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Urban Issue Reporting Applications Towards Government 2.0

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Abstract—This study examines the role of civic technology within the Government 2.0 framework in addressing urban challenges, focusing on Na Minha Rua LX, a citizen reporting application in Lisbon. Using a mixed-methods approach combining qualitative comparative analysis with case studies, the research evaluates Na Minha Rua LX alongside SeeClickFix, My City Report, and FixMyStreet. Data from official websites, academic literature, and user feedback were analysed through systematic coding and thematic analysis. Findings indicate that while Na Minha Rua LX effectively facilitates issue reporting and tracking, it lacks advanced features present in other applications. The study explores how integrating CitymisVis, a data visualization tool, could enhance Na Minha Rua LX's functionality. The research concludes that realizing the full potential of such platforms in urban governance requires ongoing evaluation, development, and integration into broader urban management strategies.

Keywords—Government 2.0, Urban Issues, Urban Governance, Civic Technology, Citizen Involvement

I. INTRODUCTION

Urban issues greatly impact the quality of life in cities. These issues present difficult challenges for local governments and range from environmental concerns to deteriorating infrastructure. If left unaddressed, they can lead to decreased citizen satisfaction, inefficient resource allocation, and hindered urban development.

In recent years, civic technology has emerged as a powerful tool in addressing these urban challenges. Civic technology refers to tools, resources, and platforms that empower individuals to interact with their community administrators by sharing concerns, getting involved in city administration processes, and participating in urban governance. This technology is designed to unite citizens and local governments to encourage teamwork in addressing urban challenges.

The concept of Government 2.0 has further transformed this landscape of public administration and citizen engagement. Government 2.0 leverages Web 2.0 technologies, artificial intelligence, and data-driven strategies to enhance governance, improve public services, and foster greater citizen participation [1], [2]. This approach moves beyond traditional e-government services, emphasizing two-way communication, transparency, and collaborative decision-making between citizens and local governments.

Within this context of Government 2.0 and civic technology, urban issue reporting tools have gained prominence. These applications typically allow citizens to report problems in their neighbourhoods, track the status of their reports, and, in some cases, engage in community discussions about local issues. The core functionalities of these tools often include:

- Issue reporting: Allowing citizens to submit descriptions and often photos of urban problems.
- Geolocation: Pinpointing the exact location of reported issues.
- Categorization: Classifying reports into specific issue types for efficient routing.
- Status tracking: Enabling citizens to follow the progress of their reports.
- Communication channel: Facilitating dialogue between citizens and local authorities.

One such initiative is Na Minha Rua LX [3], an application developed by the Lisbon City Council to enable citizens to report various issues related to public spaces. Launched in 2017, the app exemplifies the principles of Government 2.0 by providing an efficient channel for citizens to participate in local governance processes. This study aims to comprehensively analyse the application Na Minha Rua LX, examining its objectives, data sources, and potential impact on urban governance in Lisbon. Furthermore, it compares the application with other civic technology applications, namely SeeClickFix [4], My City Report [5], and FixMyStreet [6], to situate Na Minha Rua LX within the broader context of civic technology initiatives. Finally, it explores how the features of the CitymisVis tool, an advanced data visualization and analysis platform, could be applied to enhance the functionality and impact of Na Minha Rua LX. This exploration will consider how such enhancements align with Government 2.0 principles and could transform Lisbon's urban issue management.

Through this analysis, this paper aims to contribute to the ongoing discourse on the role of civic technology in enhancing urban governance and citizen engagement in the era of Government 2.0, offering insights that may be valuable for other cities seeking to implement or improve similar systems.

II. METHODOLOGY

This study employs a mixed-methods approach, combining Qualitative Comparative Analysis (QCA) [7] with case study research to examine urban issue reporting applications' characteristics, impacts, and potential improvements, focusing on Na Minha Rua LX.

A. Research Question

This research originated from a dissertation project proposed by the Iscte-IUL university in partnership with Lisbon City Council's Urban Management and Intelligence Centre LxDatalab [8]. To further understand the subject, the primary research question guiding this study is: "How does Na Minha Rua LX compare to similar urban issue reporting applications regarding features and potential impact on urban

governance, and what improvements could enhance its effectiveness within the Government 2.0 framework?”

B. Qualitative Comparative Analysis (QCA)

QCA is utilized to systematically compare Na Minha Rua LX with other urban issue reporting applications: SeeClickFix, My City Report, and FixMyStreet. This method allows for a structured comparison of multiple cases, identifying commonalities and differences across various dimensions, such as features, platforms, and user engagement strategies.

