

PARTICIPATORY BUDGETING PLATFORM

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Abstract

The proposed project aims to revolutionize civic engagement by designing an inclusive initiative that actively involves citizens in the budgeting process. This undertaking seeks to explore inventive methods for soliciting public input and preferences, particularly in the allocation of public funds. Emphasizing transparency and community involvement in decision-making, the project strives to redefine traditional budgeting processes. By leveraging innovative approaches, such as user-friendly applications and surveys, the goal is to create a participatory framework that empowers citizens to play a pivotal role in shaping the allocation of public funds. This initiative not only fosters a sense of transparency but also establishes a foundation for a more responsive and community-driven decision-making process. Through these efforts, the project aims to enhance the overall quality of public governance and contribute to the establishment of a more inclusive and citizen-centric budgeting paradigm.

The research findings underscore strategic approaches to motivate citizens, such as symbolic rewards, ultimately contributing to enhanced quality of life, community building, and improved budgetary decision-making, as evidenced by the survey results.

Keywords: Paricipatoty budgeting, Community engagement, Public funds allocation, Quality of life, Budgetary decision-making, Transparency

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1 Introduction

1.1 Participatory Budgeting

In recent years, there has been a growing recognition of the importance of citizen engagement in shaping public policies and influencing the allocation of resources. As communities strive for greater transparency and inclusivity in their governance structures. Hoyong Jung et al [16] emphasized the importance of budget transparency, while Yves Sintomer et al [23] explored transnational models of citizen participation, focusing on the case of participatory budgeting. The need for innovative approaches to involve citizens in the decision-making process becomes paramount. Further emphasizes this. Acknowledging the significance of this participatory approach, it is evident that involving the public in decision-making processes [2, 19] is not just a democratic ideal but a practical necessity. One such endeavor is the design of a project that actively engages citizens in the budgeting process, aiming to foster a sense of community ownership and empower individuals to contribute to the allocation of public funds.

This report embarks on the design of a project aimed at actively engaging citizens in the budgeting process, drawing inspiration from global best practices outlined in publications [21, 8, 26]. It also explores new and creative ways to get your thoughts on budget matters. We want to uncover smart strategies that make the process more open, hold decision-makers accountable, and give you a real say in how your community's money is spent.

Furthermore, insights from the National League of Cities' report on [5] underscore the ongoing relevance of community involvement in addressing fiscal challenges. Against this backdrop, the project seeks to not only promote transparency but also empower communities to actively contribute to the allocation of public funds, fostering a sense of ownership and informed decision-making.

Additionally, we're living in a time where involving the public in important decisions is becoming more and more important. Our project aims to tap into the collective wisdom of the community to make budget decisions smarter. In this report, we'll look at the ins and outs of creating a budget process where your opinions matter. We'll talk about the good things that can come from this, the challenges we might face, and the best ways to make it work. The goal is to add to the ongoing conversation about how communities and their governments can work together in a way that truly reflects what people want and need.

1.2 Infrastructure issues

Addressing infrastructure challenges in a community involves a systematic approach to identify, prioritize, and resolve issues that impact the well-being of its residents. To initiate this process, a comprehensive assessment should be conducted, delving into areas such as transportation, utilities, and public facilities. Moreover,

prioritizing needs based on urgency and community impact is crucial, and seeking input from local authorities, community leaders, and residents ensures a well-rounded perspective.

In his work, Brian W. Head[14] emphasizes the critical examination of community engagement, emphasizing the importance of methods such as town hall meetings and surveys for informing and garnering support. Financial planning is also paramount, exploring various funding options and establishing a realistic budget for implementation. Collaborating with local authorities and utilities streamlines the regulatory process and maximizes available resources. Sustainable solutions should be considered; emphasizing environmental responsibility and long-term resilience is vital. Engaging professional expertise in design and engineering ensures projects meet safety standards and community needs.

Furthermore, implementation requires meticulous project management, including timelines and milestones. Continuous monitoring and evaluation, coupled with transparent communication, allow for adjustments and improvements based on community feedback. Additionally, addressing infrastructure challenges is a collaborative effort, requiring a community-centric approach for lasting impact.

1.3 Motivation

In the initial stages of our project, we explored various ideas related to public services, ultimately choosing to focus on citizen engagement in government budgeting. This concept captivated our team, prompting us to develop a user-friendly prototype application. Our approach involves the government initiating projects, researching best practices, and gathering public input. After creating a draft budget, we share it with the public for feedback and revisions before approval. Once approved, the project is implemented, followed by a thorough evaluation. Our goal is to empower citizens to actively contribute to budget decisions, fostering transparency and a stronger connection between the community and government. We are excited about the potential of this initiative to redefine governance dynamics and create a more responsive approach to public service.

1.4 Objectives

Our seminar aims to create a prototype for a participatory budgeting application, that involves both citizens and the government. Through different methods like online surveys, project websites, mobile apps, scheduling public meetings, and developing educational materials, we're diving into the best practices to ensure easy interaction between citizens and the government. The app's primary objective is to provide citizens with an easy interface, encouraging their active participation in the budgeting process. This means they can play a role in budget decisions from the beginning of the project and when they notice any improvements or issues in government projects. To keep citizens engaged consistently, we're introducing a reward system, setting us apart by prioritizing user experience and motivation through

incentives for citizen involvement.

2 Background

2.1 Definitions

2.1.1 Public participation

Public participation means getting regular people involved in decisions that affect the community, like sharing their thoughts on projects or policies through meetings, surveys, or online discussions. It's important because it makes sure everyone's voices are heard, leading to better decisions that consider the needs of the whole community. As outlined by Arnstein's [3], involves actively engaging regular people in community decisions through methods such as meetings, surveys, and online discussions. Pretty and Ward's [20] exploration of social capital and the environment also reinforces the idea that involving citizens in decision-making processes enhances community well-being. In the context of the budgeting project, public participation is about giving citizens a say in how public money is spent, making the process fairer and more inclusive. By actively involving citizens, you're not only promoting fairness but also building a stronger community where people feel their opinions matter in shaping the place they live in.

2.2 Community Engagement

Redefining Community Engagement in Smart Cities: Design Patterns for a Smart Engagement Ecosystem

Community engagement [6] means working together with people in a community to make decisions, solve problems, and improve the neighborhood [7] (Cornwall Jewkes, 1995). It involves everyone's input, encourages open communication, and helps build a stronger, more connected community where everyone has a say in shaping the future. This collaborative process also focuses on sharing information, respecting different cultures and perspectives, empowering individuals and groups but also strives to create opportunities for community members to come together in various ways—whether through events, online platforms, or grassroots initiatives. It is a dynamic and inclusive approach that aims to build trust, enhance civic pride, and establish a sense of shared responsibility among community members for the overall well-being and development of their neighborhood whether in physical or virtual spaces.

Here are some examples of countries that implemented the budgeting process. In the late 1980s, the city of Porto Alegre in Brazil [24], [12] pioneered participatory budgeting, engaging citizens in municipal decision-making. Residents actively participated in assemblies, deliberating on the allocation of a significant portion of the budget towards projects ranging from infrastructure to social services.

