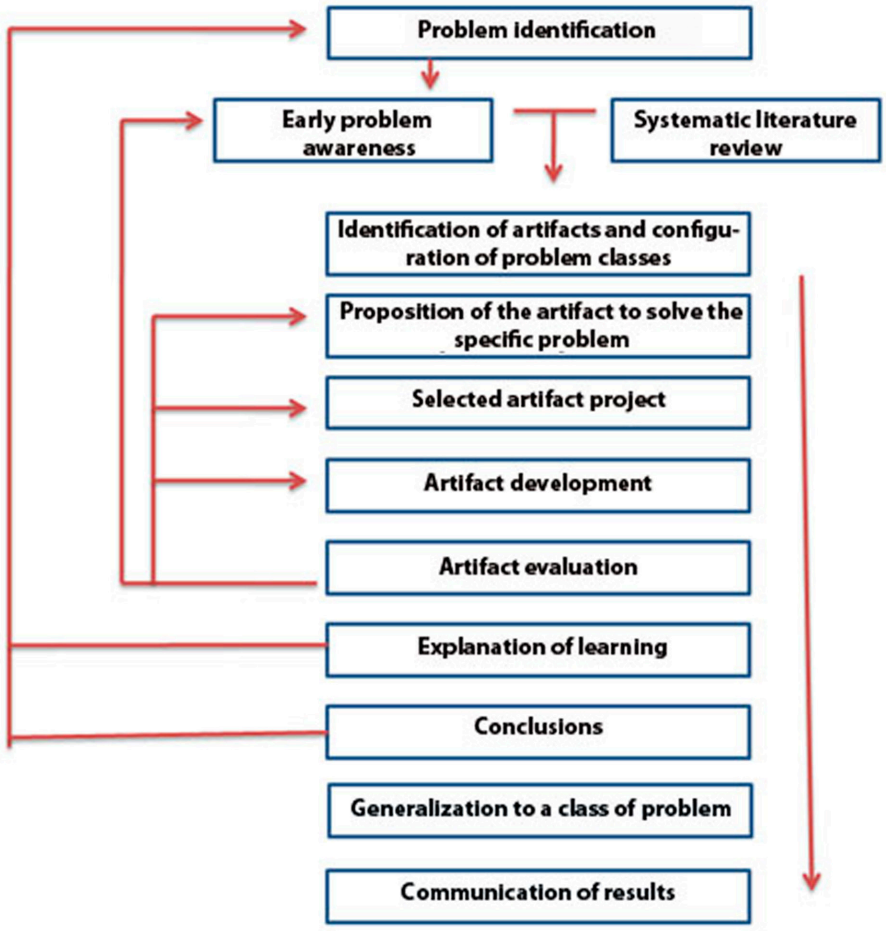
1960s, DSR was initially used for prototyping in engineering and medicine and later expanded to other research areas due to its pragmatism and problem-solving focus. Design Science Research outlines 12 development stages, according to a development timeline, many of which propose returning to previous stages whenever research data indicate discrepancies, new problems, or solutions outside the initial project scope. This flexibility allows researchers to explore new research paths that were not anticipated at the project's outset.

Below is a specific timeline of the Design Science Research stages.

Figure 1

Cycle of Design Science Research



Source: Adapted from Dresch, Lacerda, & Antunes, 2015.

The study for effective prototyping was conducted using the Watson tool, developed by IBM, which allows the creation of models for chatbots with Artificial Intelligence (AI) and their integration into various platforms and databases.

Due to budget constraints, the final prototyping tool was replaced with a low-cost alternative that also enabled satisfactory prototype development and testing. The tool used was provided by MZ WorkSpace[1], which allows the researcher to develop the interaction between the bot and the user, although it lacks the capability to integrate with other databases.

Despite not being used as the prototyping tool, the training with the Watson tool equipped

1 https://app.mzworkspace.com/

DOI: https://doi.org/10.14210/alcance.v31n1(jan/abr).p98-109

the researcher with the necessary programming logical reasoning to adapt the chatbot to the goals set for the project.

The development was based on defining key terms that would be useful in managing public maintenance issues, which would constitute the structure of the artificial intelligence interaction with citizens. The keywords were chosen for their ease of understanding and user interaction, given the inability to establish direct communication with public administration to assess which data would be most opportune for formalizing a project of this scale. The terms used in the research include problem summary, neighborhood, street, number/reference, and photo. Based on the collection of these data points, a "decision tree" was developed where selecting an item changes the flow of the model.

The interactions conducted by the chatbot are as follows:

1. The chatbot starts with a greeting: "Hello, we are São Paulo's maintenance service. To proceed, type 1".

2. The chatbot asks the user to describe the problem: "Summarize your issue in one or two words: e.g., pothole".The algorithm is trained to understand dozens of variations of this term, such as crater, big hole, and trench.