C. Case Study Approach

A detailed case study of Na Minha Rua LX complements the QCA, providing an in-depth analysis of its development, implementation, and impact in Lisbon. This approach includes:

- Documentary analysis of official reports, user guidelines, and application documentation, if available.
- Examination of application utilization data and user feedback.
- Analysing the application's functionalities and user interface, if available and not paid for.

D. Data Collection and Analysis

The data was collected from various sources:

- Official websites and documentation of the applications studied.
- Academic literature on civic technology and e-governance.
- User evaluations and feedback from app shops (for mobile apps).

The data analysis process involved:

- Systematic coding of the app's characteristics and particularities.
- Comparative analysis of the main dimensions of all the applications studied.
- Thematic analysis of user feedback and official documentation to identify patterns and key issues.

E. Limitations

This study is limited by the availability of public data on app usage and impact, particularly for newer applications. The analysis relies heavily on publicly available information, which may not capture the full extent of each application's functionality or effects.

F. Ethical Considerations

Since this study mainly uses publicly available data and does not involve direct human participants, the ethical risks are minimal. However, care has been taken to accurately represent the information collected and avoid misrepresenting the applications or their creators.

III. OVERVIEW OF NA MINHA RUA LX

A. High-Level Functionalities of Urban Issue Reporting Tools

Before delving into the specifics of Na Minha Rua LX, it's essential to understand the general functionalities standard to

urban issue reporting tools [11]. These applications typically offer:

- Issue Reporting: A user-friendly interface for citizens to report problems in their urban environment.
- Geolocation: The ability to pinpoint the exact location of reported issues, often using GPS technology.
- Categorization: A system to classify reported issues into specific categories for efficient routing and resolution.
- Photo Upload: Users can attach photos to their reports, providing visual evidence of the issue.
- Status Tracking: A feature allowing users to monitor the progress of their reported issues.
- Communication Channel: A means for citizens and local authorities to communicate about reported issues.
- Data Visualization: Tools to present aggregated data about reported issues, often in map or chart form.

These functionalities collectively aim to streamline, identify, and resolve urban issues while promoting citizen engagement and government transparency.

B. Overview of Na Minha Rua LX

1) Purpose and Objectives

The primary purpose of Na Minha Rua LX is to provide citizens with a platform to report various situations relating to Lisbon public spaces [12]. The app covers urban hygiene, green space problems, street furniture problems, street lighting failures, municipal housing repair needs, and road problems such as abandoned vehicles. By facilitating direct communication between citizens and local authorities, the app aims to improve the efficiency of public services and enhance the overall quality of urban life. Key objectives of the application include:

- Enabling citizen participation in urban management.
- Streamlining the process of reporting public space issues.
- Improving response times to urban problems
- Increasing transparency in local government operations.
- Enhancing data collection for informed decision-making.

2) Data Collection and Utilization

Na Minha Rua LX, supported by LxDataLab, collects a range of data points for each reported incident. Based on the information provided by LxDataLab, these include:

- The Date when the occurrence was created.
- Area of occurrence (e.g., animals in the urban environment, trees and green spaces, roads and cycle paths, urban hygiene, public lighting, pavements, accessibility, sanitation, and public safety and noise).
- Type of occurrence (specific issues within each area).
- Statistical subsection number.
- Parish.
- Longitude and latitude coordinates of the statistical sub-section centroid.

Additionally, through use of the application, it's evident that further data is collected:

- Photos of incidents.
- Free-form text describing the reference point of the issue.
- Detailed description of the incident.

This data is used to forward reports to the appropriate local authority for processing and potential resolution. The information is also published on a public portal, promoting transparency and community awareness.

The collection and analysis of this data align with the goals of LxDataLab, which aims to develop cutting-edge analytical solutions for Lisbon using advanced data analysis and machine learning techniques. This approach seeks to improve various aspects of urban management, including resilience, security, mobility, and emergency management while strengthening urban planning efforts.

IV. COMPARATIVE ANALYSIS

To better understand Na Minha Rua LX's position in the civic technology landscape, we compare it with three other applications: SeeClickFix, My City Report, and FixMyStreet "Table I." These applications were chosen for comparison because they all fall under the category of urban issue reporting apps and share the broad goal of improving urban services through citizen engagement within the framework of Government 2.0.