Across the Atlantic, Paris [10], France, embraced participatory budgeting to empower residents to decide the fate of a portion of the city's budget. Through rounds of idea submission and voting, citizens influence decisions related to public spaces, transportation, and local initiatives.

In the diverse landscape of New York City[25], USA, various districts experimented with participatory budgeting. Community members proposed and voted on projects, shaping their neighborhoods with projects funded directly from the city budget.

Reykjavik, Iceland, introduced participatory budgeting to engage citizens in local decision-making. The process allows residents to propose projects related to infrastructure, services, and community development, with the final decisions made through a collective voting process.

Madrid, Spain[11], embraced participatory budgeting as a means to enhance citizen engagement in local governance. Here, residents propose and vote on projects spanning culture, urban development, and public services, directly influencing how a portion of the city's budget is allocated.

Across the Atlantic once again, in Toronto, Canada, specific districts like Ward 2 and Ward 6 implemented participatory budgeting initiatives. Community members propose, review, and vote on projects, with winning initiatives receiving funding and residents actively shaping the allocation of resources in their neighborhoods.

These diverse examples underscore the global significance of participatory budgeting as a democratic tool, empowering citizens to actively contribute to the decision-making process and shape the priorities and development of their communities.

2.3 The role of citizens in “Participatory Budgeting”

The role of citizens in Participatory Budgeting (PB) is central to the democratic and inclusive nature of this decision-making process. PB is a model that allows citizens to actively engage in determining how a portion of the public budget is allocated, as outlined in a guide by Brian Wampler et al [26] for understanding and implementing PB. Anwar Shah et al [22] contribute foundational concepts to the field, while Haris Aziz et al [4] delve into various models and approaches of PB. Citizens contribute by generating project proposals that address the diverse needs of the community, covering areas such as infrastructure, public services, and community development.

In essence, PB is a model designed to harness the collective intelligence and input of citizens. This involvement becomes pivotal in influencing municipal decisions, offering tangible solutions to the challenges faced by our communities. PB serves as a framework, not confined to singular disciplines but extending across various sectors such as infrastructure, public services, and community development.

However, the true essence of PB lies not solely in its individual components but in the orchestration of an administration that seamlessly integrates technology to

foster a meaningful collaboration between the municipality and its citizens.

Sustaining the effectiveness of PB necessitates the active participation of citizens. It becomes a dynamic process through which governments can adapt to evolving situations, implementing changes that directly benefit the public. Building a robust relationship between citizens and municipalities becomes paramount to ensuring the quality and responsiveness of PB initiatives. This involves tangible actions that fortify these relationships, recognizing citizens as invaluable sources of information.

In recognizing citizens as custodians of essential information, the implementation of methods becomes imperative to extract this wealth of insights. The interaction between citizens and the government in the context of PB must align with the principles of smart cities, employing technological means to facilitate engagement. This includes both advanced technological interactions and traditional, direct engagements between citizens and the government to discuss pertinent problems.

Diverse methods can be employed to extract information from citizens within the context of PB:

Consultation: An essential method addressing specific budgetary issues, offering a valuable channel for feedback.

Electronic Consultation: Citizens communicate via electronic means, requiring timely feedback to sustain ongoing engagement.

Participatory Platforms: Dedicated websites providing citizens with information on budgetary agendas, services, and organizations, with integrated electronic consultation.

Polling: A method to measure the success of budgetary solutions and gauge citizen satisfaction or dissatisfaction, providing insights into their preferences.

Community Forums: Online platforms enabling citizens to start discussions and share opinions on budget-related topics.

Citizen Initiative: A formal avenue, such as petitions, allowing citizens to make specific budget-related requests addressed to government officials.

The underlying message underscores the need to broaden the focus of PB initiatives beyond mere government involvement to encompass community participation. Information technology serves as a conduit for both facets, showcasing tools that empower citizens to influence budgetary decisions collectively. The success of PB lies not only in the engagement of citizens but in the collaborative efforts of a community united in steering the direction of local development through informed and participatory budgeting.

3 Related Work

In this section aims to contextualize our project within the existing landscape of citizen engagement in budgeting processes. It's important to know what others have researched and done in the real world. This helps us see where there might be things missing, learn from what has worked well, and add valuable information to this area of study.

3.1 Porto Alegre - Brazil

Participatory Budgeting (PB) originated in the 1980s with the Brazilian Workers' Party (PT), aiming to establish a more participatory form of democracy beyond just winning elections. The first complete PB process was implemented in Porto Alegre in 1989. Porto Alegre [24], [12], a bustling city with a population of 1.2 million, became a model for other municipalities. By 2001, over 100 cities in Brazil had adopted PB, and by 2015, variations of PB had spread globally. In Brazil, the political landscape was shaped by the 1988 Constitution, seeking to prevent a return to authoritarian rule. Brazil's political structure, influenced by patrimonial capitalism, led to a separation between the state and civil society, fostering clientelism. In 1989, Porto Alegre's Mayor Olívio Dutra institutionalized the PT's organizational structure citywide, giving birth to participatory budgeting. While active in Porto Alegre until 2017, recent leaders have diminished political support, leading to the suspension of the PB process.

However, in certain regions of Brazil, challenges in implementing PB arise due to factors such as socio-economic inequalities, political resistance, limited resources, insufficient citizen education, weak civil society engagement, economic constraints, and cultural influences. These challenges can impact the effectiveness of PB initiatives, highlighting the need for tailored approaches that address specific contextual issues and promote inclusive decision-making processes. Learning from both successful and less successful cases is crucial to refining and enhancing future implementations of PB across the country.

3.2 Lausanne - Switzerland

Lausanne[15] initiated Switzerland's [17] first city-wide Participatory Budgeting (PB) project in 2019, supported by three-year funding from the Swiss Confederation. The goal is to involve citizens in choosing projects for their neighborhoods, fostering social ties and civic engagement. Inspired by Porto Alegre, Brazil, the PB adds a democratic tool to Switzerland's system, allowing local inhabitants to participate in decision-making. Lausanne's socialist-led municipality, starting the PB in 2019, has fostered collaboration with neighborhood associations. Despite disruptions from the COVID-19 pandemic, the PB received 26 project submissions in 2020, promoting engagement through internet and door-to-door outreach. Specific associations, along with city support, assist in promoting and implementing citizens' projects. The

PB operates on a budget, with citizens voting for projects, each eligible for up to 20,000 CHF. Transparency is emphasized, and citizens take responsibility for project implementation. Despite ongoing evaluation, positive feedback and increased participation suggest the project's appeal and potential for replication in other Swiss cities. Lausanne has also launched the Participatory Budget 2023 website[1]. The analysis considers aspects such as inclusion, popular control, transparency, efficiency, and transferability, highlighting the PB's unique features and its impact on citizens' engagement and local governance.

