

Visualization of Data from the Participatory Budget System of the City of Most

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Abstract

This work focuses on improving the visualization of participatory budgeting in the city of Most. The city of Most currently lacks a database for centralized data storing for projects from participatory budgeting. Additionally, there is no web application for visualization, statistical dashboard and advanced project search. The aim of this work was to analyze the requirements, create a design on them, and then implement a web application for map-based participatory budgeting. The work included an analysis of the existing process, frequent consultations with the consultant from the city of Most and the study of relevant existing solutions. Based on these findings was the web application designed and implemented. The result of the work is web application that includes a structured databases (specifically a geodatabase) for project management. The internal section allows city employees to efficiently manage projects and provides a clear dashboard. The public section offers citizens an interactive map visualization of all approved project from current and previous years. The application is integrated with the ArcGIS geographic information system. The new solution provides a modern tool for data management and increases transparency and accessibility of information for citizens, thereby encouraging their involvement in the decision-making process regarding the development of the city.

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1. Introduction

[Motivation] Participatory budgeting is an important tool that allows citizens to actively participate in the decision-making process regarding the use of public funds [1]. The city of Most lacks a centralized database and tools for efficient data management, map-based project visualization, advanced project search, and a statistical dashboard for participatory budgeting.

[Problem definition] This work focuses on the analysis, design, and implementation of a web application for the participatory budget of the city of Most. The goal is to replace the existing records in MS Excel with a structured database for project management, to be handled by employees, and primarily to provide citizens with an interactive map visualization of projects.

[Existing solutions] Among the existing solutions, it is worth mentioning the participatory budget of the city of Brno, "Dáme na vás" [2]. This project also uses the ArcGIS geographic information system,

just like the proposed application for the city of Most. The "Dáme na vás" project includes several key functionalities that are relevant to this work:

- **Interactive map** – projects are displayed on the map with the option to click for more details, and clustering is used for better overview.
- **Filtering** – the ability to filter projects by various criteria (district, project status and category).
- **Graphical display** – the use of different colors to distinguish between projects of different categories and the display of statistics through graphs.

[My solution] This paper presents a web application for participatory budgeting in the city of Most. The web application centralizes the management of projects and provides an interactive map visualization for citizens, and offers tools for city employees. The web application is integrated with ArcGIS.

2. Solution design

2.1 Application Structure

The application is designed with a separate frontend and backend architecture, see [Figure 1](#):

- **Backend:** The backend is responsible for data management and communication with the database. The database is hosted on ArcGIS Enterprise and published to the ArcGIS online, which enables communication between the database and the frontend.
- **Frontend:** The frontend of the application is built using the React library with TypeScript, utilizing components and classes from ArcGIS Maps SDK for JavaScript. The ArcGIS Maps SDK for JavaScript includes a core API that ensures communication with the feature service in the backend.

2.2 Data Structure

The data are stored in an ArcGIS geodatabase, see [Figure 2](#). Key elements of the data model are:

- **Type Table:** This table contains information about various project types (e.g. transport and infrastructure, sports and leisure activities, ...) Each project type is assigned a color, name and icon, which are used for visualization on the map.
- **Other Layers:** These layers contain geometric data (points, multipoints, lines, polygons) and attribute data about individual projects. There is also one point layer "Cluster layer", which contains all other projects and is used for the cluster layer in the public map. The points for this layer are calculated in the database using attribute rules.

2.3 Key components

The application contains the following key components:

- **Public map:** This map is used for citizens to view the approved proposals. It allows to filter projects by different criteria (e.g. year, project type) and to view project details by clicking on the map. See [Figure 3](#)
- **Private Map:** This map is used by City employees to manage all projects. It allows project managers to create, edit, and delete projects directly in the map interface. See [Figure 4](#)
- **Dashboard:** The dashboard provides clear project statistics such as the number of all projects, all approved projects, winner projects, total cost and charts.

- **Projects Types Settings:** This component allows workers to manage project types, their name, color and icon. This also manages the entire appearance of the map, because it determines how the elements on the map will look.

3. Conclusions

This paper introduced web application for participatory budgeting of the city Most. The development of the application was motivated by the need to replace the existing inefficient MS Excel-based system and to provide citizens with better visualization and access to project information.

The main benefits of the app are:

- **Streamlined data management:** A centralised database allows efficient storage, management and retrieval of project information on web.
- **Improved visualisation:** An interactive map provides a clear and intuitive way for citizens to get familiar with projects.

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References

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