TABLE I. SUMMARISED DESCRIPTION OF URBAN ISSUE REPORTING APPLICATIONS

Name	Launched by and Date	Purpose and Features and Website
Na Minha Rua LX	Câmara Municipal de Lisboa in 2017, Lisbon	Allows users to report and track resolution on various urban issues. It aims to improve city management through citizen participation and faster issue resolution [3].
SeeClickFix	Ben Berkowitz (independent developer), 2008, United States (expanded internationally)	Enables reporting of non-emergency issues in neighbourhoods. Features include issue tracking, community engagement through comments and voting, and integration with local government systems [4].
My City Report	Ministry of Land, Infrastructure, Transport and Tourism, 2019, Japan	Utilizes smartphone GPS to pinpoint issue locations. It enables users to report problems, add descriptions, and share issues on social media platforms [5].
FixMyStreet	Ministry of Justice, Great Britain, 2007, UK (expanded internationally)	Facilitates citizen reporting and discussion of local issues. Automatically forward reported problems to the appropriate government departments via email [6].

A. Narrative Comparison

The landscape of urban issue reporting applications showcases diverse approaches to citizen engagement and public service improvement. Na Minha Rua LX, developed by the Lisbon City Council, represents a localized solution tailored to the specific needs of Lisbon's citizens. Its integration with local government systems allows for efficient

routing of reports to relevant departments, a feature shared with several other apps in this comparison.

SeeClickFix, one of the pioneers in this field, offers a more extensive platform adopted in multiple countries. Its strength lies in its robust community engagement features, including the ability for users to vote on issues and earn "civic points". This gamification approach, not present in Na Minha Rua LX, could potentially enhance user engagement and participation. SeeClickFix also provides a comprehensive back-end system for local governments to manage and respond to reports, which could offer insights for enhancing Na Minha Rua LX's capabilities in issue management.

My City Report, a more recent entrant developed by the Japanese government, focuses on real-time information provision alongside issue reporting. While Na Minha Rua LX allows for issue tracking, My City Report's emphasis on real-time data could offer insights for enhancing the Lisbon app's capabilities in keeping citizens informed about ongoing urban developments. The app's use of smartphone features like GPS and camera integration for precise issue reporting and documentation could be a valuable addition to Na Minha Rua LX's functionality.

FixMyStreet, launched by the UK Ministry of Justice, shares many similarities with Na Minha Rua LX regarding its core functionality. However, FixMyStreet's feature, which allows public discussion of issues on its platform, presents an exciting avenue for fostering community dialogue that Na Minha Rua LX could consider incorporating. Additionally, FixMyStreet's expansion to multiple countries demonstrates the potential for scaling such platforms, which could be an essential consideration for the future development of Na Minha Rua LX.

Compared to these apps, Na Minha Rua LX holds its ground in the core functionality for reporting and tracking issues. However, there are several areas where it could potentially enhance its features:

- Community engagement: Incorporating voting systems or discussion forums could increase user participation and provide valuable insights to city officials.
- Real-time information: Enhancing real-time data provision, as seen in My City Report, could improve the app's utility for citizens and city officials.
- Gamification: Introducing gamification elements, like SeeClickFix's civic points system, could boost user engagement and participation.
- Public discussion: Implementing a feature for public discussion of issues, similar to FixMyStreet, could foster community dialogue and collective problem-solving.
- Advanced reporting features: Integrating more advanced smartphone capabilities for issue reporting and documentation could enhance the accuracy and detail of submitted reports.

V. CITYMISVIS A TOOL FOR ENHANCED URBAN ISSUE ANALYSIS

A. Overview of CitymisVis

CitymisVis [13] is an innovative tool developed to extend the functionality of citizen reporting applications like his Community. It represents a significant advancement in the analysis and visualization of urban issue data, aligning closely with the principles of Government 2.0 by enhancing data-driven decision-making and citizen engagement.

At its core, CitymisVis is a data analysis and visualization platform designed to process and present the large volumes of data generated by urban issue reporting applications. It employs advanced algorithms and interactive visual interfaces to transform raw data into actionable insights, benefiting city officials and citizens.

B. Key Features of CitymisVis

- **Heatmaps:** CitymisVis uses heatmaps to depict the intensity of requests and complaints at geographical points. This feature enables users to identify and visualize problematic hotspots across the city that may require urgent attention [14].
- **Clustering:** The tool employs density-based spatial clustering (DBSCAN algorithm [14], [15]) to group related issues. This feature helps identify patterns and trends in reported problems, which can be crucial for strategic urban planning.
- **Hierarchical Clustering:** CitymisVis offers a hierarchical greedy clustering algorithm [14] that allows users to visualize sub-clusters within larger clusters. This multi-level view provides a more nuanced understanding of issue distribution across different areas of the city.
- **Zoomable Sunburst Charts:** These interactive charts offer a hierarchical representation of report statistics, allowing users to drill down into specific issue categories and subcategories. This feature provides an intuitive way to understand the relative proportions of different types of problems citizens report [14], [16].