3.3 Aarau - Switzerland

Expanding the narrative of participatory budgeting in Switzerland, the town of Aarau adds a distinctive layer to the country's democratic landscape. Unlike other Swiss municipalities, Aarau mandates residents to participate in referendums on budget items exceeding CHF 6 million, fostering a robust culture of direct involvement in financial decisions. While successful financial vetoes are infrequent, the mere existence of the referendum influences decision-makers to act more sensibly, promoting careful expenditure. The parallels with the participatory budgeting project in Lausanne highlight the nation's commitment to incorporating citizens into the decision-making process, albeit through different mechanisms. In Aarau, residents actively exercise their right to intervene in political decisions, showcasing Switzerland's dedication to democratic ideals and community engagement at various levels of governance.

However, Thomas Samuel Wellings et al [27] introduce a data-driven approach to help Aarau's city policymakers allocate public funds effectively, addressing the lack of data-driven evidence in budgeting. The approach includes a legitimacy metric to optimize decision-making and a classification model to guide policymakers on factors influencing citizens' quality of life, aiming to enhance direct democracy practices in Switzerland and provide a global policy-making blueprint.

4 Implementation/methods

4.1 Survey - Participatory budgeting

In the process of developing a project to involve citizens in budgeting decisions, we are taking an inventive approach to systematically collect input and preferences from the public. Our focus is on exploring creative methods to understand how public funds can be allocated to address societal issues. The ultimate goal is to enhance transparency and encourage community participation in decision-making. To understand the perspectives, motivations, and preferences of the public, we have carefully crafted a survey. This survey aims to be a valuable tool in decoding nuanced insights, contributing to the creation of a more inclusive and citizen-centric budgeting framework.

4.1.1 Survey review

In our survey, we focus on participants' understanding of certain concepts, such as "How crucial budgeting decisions are" and ask them a series of questions to delve into participants' perspectives on topics such as the transparency of local government in fund allocation, the importance of public awareness regarding decisions of budget, and the level of interest among the public in participating in budgeting decisions. This section will cover the survey introduction and results of our survey.

4.1.2 Survey Participants

We conducted a survey with 34 participants across various age groups. Of the respondents, 61% were between the ages of 18 and 35, while 39% fell within the 35 to 65 age range. There were no participants younger than 18 years and 60 years. The majority of respondents, around 25-35 years old, were classmates to whom we primarily distributed the survey. Our target audience included individuals from all age groups interested in participating in government budget allocation and providing input on budget-related projects.

4.2 Web Application Augmented-Reality App

A mobile app prototype was chosen since a phone is always carried around and it can be easily used to take pictures to signal problems found or possible improvements that could be made.

4.2.1 Use case diagram

In the use case diagram, we can see that the user has the roles of citizen, as well as an administrative side (the municipality). To describe the actions, we will start by explaining from the citizens' perspective. Citizen has the option to do following actions:

1. Login

The user can log in on the welcoming page, which gives him/her the possibility to interact with the municipality, as well as the other users (citizens) of the application.

2. View Dashboard

When the user is logged in, he/she is redirected to the dashboard of all the latest news reports of the city. The dashboard could be sorted by date, relevance (how many times has the report been visited, votes (the articles have an option to be voted up/down), and location. This keeps the user up to date with the new updates on his/her surrounding environment.

3. Debates

Any Citizen can open debates on any subject, creating a post where people can discuss the proposed topic. Debates are accessible by every citizen, to highlight the most important issues.

4. Proposals

A page for everyone to create proposals and seek supports. Proposals which reach to enough supports will be voted and so, together we can decide the issues that matter to us

5. Voting

After successfully receiving support from citizens, the project is forwarded to the municipality for evaluation and feasibility analysis.

6. Participatory budgeting

After the budget is allocated for citizen projects, the platform s allow citizens to propose and decide directly how to spend part of the budget, with monitoring and evaluation of proposals by the institution. Maximum effectiveness and control with satisfaction for everyone.

7. Logout

After the user has finished with his/her activities on the application, he/she can log out of the app.