3. Location: "Please indicate the neighborhood".

4. Location: "Please enter the name of the street".

5. Reference: "Can you provide the number or a reference location?" The reference option is included because some locations in the city lack numbers, or the issue is in front of a park or open area.

6. The chatbot asks the user to take a photo: "Could you point your phone and take a picture to guide our attendants?" A mix of images from various users can give the manager a more accurate dimension of the problem.

7. The interaction is completed: "Your request has been forwarded to the manager. You will be notified within two hours! Protocol XXXXX".

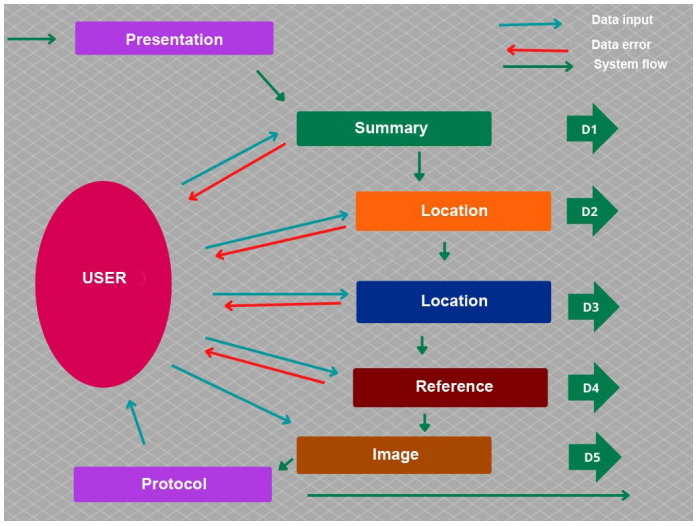
The development concept of this project envisions that these pieces of information are collected and sent to the data center of the responsible public administration. There, through algorithms, multiple pathways can be simultaneously pursued, such as generating a work order and forwarding it to the appropriate sub-municipality, integrating with public databases on zoning, roads, and transportation to create a risk-measuring dashboard. Messages within the same system are also cross-referenced to determine the volume of similar issues by area, neighborhood, street, and traffic.

All this data provides the public manager with a systemic view of the problem. For instance, a pothole consistently appearing in the same spot in an area with low vehicle traffic may indicate issues with the soil, asphalt quality, infiltration from underground galleries, and a range of concepts that go well beyond simple maintenance services.

Below is an example of the flow of data collection and transmission in interaction with the end user:

Figure 2

Data Flowchart.



Source: Own authorship.

Considering that this project was conceived to address two specific problems — the difficulty in communicating urban maintenance issues and low digital literacy in some peripheral regions of the city — the interaction texts that compose the application were formulated intuitively, following the standard of most digital appli-

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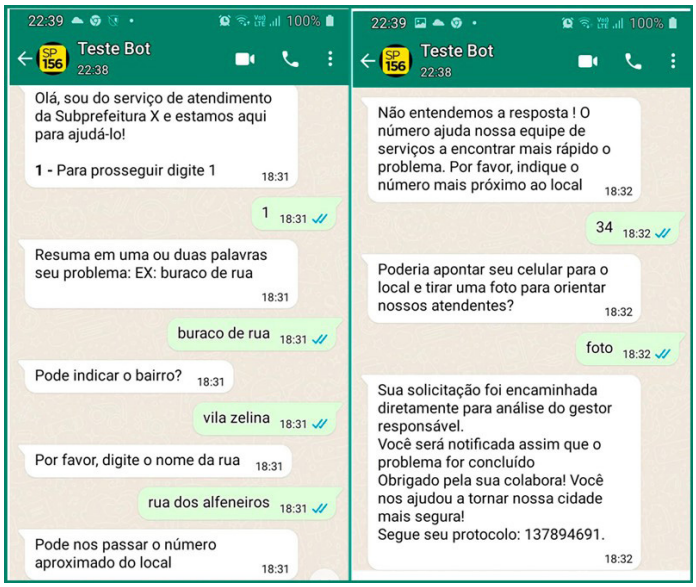
cations. However, it is crucial that these texts be adapted according to specific regional and cultural concepts.

Figure 3

Prototype screenshot.

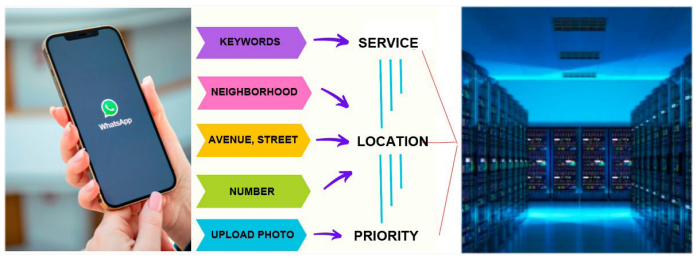


Source: Own authorship.

