



CHALLENGES

Climathon Bratislava 2024

In the 5th edition of Climathon Bratislava, we have prepared 3 challenges for the participants, who can bring their ideas for solutions:

1. Data for people. How can we better communicate Bratislava's research to the people?
2. Second chance. How can we give items a better second chance?
3. City services. How can we use data to improve city services?

When approaching all challenges, **keep the implementation of your solution** in mind.

General sources:

SECAP Sustainability Energy and Climate Action Plan

https://cdn-api.bratislava.sk/strapi-homepage/upload/SECAP_akcny_plan_pre_udrzatelnu_energetiku_a_klimu_29_4_2024_pages_63e1bdc9ca.pdf

Climate resistant Bratislava

<https://klimatickyodolna.bratislava.sk/wp-content/uploads/2024/05/SECAP-hodnotenie-zranitelnosti.pdf>

New Bratislava data portal

<https://data.bratislava.sk/#home>

Challenge 1: Data for people. How can we better communicate Bratislava's research to the people?

Challenge vision

The Metropolitan Institute Bratislava aims to **raise awareness, build environmental responsibility, maximize the use of data** and studies and present the research results to the public. We are looking for ideas that are based on data and digital technologies that will help the city to improve the communication about research results in an attractive way. Ideas for this challenge should aim to help the city in the following areas:

- 1) Help the city **raise environmental awareness** and **build environmental responsibility**. Thanks to this solution, the citizens of Bratislava will have a chance to become more engaged, educated and motivated to take preventive measures to make Bratislava more resilient to climate change.
- 2) Help the city to **make the data findings** of the Bratislava Metropolitan Institute **more accessible** to the public. Thanks to this solution, the citizens of Bratislava will have access to studies on climate change, ecosystem status, temperature mapping, green space distribution and future development scenarios up to 2050.

In approaching this challenge, the aim should be to present the already existing data and information of the Bratislava Metropolitan Institute. These results should be **visually appealing, easy to understand** and **actively used by citizens** in the future.

Challenge context

The city of Bratislava needs more environmentally literate citizens. The Metropolitan Institute of Bratislava (MIB) has a lot of data available, but sometimes it is not accessible to the public in an attractive form. There is a big gap in publishing data to the public and poor understanding of complex issues.

The goal is to bridge this gap between data creators and the common public, making data more understandable and leading to a more environmentally aware society which in turn can contribute to increase in community resilience and individual resilience. For example, if I notice that it's hotter where I live, I can look at data to confirm that my area is indeed in a heat island or flood risk prone zone. This information can be helpful in many ways, such as adopting adaptation measures at their households – such as renovating a house or garden, or changing consumer behaviour in general.

Inspirations

We are looking for ideas that help to address this challenge through the use of portals, data analysis tools, visualisation tools, digital applications or similar digital innovations. Your solutions should address the specific needs and objectives of the Metropolitan Institute Bratislava. In addressing this challenge, we recommend that you focus on demonstrating the power of your solutions in specific cases or areas.

Ideas could be based on, but not limited to:

- Climate change adaptation/mitigation (How can we increase the resilience of the city and its inhabitants or visitors?)
- Providing information on ecosystem services (Which ecosystems provide the most services? What is the demand for ecosystem services and where is it met and where is it not??)
- Future development scenarios for Bratislava (What will Bratislava look like in 2050?)
- Nature in Bratislava (Where are biodiversity hotspots?)

Examples from abroad:

<https://www.sfenvironment.org/san-franciscos-climate-storyboard>

<https://comptroller.nyc.gov/services/for-the-public/nyc-climate-dashboard/resiliency/>

https://experience.arcgis.com/experience/d109ec235c8a44b08675452e64b5e4fe/?block_id=layout_733_block_44

<https://citiesindicators.wri.org/>

Challenge owners and beneficiaries

The owner of this challenge is the Metropolitan Institute Bratislava (Martin Jančovič)

Desired solution

- concept and analysis
- data model
- data algorithm (prediction)
- software solution

Potential Outputs

- **Interactive Digital Platforms or Mobile Apps:** Develop applications that visually display climate change data, green space distribution, and other environmental metrics.
- **Visualization Tools:** Create tools that transform complex data into user-friendly, engaging formats.
- **Educational Campaigns:** Launch campaigns that utilize data-driven insights to inform residents about climate risks and preventive actions.
- **Educational Toolkits:** Design modules for schools and community groups that incorporate local environmental data.
- **Interactive Dashboards:** Develop regularly updated dashboards that track environmental changes and forecasts.