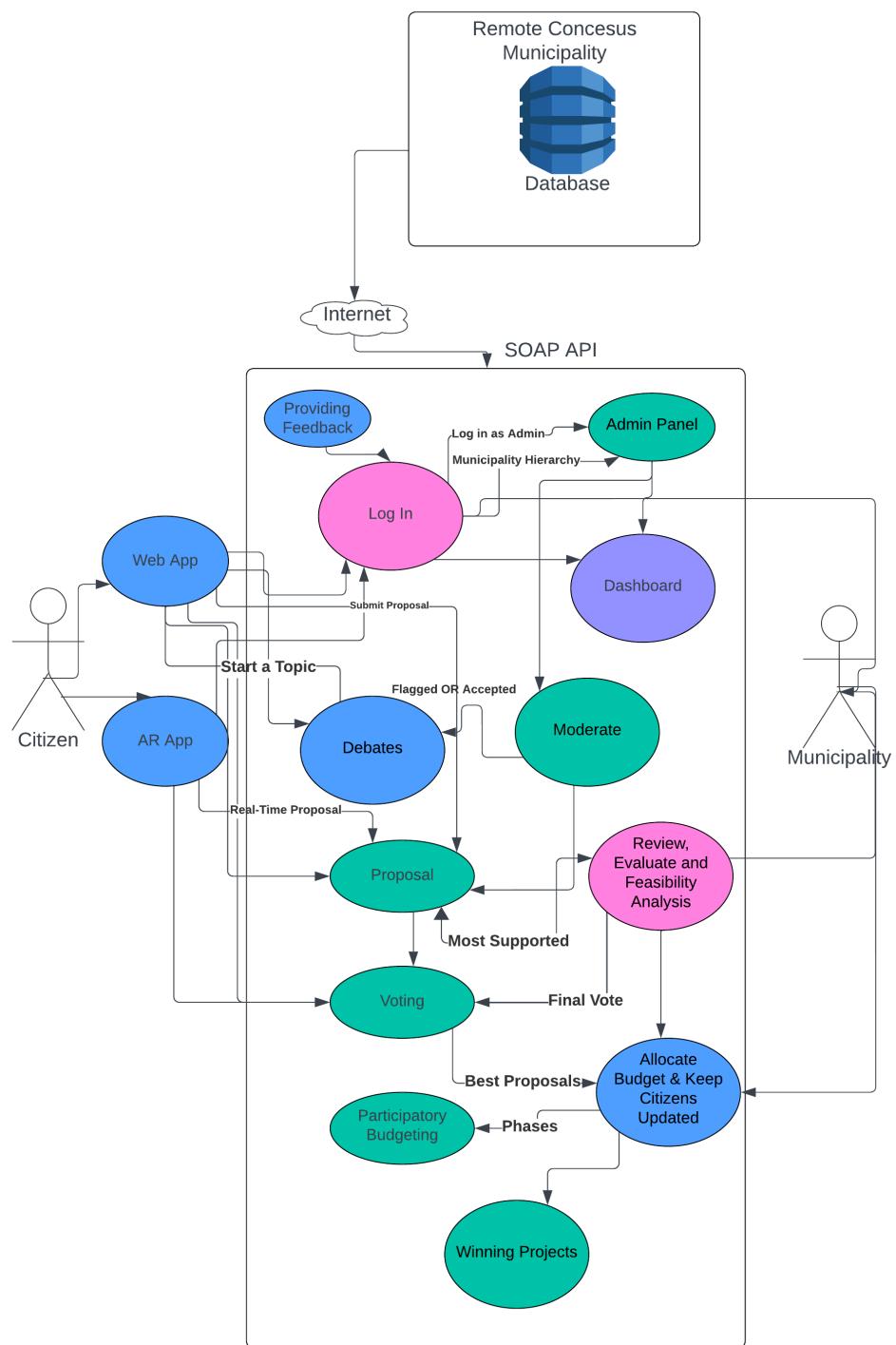


Figure 1: Use case diagram

5 Results

5.1 Survey results

As the survey was distributed online to Swiss residents, we aimed to identify their canton of residence. The majority of responses came from the canton of Bern, accounting for 28%, followed by Zurich with 25%, and Fribourg with 10%. Among the total submissions, 73% expressed a belief that citizens should have a say in how public funds are allocated, while only 26% disagreed with the idea. Additionally, 50% of respondents indicated the highest level of interest, rating it as 5, in involving citizens in the budgeting process and seeking public input on fund allocation. Another 38% rated their interest as 4, and 0% of respondents gave a rating of 0. This high level of interest suggests a strong wish among people to actively participate in public fund allocation, indicating the potential for project quality improvement with minimal funds. This highlights a promising method for enhancing community engagement in budgeting processes.

In response to the question, "How important is it to you that the budgeting process for public funds is transparent and easily accessible to the public?" depicted in Figure: 2, 30% of people consider it extremely important, 41% rated it as very important, 29% found it somewhat important, and 0% people are feeling it is not so important or not at all important.

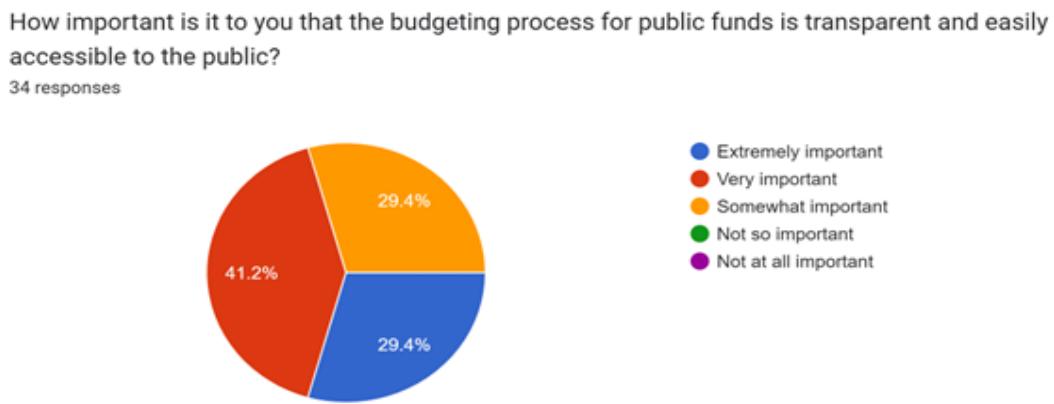


Figure 2: Importance of transparent public funds

In response to the question about "how often participants feel informed about government allocation of public funds?", the survey revealed that 38% feel informed 'rarely,' followed by 32% 'occasionally,' then 14% voted as 'never,' 9% with 'frequently,' and 5% are voted with 'very frequently.' These findings are visually represented in Figure: 3.

When we ask about "satisfaction levels regarding community involvement in local budgeting decisions", 40% expressed dissatisfaction which is a rating of 2, 35%

reported moderate satisfaction (rating 3), 6% indicated high satisfaction that is a rating of 5, and 3% gave a rating of 4. Figure: 4 illustrates these satisfaction levels. Notably, 73% of participants believe that citizens should be actively engaged in the allocation of public funds.

Exploring the areas participants feel the government should prioritize in allocating public funds, most of them answered including health, education, and other answers are transportation, infrastructure improvements, public safety, and childcare services. Additionally, participants provided valuable insights on how local governments or project organizers can enhance citizen involvement, emphasizing the importance of building trust, providing regular updates, promoting transparency through public meetings, creating user-friendly apps, utilizing newspapers and communication channels, and even considering incentive-based rewards for participation. The answers to this question are helpful for the government to understand how important it is to involve the public in budgeting and gain their trust.

How frequently do you feel informed about how your local government allocates public funds?

34 responses

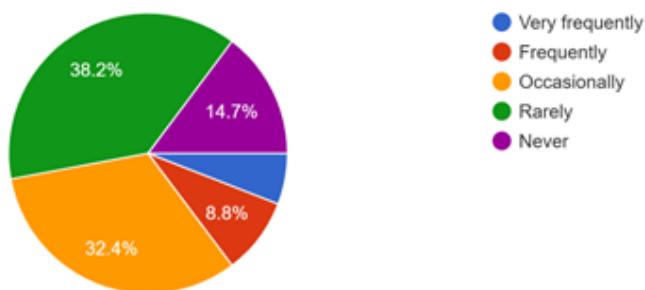


Figure 3: Frequency of informing the public about government public funds

How satisfied are you with the current level of community involvement in budgeting decisions in your local area?

34 responses

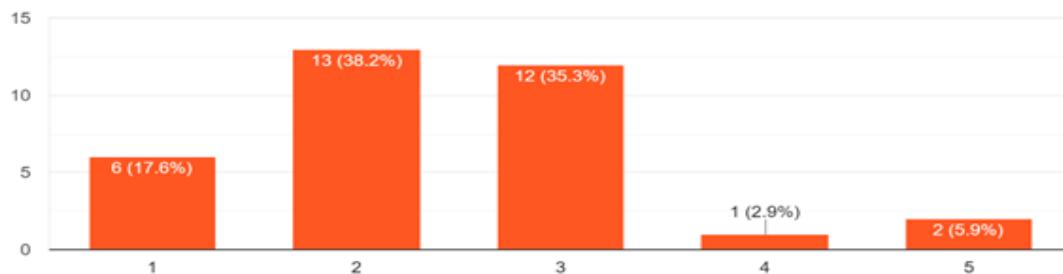


Figure 4: Satisfaction with current government about budget decisions

5.2 Survey conclusion

Based on the comprehensive survey conducted, it is evident that there is a notable interest and belief among participants in actively involving citizens in the budgeting process. The majority expressed a desire for transparent and accessible information regarding government allocation of public funds. Dissatisfaction was observed in the perceived frequency of the government informing citizens about fund allocation. Despite this, a significant portion of participants emphasized the importance of community involvement in local budgeting decisions. Areas such as health and education were commonly identified as priorities for fund allocation. Furthermore, participants offered valuable suggestions for enhancing citizen participation, underscoring the significance of trust-building, regular updates, transparency, and the use of various communication channels. Overall, the findings underscore a collective aspiration for a more inclusive and transparent approach to budgeting, aligning with the belief that citizens should play an active role in shaping public fund allocation.

5.3 App prototype

Utilizing the insights garnered from our research and surveys, we have embarked on creating a comprehensive platform that integrates with the Consul Democracy open-source participatory budgeting system[9]. Our initiative includes the enhancement of the existing platform, aligning it meticulously with user feedback to refine its functionality and user engagement. In addition, we have developed an Android application that employs augmented reality (AR) to gamify the user experience. It is designed to facilitate and encourage daily communication between citizens and the municipality. By allowing users to report and visualize improvements or issues in their city environment through an immersive AR interface, we aim to foster a more interactive and engaging process of civic participation.