Short and direct question models were chosen so that the user does not become frustrated with excessive reading and so that the interaction can be completed in just a few minutes, which is exactly the opposite of what currently occurs in the maintenance services area. The simplicity of the "decision tree" and the technology also eliminates the need for relearning if the user decides to reuse the tool.

Figura 4

Prototype Flowchart.



Fonte: autoria própria.

Analysis of Data/Results

Devido a limitações técnicas da ferramenta esDue to technical limitations of the tool chosen for prototyping, the Wizard of Oz (WOz) technique was adopted during the tests. This method allows for emulating the system's intelligence, making participants believe they are interacting with a functional system, while the experimenter acts as a 'proxy' for the system. Specifically, in this project, the WOz technique was used to clean the database after each interaction with the interviewees, as the adopted system was unable to perform this function, and without this step, new data entries would be compromised.

The project was tested by the target audience in two rounds of focus groups consisting of eight people aged between 30 and 70 years. The participants came from the neighborhoods of Guaianases, Itaim Paulista, Sapopemba, Vila Industrial, and Jardim Oratório, all located in the outskirts of the city of São Paulo. Among the eight participants, four have higher education, three have completed high school, and one has only completed elementary school. The group was selected through a non-probabilistic random sample based on availability, and the research was conducted via the Google Meet platform.

The project was evaluated based on the usability concepts defined in ISO 9241-11:

a) Easy to Learn – The user should be able to perform basic tasks on the site or app, even on the first access;

b) Efficient – The user understands the system and can perform tasks quickly without needing to think too much;

c) Effective – After some time, the user can still perform tasks with little or no difficulty;

d) Error Tolerant – If an error occurs, the user can correct it or understand what went wrong and avoid repeating the mistake;

e) Satisfaction – The user does not feel discomfort and has a positive attitude towards using the prototype.

All participants were invited to test the prototype and then completed a questionnaire about their experience with it.

As a general result, without exception, everyone was able to use the prototype on the first attempt, with an average time of two to six

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minutes to complete a service request for maintenance.

The research cycles provided feedback indicating the need to establish deadlines for responses to requests (even if the service has not been completed). Participants also requested that the texts in the prototype be shorter and more direct to make the system's usability faster and more simplified. They suggested adding the phrase "or reference" to the "number" field, as some locations do not have a number. Additionally, they recommended the creation of the role of a "maintenance agent" in the sub-municipalities, who would serve as the interface between the technology and the community.

During the testing process, all five stages of ISO 9241-11 were evaluated satisfactorily by all participants. None of them, not even those who were older and had lower digital literacy, had any issues completing the system usage procedure.

FINAL CONSIDERATIONS

The two focus group studies conducted with the target audience to evaluate the prototype revealed that the simplification concept proved to be very promising for addressing issues of low literacy and also for solving a very complex problem in most large metropolises: communication with society.

The solutions to meet the community's needs do not involve having more technology, but rather the quality of the technology offered. This project demonstrated that the adaptation of a simple technology model, which is already publicly accessible, can be used very efficiently to collect simple data and transform it into a complex mass of information of great utility for public management.

The system proved to be simple and efficient for use by people of various ages and educational levels, overcoming the barrier of digital literacy. Despite the differences in age, education, and social level among the interviewees, all reported having no problems completing a service cycle.

Based on user feedback, the prototype evolved into a second formatting, where the texts became more direct, and a "promise of response" within two days from administration was included, along with a pre-evaluation of the problem to be addressed and an estimated timeframe. Respondents also suggested the incorporation of new audio and video technologies that could be implemented in subsequent testing phases to further enhance communication speed and directness.

The research also highlighted that the population has certain concerns and distrust regarding electronic service delivery. Many users expressed a desire to speak with a representative "as in the past", as this would provide someone to hold accountable for service non-compliance. Previous experiences with robot technology were cited as problematic and inefficient by many respondents, reflecting a broader skepticism towards public administration due to its historical inefficiencies in community service delivery.

Although this project is far from solving the issues of literacy and digital exclusion, which are enormous in Brazil, as well as access to public services, it is a step towards demonstrating that satisfactory e-Gov solutions can be found at low cost, provided that certain principles are respected. These include the use of scientific methodology, citizen participation in development stages, and exhaustive testing of solutions before their actual implementation.

This study was limited to the first phase of data entry, namely from the community to the Data Center of the respective agency. The second part of this study, which involved cross-referencing this data with public databases to enrich the final dataset, was canceled due to the requirement for access to technology and public databases, which became impossible during an election year. Attempts to progress in this study were unsuccessful as the public administration denied all requests for information and access.

The lack of access to identify the technologies used prevents assessing the efficiency in reworking the collected data to generate new and relevant insights. It should also be noted that this project was designed to operate in an ideal environment, without considering the technological disparities among agencies constrained by

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specific budget limits.

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