Required Skills

- **Data Analysis and Management:** Ability to interpret and process environmental data.
- **UX Design:** Skills in crafting engaging and intuitive user interfaces.

- **Software Development:** Proficiency in developing robust and scalable applications.
- **Data Visualization:** Expertise in presenting complex information graphically.

Relevant Data

Sustainable Energy and Climate Plan (SECAP) issued in April 2024

Spatial Plan (Master/territorial plan) Map

<https://bratislava.sk/zivotne-prostredie-a-vystavba/rozvoj-mesta/uzemnoplanovacie-dokumenty/platna-uzemnoplanovacia-dokumentacia/uzemny-plan-mesta-a-jeho-zmeny-a-doplňky>

www.rpi.gov.sk - large variety of environmental data (spatial data – WMS and WFS)

www.scitanie.sk , <https://www.scitanie.sk/obyvatelia/rozsirene-vysledky> - latest demographic and social census data for 270 local territorial units in Bratislava (xls data)

<https://www.skgeodesy.sk/sk/> , www.zbgis.skgeodesy.sk - large variety of administrative and basic territorial data (spatial data, including remote sensing data)

<http://www.geofabrik.de/> - openstreetmap data (public transport, landuse, points of interest, etc.)

<https://earthexplorer.usgs.gov/> - satellite images (registration needed, free of charge) (spatial data)

To be provided later on:

- <https://klimatickyodolna.bratislava.sk/wp-content/uploads/2024/05/SECAP-hodnotenie-zranitelnosti.pdf> + story maps and experience builder app (emaps will be published on the geoportal on 8/2024)
- Forecast 2050 (also should be complete after summer published 4Q/2024)
- Data Sharepoint - environmental indicators, climate change vulnerability/risk, landscape prediction 2050, currently landscape structure, ecosystem services data, climate vulnerability 2050 (this topic focus mainly to environmental and landscape GIS data)

Challenge 2: Second Chance. How can we give items a better second chance?

Challenge vision

The goal of KOLO - Bratislava's Reuse Centre is to give a second life to unnecessary but functional items. If these items are not chosen by the city's residents, KOLO can provide them as material aid to various cooperating organisations (NGOs, schools, organisations). However, our most abundant items —books—remains a challenge for us. There are certainly places, organisations that could use the books and other items that KOLO has in stock. KOLO needs a solution that provides a simple yet effective system for working together and getting the items collected to where they are needed, regardless of location or type of recipient.

KOLO n.o. is looking for an efficient system to easily pass on items that are suitable for reuse. These items are abundant in KOLO, but have less demand than others and tend to accumulate unnecessarily.

The key challenges that the City of Bratislava needs to solve are:

- How can we optimize the distribution of items?
- How to identify recipients (organisations) and their potential needs?
- How to use our data sources and digitalize the process of receiving the items?
- How to reuse books that nobody wants alternatively – recycling, upcycling, other reuse?

Challenge context

KOLO already co-operates with numerous NGOs and the City of Bratislava (e.g. the Social Affairs Department), passing on items on the basis of calls and co-operation. However, this is mostly done at the request of the organizations that need help – they do not have a precise overview of KOLO's material support possibilities, and many are still unaware of us.

We actively work with the organizations in our portfolio, keeping track of the items given away, their quantity and type. We do not have the internal capacity to develop a system or even to contact different organizations directly and effectively.

KOLO uses a stock monitoring application (Inisoft) - could we possibly integrate this solution into the hackathon project?

Inspirations

Examples from abroad:

<https://plentifulapp.com/pantries>

Challenge owners and beneficiaries

KOLO - Bratislava Reuse Center - M. Čechová, K. Tamášová, I. Jurčíková

Desired solution

- We are looking for a digital solution that will provide a system to identify potential recipients and their needs; a system to easily deliver items to them. This does not mean individuals (citizens), but various types of help or educational organizations that would need material help of any kind. So far we cooperate with e.g: Slovenská katolícka charita, Človek v ohrození, Kto pomôže Ukrajine, De Paul, VŠVU, STU, various schools and kindergartens, dog shelters.
- We are also looking for a concept of alternative material use of books for different purposes (other than reading). (e.g. - recycled book paper, upcycled products made from used books, art, design etc.)