C. Operational Aspects of CitymisVis

CitymisVis operates by integrating with existing urban issue reporting platforms, ingesting the data they generate, and applying its suite of analytical and visualization tools. The system is designed to handle large volumes of data in real time, allowing for up-to-date analysis of urban issues as they are reported.

The tool is typically accessed through a web-based interface, allowing authorized users (such as city officials) to interact with data visualizations directly. It can generate reports and visual representations that can be shared with other stakeholders or even made public to increase transparency in urban governance.

D. Potential Applications for Na Minha Rua LX

Implementing CitymisVis-like features in Na Minha Rua LX could significantly enhance its utility and impact:

- **Enhanced Decision-Making:** City officials could make more informed decisions about resource allocation and prioritization of urban issues by

providing visual representations of issue hotspots and clusters.

- **Improved Logistics Planning:** The clustering features could help optimize the routes of maintenance teams, potentially reducing response times and improving efficiency.
- **Data-Driven Urban Planning:** The ability to visualize trends and patterns in reported issues could inform long-term urban development strategies, aligning closely with Government 2.0 principles of data-driven governance.
- **Increased Citizen Engagement:** Interactive visualizations could make the data more accessible and exciting to citizens, potentially increasing their engagement with the platform and their local community issues.
- **Transparency and Accountability:** By making aggregate data easily viewable through features like zoomable sunburst charts, Na Minha Rua LX could enhance government transparency and accountability.
- **Predictive Analysis:** With sufficient historical data, the clustering and heatmap features could predict future problem areas, allowing for proactive maintenance and issue resolution.

E. Implementation Challenges and Considerations

While the integration of CitymisVis-like features into Na Minha Rua LX offers significant potential benefits, it also presents some challenges:

- **Data Privacy:** Ensuring citizen privacy while providing detailed geographic visualizations of issues would be crucial.
- **System Integration:** Integrating these advanced features with the existing Na Minha Rua LX infrastructure may require significant technical work.
- **User Training:** Both citizens and city officials may need training to use and interpret the new visualization tools effectively.
- **Resource Allocation:** Implementing and maintaining these advanced features would require additional resources, both in terms of technology and personnel.

Despite these challenges, the potential benefits of incorporating CitymisVis-like features into Na Minha Rua LX align strongly with the goals of Government 2.0, potentially transforming it into a more powerful tool for citizen engagement and urban governance.

VI. IMPACT ON URBAN GOVERNANCE

Implementing advanced civic technology applications like Na Minha Rua LX, particularly when enhanced with features similar to those offered by CitymisVis, can significantly impact urban governance within the framework of Government 2.0. While comprehensive studies on the effectiveness of these platforms are still limited, we can identify several potential areas of impact:

- **Improved Citizen Engagement:** These apps increase citizen participation in local governance by providing easy-to-use platforms for reporting urban issues and

visualizing aggregate data. The interactive nature of features like zoomable sunburst charts could further stimulate citizen interest and involvement. This enhanced engagement aligns with the Government 2.0 principle of fostering active citizenship and participatory democracy.

- **Efficient Issue Resolution:** The categorization, geo-tagging, and clustering of reports can lead to faster and more accurate routing of issues to relevant departments. The ability to visualize issue hotspots through heatmaps could help prioritize urgent problems more effectively. This improved efficiency in problem-solving can lead to higher citizen satisfaction and more effective use of municipal resources.
- **Data-driven decision-making:** Accumulating data on urban issues and advanced visualization tools can inform urban planning and resource allocation decisions. This aligns with the Government 2.0 principle of leveraging data for smarter governance. City officials can use these insights to make more informed decisions about long-term urban development strategies and short-term resource allocation.
- **Increased Transparency:** The public availability of reported issues and their visualizations may foster greater trust between citizens and local government. This transparency is a key tenet of the Government 2.0 philosophy. By making data accessible and understandable through tools like CitymisVis, governments can demonstrate their commitment to openness and accountability.
- **Enhanced Accountability:** The ability to track issue resolution and visualize government responsiveness through features like clustering and sunburst charts may put positive pressure on local governments to address problems more promptly. This can lead to improved performance and increased public trust in government institutions.
- **Improved Urban Services:** Over time, the systematic reporting, visualization, and resolution of issues could lead to overall improvements in urban services and infrastructure. By identifying recurring problems and patterns, city officials can implement more effective long-term solutions rather than just addressing individual complaints.
- **Predictive Governance:** With sufficient historical data and advanced analysis tools, local governments could move towards more predictive and proactive governance models, addressing issues before they become significant problems. This shift from reactive to proactive governance represents a substantial advancement in urban management.
- **Bridging the Digital Divide:** While these technologies offer numerous benefits, it's crucial to consider their potential to exacerbate existing digital divides. Efforts must ensure equitable access to these platforms across all demographics to prevent the underrepresentation of specific communities in the data collected.