5.3.1 Login

The application provides a secure login screen, enabling citizens to sign in with their email or create a new account. Users not logged in can view the dashboard, but registration and verification are required for full interaction, including voting, suggesting initiatives, and starting discussions. Additionally, the platform supports various user levels, providing tailored access and capabilities.

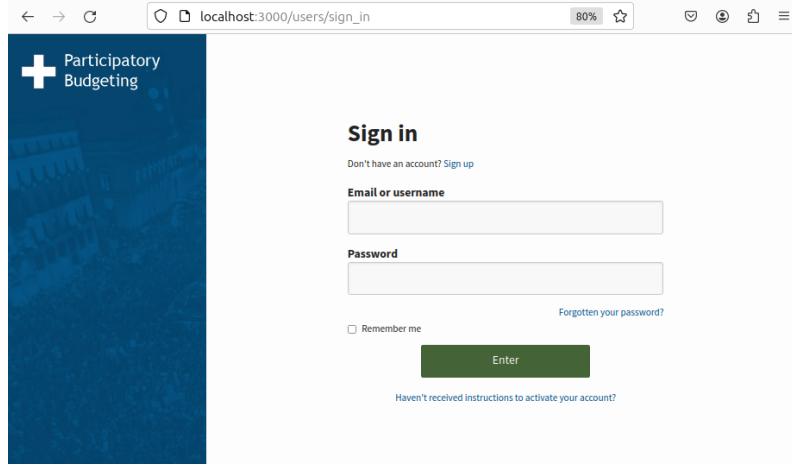


Figure 5: Login Screen

5.3.2 Dashboard

After successful login, users are redirected to the main dashboard of the Participatory Budgeting Platform, with four easily accessible menus and account preferences. Additionally, there exists an administrative panel that offers several functionalities and administrative options that are assigned to the user's level of access. Municipal administrators possess specific privileges and capabilities. The first menu is about debates, where users can submit and refine their ideas. The second menu allows users to submit their proposal suggestions. Proposals that have garnered sufficient support are displayed on a separate menu for first voting. This menu is specifically dedicated to voting and comes before the municipality evaluates the proposals. The chosen projects advance to the final round of voting in order to be picked as the winners. Additionally, there is a short survey for final voting that may be used to gather valuable data regarding these projects.

Figure 6: Dashboard

5.3.3 Features

A successful proposal can be realized by achieving the following steps

1. Debates

Anyone can open threads on any subject they wish to address, creating separate topics where people can discuss the proposed issue. Debates are open to everyone, allowing individuals to join and contribute their thoughts, thereby highlighting the most important issues.

The screenshot shows a web browser window for 'localhost:3000/debates/new'. The header features a red bar with a white cross icon and the text 'Participatory Budgeting'. Below the header, there are navigation links: 'Debates', 'Proposals', 'Voting', and 'Participatory budgeting'. A backlink '[Debates](#)' is present. The main content area has a dark blue header with the text 'Start a debate' and a small icon. Below this is a section titled 'Recommendations for creating a debate' with several bullet points. A 'REQUIRED FIELDS' section contains a 'Debate title' input field. To the right, there is an 'OPTIONAL FIELDS' section with a 'Topics' dropdown, a 'Location' map, and a checkbox for 'Agree to the Privacy Policy and the Terms and conditions of use'. A green 'Start a debate' button is at the bottom.

Figure 7: Debates

2. Proposals

A platform for every citizen to submit their proposals and seek support from others. Proposals that reach enough support will be put to a vote, enabling us to collectively decide on the issues that matter and enhance the community we live in.

The screenshot shows a web browser window for 'localhost:3000/proposals/new'. The header features a red bar with a white cross icon and the text 'Participatory Budgeting'. Below the header, there are navigation links: 'Debates', 'Proposals', 'Voting', and 'Participatory budgeting'. A backlink '[Proposals](#)' is present. The main content area has a dark blue header with the text 'Create new proposal' and a small icon. Below this is a section titled 'Recommendations for creating a proposal' with several bullet points. A 'REQUIRED FIELDS' section contains a 'Proposal title' input field and a 'Proposal summary' input field with a note '(maximum 200 characters)'. A 'Proposal text' input field with a rich text editor toolbar follows. To the right, there is an 'OPTIONAL FIELDS' section with a 'External video URL' input field and a 'Descriptive image' input field. A green 'Create proposal' button is at the bottom.

Figure 8: Create Proposal

The figure consists of two screenshots of a web-based participatory budgeting platform.

Top Screenshot: Proposal Creation Page

- Left Panel:** A sidebar with "Documents" and "Scope of operation" sections. "Scope of operation" is set to "All city".
- Map Location:** A map of Bern, Switzerland, with a blue marker indicating the location.
- Tags and Categories:** A grid of Sustainable Development Goals (SDGs) numbered 1 to 17, each with a corresponding icon.
- Bottom Panel:** A checkbox for agreeing to the Privacy Policy and Terms of Use, followed by a "Create proposal" button.

Bottom Screenshot: Proposal Details Page

- Header:** "PROPOSALS" and "Participatory Budgeting".
- Left Column:** "Community Learning" proposal by "admin" (2023-11-21). It shows 6 supports needed (6/100%), a summary, and a large image of a modern learning space.
- Middle Column:** "Sample Proposal" by "admin" (2023-11-24). It shows 4 supports needed (4/100%), a summary, and a large image of a modern learning space.
- Right Column:** "AUTHOR" section for "admin", showing 0% support needed. It includes a "Dashboard" button and social sharing links for Twitter and Facebook.
- Bottom Right:** "SUPPORTS" section showing 0% support needed for the "Community Learning" proposal, with a "Support" button.
- Bottom Left:** "SHARE" section with social sharing links for Twitter and Facebook.
- Bottom Center:** "FOLLOW" section with a "Follow citizen proposal" button.
- Bottom Right:** "COMMUNITY" section with a "Participate in the user community of this proposal" link.

Figure 9: Proposal Details

3. Voting

The voting system facilitates citizen proposals and institutional inquiries. Everyone can easily decide on key issues using their phones or the platform. After successful voting, projects are forwarded to municipal evaluators for a final vote.

All city



Sample Proposal for a Community Learning & Innovation Hub Near the University of

- Strategic plan for a 100% green city
- Strategic plan for a 100% green city
- The right to play: for a more child-friendly city
- Do you consider it necessary to remodel the square?
- Which of the two finalist projects do you prefer to be carried out?

Participate in this poll

Help with voting

Citizens' polls are a participatory mechanism by which citizens with voting rights can make direct decisions

Figure 10: Participate in the Poll

4. Participatory budgeting

Participatory budgets allows citizens to directly decide how to allocate a portion of the budget. They can engage in various polls to vote on the projects they wish to see implemented. This process includes thorough monitoring and evaluation of proposals by the institution, ensuring effectiveness, control, and satisfaction for everyone.