Potential Outputs

- **Digital Redistribution Platform:** Create a platform that matches available items with potential recipients based on their needs.
- **Repurposing Ideas for Unused Items:** Generate creative solutions for items that go beyond their intended use.
- **Collaboration Networks:** Establish partnerships facilitated through technology, connecting KOLO with other organizations and individuals.
- **Mobile App for Item Tagging:** Develop an app with features for virtual tagging of items for pickup or delivery.
- **Materials Library Database:** Create a database where items can be cataloged and accessed by various creative projects.

Required Skills

- **System Design and Digital Solution Development:** Skills in creating efficient systems for item distribution.
- **Supply Chain and Logistics:** Understanding of logistics planning and laws related to item distribution.
- **Creative Problem-solving:** Innovative thinking for upcycling and recycling.
- **UI Design:** Expertise in user-friendly interface design.

Relevant Data

- Information from the application of the Re-Use Centre according to the specific methodology of the Re-Use Centre: number of items received / "sold" / categories of items / date of availability of the items in the shop / images of the items / date of sale of the item.
- Application results - monthly statistics
- Real-time visitor counter - Excel data
- In Excel we have accurate records of items received (categorised into around 40 types, each with a photo) and their quantities. We track items as they are received and as they are distributed. We also keep a separate record of all material aid provided to date (possibly including OLO data).

- Spak- Eko (source)- press release
- https://www.olo.sk/arte-content/uploads/2023/09/Vyrocnna-sprava-OLO-2022_compressed_compressed.pdf
- <https://data.bratislava.sk/pages/odpadove-hospodarstvo>

Challenge 3: How can we use data to improve city services? Placement of container stands, water retention measures, identification of available areas for planting

Challenge vision

The City of Bratislava aims to make decisions based on data. This principle needs to be applied in every city department and organisation wherever possible. It is also the case when the city needs to determine the placement of container stands, water retention measures and the identification of available areas for planting. These three specific areas have been selected for this year's challenge.

1. Placement of Container Stands

The municipality needs information on suitable locations for container stands in order to improve and speed up the process of leasing land.

The leasing of land for container stands at SSN (Property Management Department) is being addressed. An application is received from an apartment building, and then applications are sent to various city departments and the municipality to express their agreement with the lease and placement.

The placement of containers on city property as part of a land lease application involves:

- City districts
- Departments of the City of Bratislava: Territorial Development, Transport Department, Informatics Department, Environment Department, Chief Architect's Office, due to arrears also Finance Department
- OLO

Efforts are currently being made to speed up the process by setting a 30-day response time and trying to gather requirements and KO criteria for placement from individual departments.

2. Water retention measures

Water utilities, urban districts and their residents who are faced with the problem of flooding in certain areas need a solution for the drainage of rainwater into the sewerage system. These waters sometimes cause operational problems for the water company and contribute to the deterioration of the environmental, socio-urban environment.

Water retention measures represent a "current" topic, so their elaboration in terms of utilizing possible and available information for potential measures is high. The main problem is finding suitable locations from the perspective of property-law settlement and addressing permitting and other administrative requirements.

From the point of view of BVS (Bratislava Water Utility Company), efforts are currently underway to identify and quantify areas where there is excessive water inflow from surface runoff. The next step is to work with landowners and municipalities to propose solutions and prepare them for implementation.

Correct identification of the rainwater runoff pathways serves as the basis for the solution strategy. In this way it is possible to identify both the necessary technical data on the quantity of water to be retained and the possible sources of problems within the river basin in question. The subsequent evaluation of the environmental and geological data allows further steps to be taken to find the right solution. Synergies with climate change mitigation should not be overlooked, as these include drought prevention measures and improving the water balance in the area in question.

3. Identification of available areas for planting

The Department of Maintenance and Greening needs to find and identify suitable areas for tree planting in order to meet the planting targets defined in the Bratislava 2030 document; the current planting plan is limited by the city's land and its knowledge.

We are currently facing the problem of identifying open areas where we can plant. In some parts of the city, planting is becoming increasingly dense and the available areas for planting can no longer be found without a significant time commitment from officers.

The main objective of the challenge is to obtain plots of land that are suitable for planting in accordance with pre-determined conditions. The main conditions are that the planting must be on city land, comply with STN X and the Arboricultural Standard for Tree Planting AS X. The solution should be built to respond to a change in input data such as the geometry of existing trees, a property change or an update to the utility data. Another part of the solution should be the ability to work interactively with predefined tree species that have their own specific planting conditions (e.g. different spacing).