- **Data Privacy and Security:** As these platforms become more sophisticated and data-driven, addressing the challenges and ethical implications of data privacy and security becomes increasingly important. Striking a balance between transparency and privacy protection is crucial for maintaining public trust.
- **Evolving Role of City Officials:** Implementing these advanced tools may require a shift in city officials' skill sets and roles. There may be a growing need for data literacy and analytical skills among government employees to utilize these tools effectively.

While the potential impacts are significant, it's important to note that the actual effects may vary depending on factors such as the level of adoption by citizens, the responsiveness of local government to reported issues, the integration of these platforms with existing government systems, and the digital literacy of the population.

As we move further into the era of Government 2.0, platforms like Na Minha Rua LX and tools like CitymisVis represent a significant step towards more participatory, transparent, and data-driven urban governance. However, their full potential can only be realized through ongoing evaluation, development, and thoughtful integration into broader urban management strategies.

VII. CONCLUSION

Na Minha Rua LX, along with similar platforms like SeeClickFix, My City Report, and FixMyStreet, represents a significant advancement in leveraging civic technology to enhance urban governance in the era of Government 2.0. These applications provide citizens with platforms to report various urban issues, improving communication between residents and local authorities, streamlining public services, and fostering greater civic engagement.

Our comparative analysis reveals that while these platforms share common goals, they have unique features and approaches. Na Minha Rua LX stands out for its direct integration with Lisbon's city government systems, providing a tailored solution for its needs. However, the analysis also highlights potential areas for improvement, such as incorporating more extensive community engagement features, enhancing real-time information provision, and integrating with social media platforms.

The exploration of the CitymisVis tool reveals exciting possibilities for enhancing urban issue reporting and analysis platforms. Features such as heatmaps, clustering algorithms, and interactive data visualizations could significantly improve the ability of both citizens and city officials to understand and address urban issues effectively. Implementing such features in Na Minha Rua LX could transform it into a more powerful tool for citizen engagement and data-driven urban governance, aligning closely with Government 2.0 principles.

However, the lack of formal impact studies and comprehensive data on these platforms' effects highlights significant areas for future research. These gaps underscore the need for rigorous evaluation and better integrating the apps' data into decision-making processes.

Looking forward, several recommendations emerge:

- Conduct comprehensive impact studies to quantify the effectiveness of these platforms and identify areas for improvement.
- Develop strategies to integrate the apps' data more effectively into policy-making processes, leveraging advanced analysis and visualization techniques.
- Invest in features that enhance community engagement and collective problem-solving, drawing inspiration from successful elements of other platforms.
- Explore implementing advanced data analysis and visualization tools, such as those offered by CitymisVis, to enhance the platform's utility for both citizens and city officials.
- Address potential issues of digital divide and data bias to ensure equitable representation and service delivery.
- Implement regular user feedback mechanisms to improve the apps' functionality and impact continuously.
- Consider the challenges and ethical implications of data privacy and security as these platforms become more sophisticated and data-driven.

As cities worldwide continue to explore the possibilities of civic technology in the context of Government 2.0, the experiences and challenges of platforms like Na Minha Rua LX offer valuable lessons for the future of urban governance in the digital age. The potential integration of advanced features like those provided by CitymisVis represents an exciting next step in this evolution, potentially transforming how we understand and address urban issues in the 21st century.

The future of urban issue reporting tools lies in their ability to facilitate problem reporting and foster a sense of community ownership and engagement in urban governance. As these tools evolve, they have the potential to create more resilient, responsive, and citizen-centric cities. However, this potential can only be fully realized through ongoing collaboration between citizens, government officials, and technology developers, ensuring that these tools genuinely serve the needs of all urban stakeholders.

In conclusion, while Na Minha Rua LX and similar platforms show great promise as tools for enhancing urban governance through citizen engagement, realizing their full potential will require ongoing evaluation, development, and thoughtful integration into broader urban management strategies. As we move forward, it will be crucial to balance the drive for technological innovation with the fundamental principles of inclusive governance, ensuring that our future smart cities are efficient, equitable, and truly responsive to the needs of all citizens.

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