Figure 11: Participatory Budgeting phases

5. AR Reality App

Our app gamifies the process, engaging citizens through Augmented Reality (AR) that allows interactive marking of locations and proposing improvements directly tied to sustainable development categories. By integrating the Sustainable Development Goals (SDGs) framework[18], users can categorize their proposals to address specific community needs.

5.3.4 Functionality

- **AR Location Marking:** Users can visually mark and view exact locations using AR, enhancing the accuracy and context of each proposal.
- **Sustainable Development Categories:** A swipeable interface lets users choose from SDG-aligned categories [18], ensuring proposals target relevant community and global objectives.
- **Proposal Submission:** After marking a location, users fill in details and publish their proposals, which are then directly uploaded to our web platform.
- **Community Support:** Once live, other users can view, support, and collaborate on proposals, fostering a community-driven approach to development.

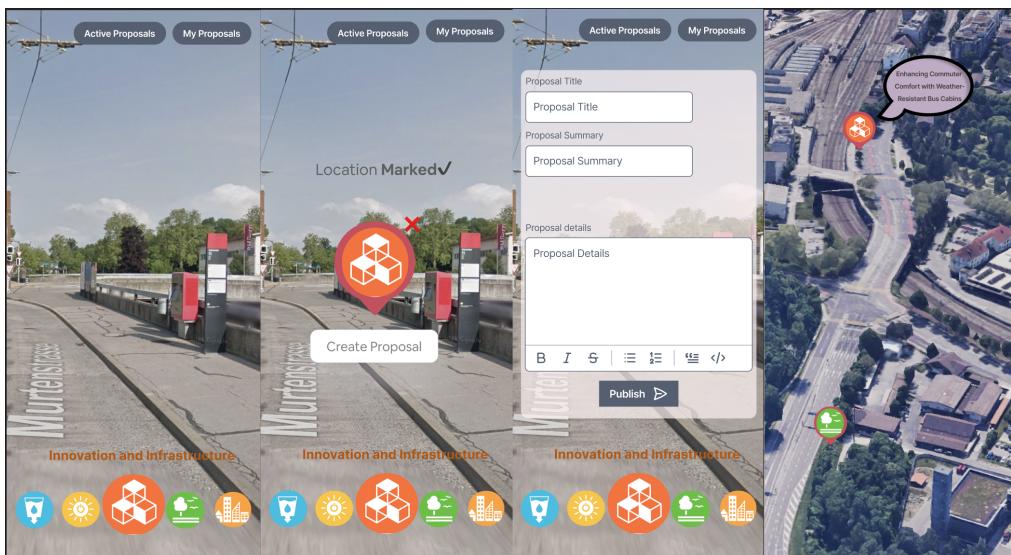


Figure 12: Augmented Reality mobile app

6 Evaluation

To assess the impact and efficacy of our initiative aimed at enhancing civic engagement in participatory budgeting, we have implemented an innovative Augmented Reality (AR) platform coupled with a specialized website. This initiative is designed to gamify the budgeting process, thereby making it more interactive and engaging for the public. Our goal is to transform the often complex fiscal decision-making process into an enjoyable game-like experience, thereby fostering wider community participation.

For a thorough evaluation of our gamified approach's effectiveness and user engagement levels, we have adopted the Task Scenario methodology for usability testing, as recommended by the Nielsen Norman Group[13]. This will involve conducting structured interactive sessions with local residents, where participants will navigate the budgeting process using our AR tool and website in a scenario-based, game-oriented environment. Throughout these sessions, we will systematically collect participants' feedback and observe their interactions with the system. This valuable data will be meticulously analyzed to identify areas for enhancement, ensuring continuous improvement of the gamification elements within our system.

6.1 Protocol

6.1.1 Guidelines for Explaining the Test Scenario to Participants

- (a) **Introduction to the Platform:** We begin with a brief overview of the participatory budgeting platform's purpose and functionalities.
- (b) **Purpose of the Test Scenario:** We clarify the objectives of the test scenario to the participants, ensuring they understand the goal is to evaluate the usability of the platform.
- (c) **Task Explanation:** The tasks are explained in detail, including the evaluation criteria to give participants a clear understanding of what is expected.
- (d) **Interaction Methods:** Describe the available interaction methods on the platform, such as clicking, scrolling, or dragging and dropping. Participants should know they can switch between these methods as needed.
- (e) **Practice Round:** Allow participants to familiarize themselves with the platform through a practice round before the actual test begins.
- (f) **Test Scenario:** Once participants are comfortable with the guidelines and the interface, start the test scenario.
- (g) **Support and Feedback:** Transcribe the entire procedure, noting any errors, test durations, and participant feedback. Administer a brief questionnaire after the test to collect additional insights.

6.1.2 Task Scenarios

The usability testing was structured around a series of task scenarios. These scenarios were designed following the principles outlined by the Nielsen Norman Group[13] to ensure they were realistic, encouraged action, and did not give away how the interface should be used. Each scenario represented a common task a user might perform on the participatory budgeting platform, such as exploring the front page, debating proposals, creating a proposal, voting on proposals, participating in a poll, and checking participatory budgeting information.

6.1.3 Participants

Eight participants (P1 through P8) were recruited for the study, with a diverse range of ages and varying levels of familiarity with participatory budgeting platforms. The average duration of the sessions and overall ratings for each participant are presented in the table below.

Users	Age	Familiarity	Duration avg	Overall rating
P1	29	Low	20 min	4
P2	31	High	25 min	3
P3	42	Moderate	15 min	5
P4	31	Low	20 min	4
P5	22	Moderate	20 min	3
P6	39	Low	25 min	5
P7	27	Moderate	20 min	4
P8	47	Moderate	15 min	3