A major issue in green space management is the removal of older existing trees in emergency situations and the repairs of utilities that are replaced by planting. A suitable addition to the solution would be a 'threat warning system' for exiting trees growing in the protection zone of utility networks, as defined by the STN of utility networks. This would allow us to identify in advance sites that will be vacated in the future and will need to be replanted elsewhere than in the utility protection zone.

Challenge Context

1. Placement of Container Stands

Residents are concerned about the placement of container stands, which currently stand freely in public spaces in around 2,240 cases.

These containers are often placed inappropriately on roads, car parks, pavements or green spaces. Residents are not in a position to identify suitable locations themselves, as the placement of these stands must comply with numerous conditions set by various bodies.

They are unaware of all the factors that need to be considered and do not know where to find the data they need to make better decisions. The need to enclose container stands is important not only for the esthetic value of public spaces, but also for maintaining cleanliness, achieving better waste sorting - which affects residents' fees - and protecting the environment.

2. Water retention measures

Average precipitation levels are not changing significantly from a long-term statistical perspective, but because of climate change, there is a significant redistribution of its variability throughout the year. This results in periods of drought followed by sudden downpours, causing problems both in terms of surface runoff (after dry periods, only a very small proportion of rainfall is available for infiltration into the ground, leading to a virtually permanent drop in groundwater levels) and localised flooding (the underpasses at Gagarinova and Ružinovská are typical examples visible to everyone, but minor flooding occurs in practically every district of Bratislava).

The need to address such a situation is not only relevant to the operator of the sewer system but also to the individual residents affected by these problems, and, of course, collectively through urban districts. In 2023, three major precipitation events caused flooding.

From the water company's point of view, the solution is to implement measures to slow down and possibly eliminate surface runoff directly in the area, where cooperation with local councils and property managers is essential.

The key factor will be the correct design of possible measures, both from the point of view of a suitable location for implementation, and the correct selection of measures. Existing catalogues of measures and possible solutions offer a wide range of choices, but not all measures are suitable for implementation in specific locations. Similarly, determining the potential of a specific site together with the technical requirements will be key to finding an appropriate implementation strategy. This will also need to be harmonized with the city and district spatial planning documents and translated into requirements for future development and construction in the city.

3. Identification of available areas for planting

The city of Bratislava has committed to planting trees by 2030, and planting is underway. However, there is a problem in identifying suitable areas for planting. The limiting factors are the amount of land owned by the city, existing planting and the presence of utilities on the land.

At the moment, all the major plantings have been made on vacant land and we have a problem identifying new areas. We need to create this inventory of areas for efficient planning activities. Currently, areas are identified manually based on the knowledge of the area manager.

Inspirations

1. Placement of Container Stands

We are looking for a solution that will help residents choose a place for a container stands, that meets all requirements, e.g. a map platform that displays possible locations on plot of land near their buildings.

2. Water retention measures

<https://scalgo.com>

www.dhigroup.com

<https://www.futurecityflow.com/Start>

<https://www.nyc.gov/assets/dep/downloads/pdf/water/stormwater/2024-stormwater-analysis-report.pdf>

<https://www.london.gov.uk/programmes-and-strategies/environment-and-climate-change/climate-change/climate-adaptation/climate-risk-map>

3. Identification of available areas for planting

<https://www.davey.com/about/newsroom/drg-and-greehill-partner-to-deliver-digital-tree-inventory-to-us-cities/>

<https://www.greehill.com/>

<https://www.nycgovparks.org/services/forestry/tree-work>

Challenge owners and beneficiaries

1. Placement of Container Stands- Department of Environmental Protection (OŽP)- Martina Kicová, Daniel Kleman
2. Water retention measures- Bratislava Water Company (BVS a.s.) - Matúš Letko, Juraj Haluska, Tomáš Gibala
3. Identification of available areas for planting - Department of Maintenance and Greening- Dušan Vacek, Samuel Ferencei

Desired solution

1. Placement of Container Stands
 - data model
 - data algorithm (prediction)
 - software solution
2. Water retention measures
 - concept and analysis
 - data model
 - data algorithm (prediction)
 - software solution
3. Identification of available areas for planting
 - Data concept and analysis
 - data model
 - software solution, code or script
 - Pilot database of suitable planting plots

Potential Outputs

- **Data Models and Algorithms:** Develop predictive models for optimal placement of urban infrastructure.
- **Software for Water Retention and Planting:** Create a platform for managing and mapping water retention measures and planting areas.

- **Pilot Databases:** Compile data on suitable locations for infrastructure or future urban development scenarios.
- **Real-time Monitoring Systems:** Monitor environmental conditions that affect infrastructure decisions.