Figure 13: Participant Details

6.1.4 Average Time-on-Task for Different Scenarios

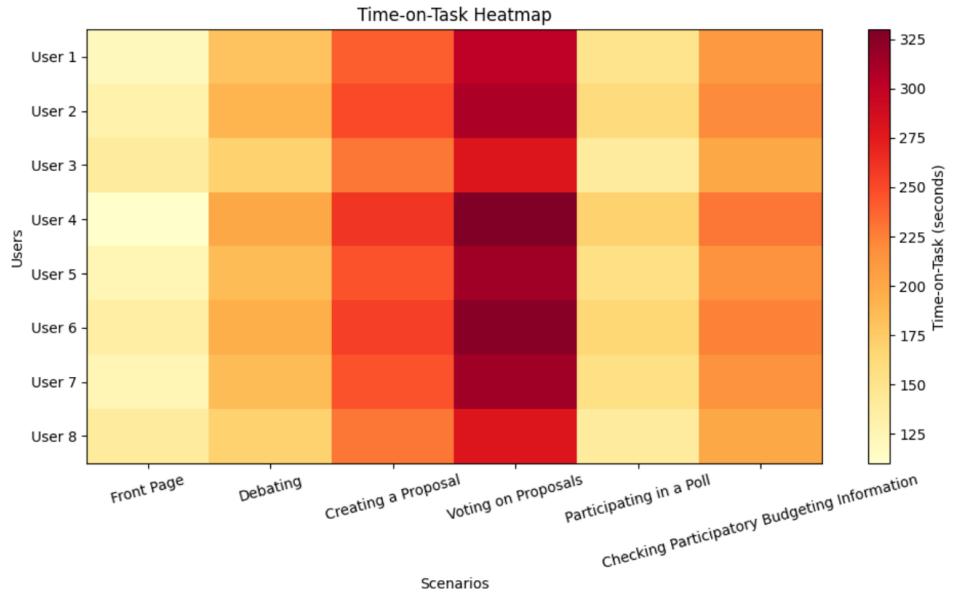


Figure 14: Average Time-on-Task for Different Scenarios

6.1.5 Satisfaction Ratings Heatmap

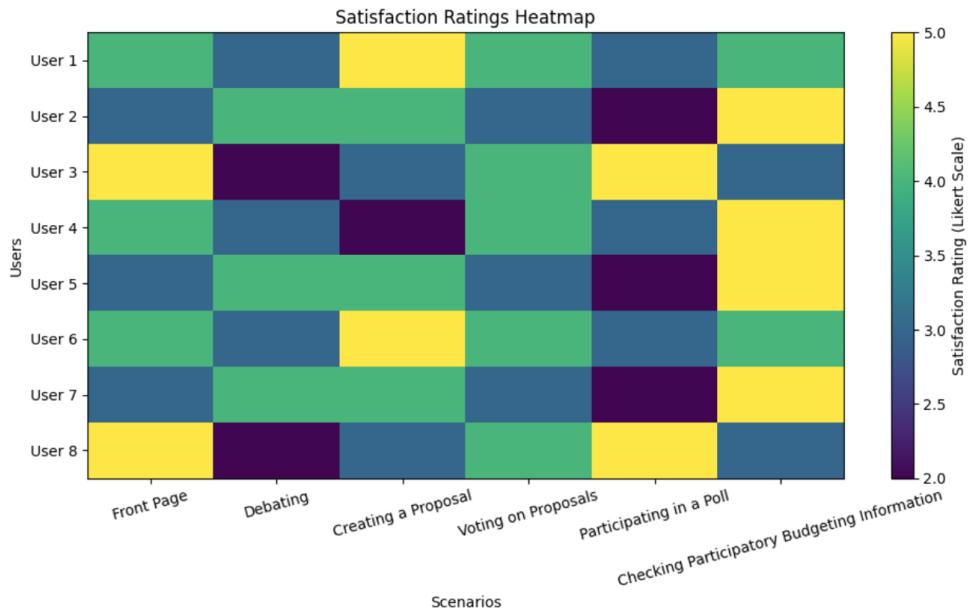


Figure 15: Satisfaction Ratings Heatmap

6.1.6 Average Satisfaction Ratings for different scenarios

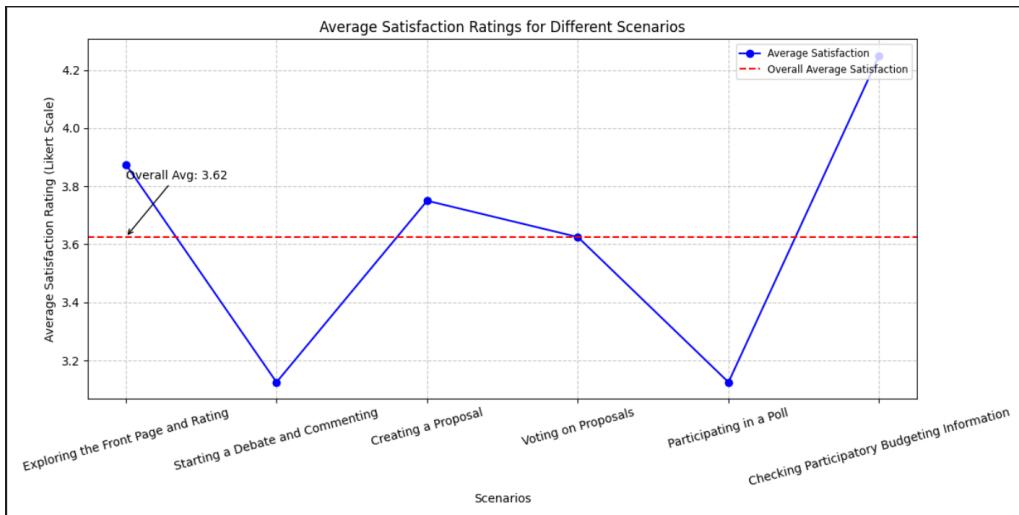


Figure 16: Average Satisfaction Ratings for Different Scenarios

6.1.7 Average Time-On-Task for different scenarios

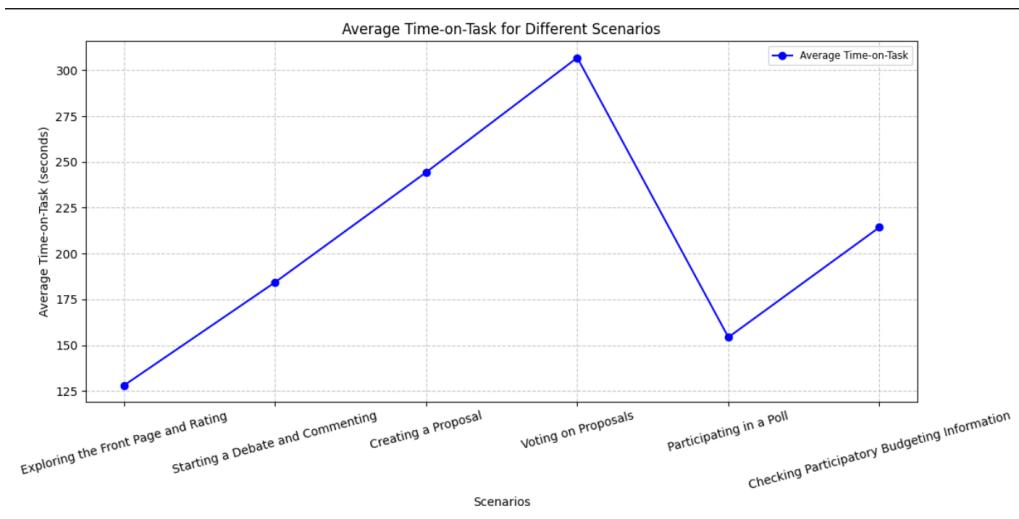


Figure 17: Average Time-On-Task for different scenarios

6.1.8 User Requirements for Improvement

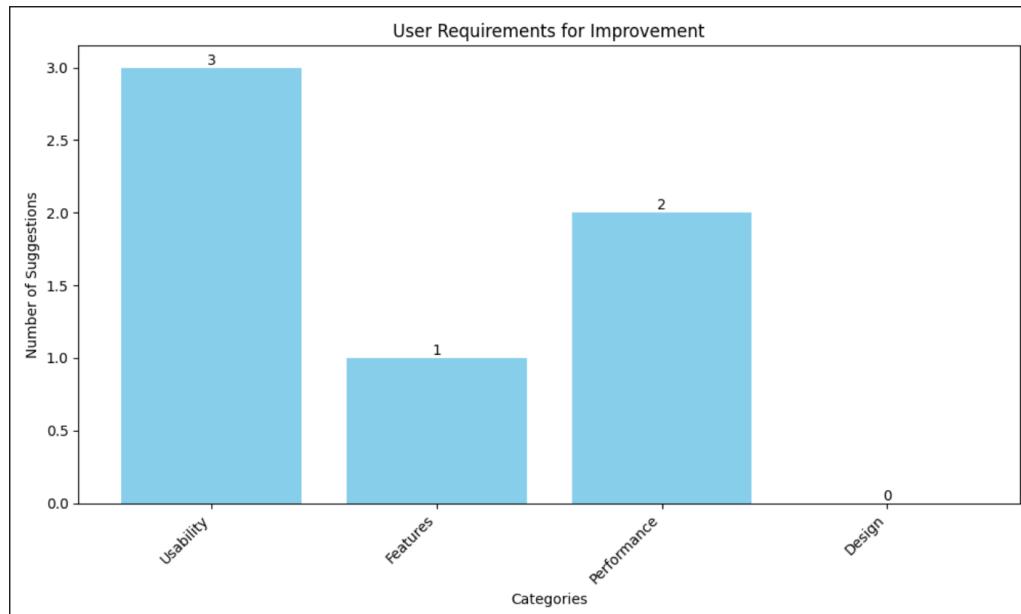


Figure 18: User Requirements for Improvement

This Figure briefly describes the areas for improvement in our platform as identified by user feedback, categorized into Usability, Features, Performance, and Design.

6.1.9 Usability

- Enhance navigation.
- Add more accessibility features.
- Improve task completion process.

6.1.10 Features

- Implement a feature to save progress.

6.1.11 Performance

- Optimise website loading time.
- Improve user feedback when something is wrong.

6.1.12 Design

- Currently, no suggestions. Open for future input.

6.2 Analysis

The collected data were analyzed to produce a heatmap of satisfaction ratings, bar charts for overall user ratings and user requirements for improvement, and line graphs for average time-on-task and satisfaction ratings. These analyses provided insights into the usability of the platform and informed the recommendations for enhancement.

7 Evaluation Results

We compared user performance based on the time taken to complete tasks across various scenarios in the usability testing of the participatory budgeting platform. For this analysis, users are categorized based on their performance. 'High Performers' are those who completed tasks efficiently, while 'Low Performers' took longer and have encountered more challenges.

This report presents a summary of the feedback received from three distinguished users during the testing:

- **User 3 - Quick and Adaptive:** Identified as a 'High Performer' due to their swift completion of tasks and adaptability to different scenarios.
- **User 7 - Consistent and Thorough:** Though not the fastest, this user was consistent and thorough, demonstrating a deep engagement with the tasks and platform.
- **User 2 - Room for Improvement:** Categorized as a 'Low Performer', this user's feedback and task completion times indicate areas where the platform could be optimized to enhance the user experience.

The following sections provide detailed feedback and performance data for those users, offering insights into their experiences and interactions with the participatory budgeting platform.

7.0.1 User 3 - Quick and Adaptive

Task	Feedback	Duration (s)	Task Rating
Front Page	”Navigation was user-friendly.”	140	5
Debating	”The debating menu was a little bit challenging but was manageable.”	170	2
Creating a Proposal	”Creating a proposal was straightforward and intuitive.”	230	3
Voting on Proposals	”Voting process was well-designed and easy to use and contribute in the voting.”	280	4
Participating in a Poll	”The polls was direct and engaging, making participation simple.”	140	5
Checking Information	”Information was helpful, but it would be better to include more tips.”	200	3
Average Duration (s)		193.33	
Average Task Rating		3.67	
Overall Platform Rating		5	

Table 1: Feedback and performance data for User 3

7.0.2 User 7 - Consistent and Thorough

Task	Feedback	Duration (s)	Task Rating
Front Page	”The front page was quite simple, but I didn’t know where to start.”	125	3
Debating	”I appreciated the depth of the debating feature.”	185	4
Creating a Proposal	”Proposal creation was easy to use, but to prepare a proposal it will take me a few days then i can post it directly .”	245	4
Voting on Proposals	”The voting was intuitive, but I double-checked my selections.”	315	3
Participating in a Poll	”Poll questions were clear, but I changed my mind after submitted.”	155	2
Checking Information	”Checking the budgeting information was straightforward, but I could understand all the details.”	215	5
Average Duration (s)		206.67	
Average Task Rating		3.5	
Overall Platform Rating		4	

Table 2: Feedback and performance data for User 7

7.0.3 User 2 - Room for Improvement

Task	Feedback	Duration (s)	Task Rating
Front Page	"I occasionally struggled to find what I was looking for quickly."	130	3
Debating	"The debating feature was somewhat intuitive but could be improved."	190	4
Creating a Proposal	"I found the process of creating a proposal to be a bit confusing."	250	4
Voting on Proposals	"The vote was clearly straightforward, but there are some obstacles."	310	3
Participating in a Poll	"Understanding the poll questions took some time."	160	2
Checking Information	"Accessing the informations page was straight-forward."	220	5
Average Duration (s)		210.0	
Average Task Rating		3.5	
Overall Platform Rating		3	

Table 3: Feedback and performance data for User 2

7.0.4 Measurement Tools

We employed several measurement tools to capture user feedback:

- A Likert scale was used to quantify satisfaction levels across different aspects of the platform.
- The time-on-task for each scenario was measured to determine the efficiency of the interface.
- Open-ended questions and direct observation were used to gather qualitative data on user experience and areas requiring improvement.

8 Conclusion

In conclusion, this report highlights the significant role of community involvement in city development, particularly via platforms for participatory budgeting. It shows how residents, using just their mobile phones, can greatly influence their city's progression and quality of living. Municipalities currently possess the opportunity to harness this capability by implementing innovative methods and tech. For example, the Augmented Reality (AR) platform and Participatory Budgeting web application we developed let citizens actively shape their city

Our research indicates a notable increase in individuals eager to contribute within their own communities. This increasing enthusiasm underscores the

necessity for urban environments to further embrace public participation and harness the collective input and expertise. Such actions lead to a more transparent and just urban planning process, in the mean time enhancing the quality of urban living. Consequently, this fosters cities that are more open and reflective of their residents desires and needs, cultivating a more hospitable atmosphere and paving the way for a sustainable and enduring future.

9 Outlook

9.1 Further Development

Our future plans aim to enrich the participatory budgeting platform and AR app, fostering more dynamic and inclusive urban development.

- **Advanced AR Features:** Enhancing the AR experience with 3D visualizations and interactive scenarios for proposed community projects.
- **User Interface Enhancements:** Continually improve navigation, accessibility, and personalization to maintain a user-friendly platform.
- **Community Integration Tools:** Introduce features for real-time community discussions, workshops, and feedback to deepen civic engagement.
- **Gamification and Incentives:** Develop new ways to motivate participation through points, achievements, and community competitions.
- **Pilot Programs and Partnerships:** Test the platform in different urban settings through pilot programs and collaborations with local stakeholders.

Through these developments, we aim to enhance the impact of our platform, promoting more responsive, inclusive, and sustainable urban futures.

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