Required Skills

- **GIS and Data Science:** Skills in handling geographic and predictive data.
 - **Software Engineering:** Development of complex software solutions.
 - **Environmental Planning:** Knowledge of sustainable urban development.
 - **Urban Planning:** Integration of data insights into city planning.
 - **Environmental Science:** Understanding of ecological impact assessments. Relevant resources
1. Placement of Container Stands

Relevant Data

1. Placement of Container Stands
- Manual for container stands https://cdn-api.bratislava.sk/strapi-homepage/upload/Manual_kontajnerovych_stanovist_510b7dace7.pdf
 - General Binding Regulation no. 18/2023 https://cdn-api.bratislava.sk/strapi-homepage/upload/VZN_18_2023_o_nakladani_s_KO_a_DSO_v_r_1_7b4b332b89.pdf
 - Cartography and Catastre of the Slovak Republic
<https://zbgis.skgeodesy.sk/mapka/sk/kataster?pos=48.800000,19.530000,8>
 - City Spatial Plan <https://bratislava.sk/en/environment-and-construction/development-of-the-city/spatial-planning-documentation/current-spatial-planning-documents/city-spatial-plan-with-amendments>
 - Technical map of the city <https://data.bratislava.sk/pages/technicka-mapa-mesta>
 - Property of the city
<https://data.bratislava.sk/apps/c4b1e524ca5e45ce8ba05ed490b9adf5/explore>
 - Bicycle infrastructure network https://cdn-api.bratislava.sk/strapi-homepage/upload/UGDB_cyklo_30000_layout_A0_76d6a62980.pdf
 - City spacial plan – public transport equipment
https://bratislava.blob.core.windows.net/media/Default/Dokumenty/Str%C3%A1nky/Chcem%20vediet/3_verejne_dopravne_vybavenie.pdf
 - [Planing bicycle infrastructure network](https://mapa.cyklokoalicia.sk/bratislava/public/#l4|z15|c48.14680,17.12348)
<https://mapa.cyklokoalicia.sk/bratislava/public/#l4|z15|c48.14680,17.12348>
<https://maps.app.goo.gl/ZjWk6MyH7zHZAmPk8>

- Geographic data of green areas

<https://data.bratislava.sk/apps/1f066caefb3843c39a1bb038dc0bfbd5/explore>

Our department does not have any data on this subject. In order to identify suitable land, data such as the zoning plan, the location of utility networks and information on parking spaces may be required. This data exists but is not currently available to us. Information on which residential buildings do not currently have closed container sites is not yet available.

Requirements and KO criteria for placement from individual departments. Some criteria for placing container stands (not from all departments)

- Max. 10 m from the main road accessible for OLO's vehicles,
- The underpass height is min. 4 m and longitudinal slope of road is max. 12%.
- The distance between the entrance of the building and its container stand is 10 - 50 m.
- The minimum distance between a facade of a building without windows and a container stand is not specified. (nice to have a few meters distance) However, if there are windows on the facade, it is necessary to observe min. a distance of 6-10 m from the diagonal of the nearest window.
- When container stands are placing on a sidewalk, it is necessary to leave 1,5 m width of the sidewalk for pedestrians. (due to summer and winter maintenance).
- we prefer placing container stands on paved surfaces. If such surfaces do not exist, or are not suitable for placing stands, they can be placed on the greenery, but the distance between the trees and the container stand must be min. 2,5 m. If the trees are closer, than they must be marked for felling.
- The container stands should not be placed on the planned cycle infrastructure
- The street, where the container stands are placed, must be passable, or there must be a turning point for OLO's vehicles.
- The placing of the container stands should not affect the operation and maintenance of public lighting and metropolitan optical network.
- The container stands must be placed within the territory with the following function numbers (City spacial plan):
101,102,201,202,301,302,303,304,401,501,502,602,701,702,703,705,801,802,1003,1203.

2. Water retention measures

We utilize publicly available data:

- Office of Geodesy Cartography and Catastre of the Slovak Republic) -
<https://zbgis.skgeodesy.sk/mapka/sk/kataster?pos=48.800000,19.530000,8>,
<https://zbgis.skgeodesy.sk/mapka/sk/teren?pos=48.800000,19.530000,8>
- modelled calculations of surface runoff (n/a to put on Sharepoint)

Note: These data are either publicly available or owned by BVS.

3. Identification of available areas for planting

- City property
- Current planting in the city
- Placement of existing trees and other greenery - in some parts of the city
- Map of utility networks