Challenge for the Cities Cup

SMART ROUTES: A CITY THAT CHOOSES COMFORT

Focus Area
Solutions in the field of improving the quality of the urban environment and urban mobility.

Objective
To create a realistic digital solution that helps residents of Russian cities choose comfortable and safe routes, improves the perception of the urban environment, and contributes to the development of sustainable urban mobility.

Context and Relevance

In many Russian cities, especially industrial ones, the issue of comfortable and safe movement around the city is becoming increasingly acute.
Residents face inconvenient sidewalks, lack of shade in hot weather, strong winds, air pollution along major roads, and difficulties for people with limited mobility.

An example is the city of Berezniki (Perm Krai), a major industrial center where historical changes in terrain and development have created a heterogeneous urban environment. In some districts, there are areas of unstable ground and inaccessible infrastructure, which reduce comfort and hinder mobility.

Participants may also choose similar cities where SUEK, SGK, or EuroChem operate: Barnaul, Biysk, Rubtsovsk (Altai Krai), Kotelnikovo (Volgograd Region), Leninsk-Kuznetsky, Polysaevo, Prokopyevsk, Myski (Kemerovo Region–Kuzbass), Borodino, Nazarovo, Sharypovo (Krasnoyarsk Krai), Kovdor (Murmansk Region), Kingisepp (Leningrad Region), Abakan, Chernogorsk (Republic of Khakassia), Reftinsky (Sverdlovsk Region), Chegdomyn (Khabarovsk Krai).
These cities share similar structure and challenges: a barrier-filled urban environment, climatic vulnerabilities, and the need to develop pedestrian routes and points of attraction.

Problem

Modern navigation systems consider distance and travel time, but do not take into account the qualitative characteristics of the route — noise levels, the presence of greenery, shade, air quality, comfort for walking, or accessibility for people with limited mobility.

Residents lack tools that would allow them to consciously choose routes based on personal preferences and environmental conditions.

Task for Participants

Develop a digital application, platform, or web map that builds “smart routes” around the city, taking into account parameters of comfort and the quality of the urban environment.

The system should consider:

● air temperature, shade availability, humidity, wind speed
● noise level and air pollution
● public spaces, green zones, rest areas
● accessibility of infrastructure — ramps, transport, dining options

The application should allow users to select route types based on preferences — for example, “most shaded,” “best for walking,” or “environment-friendly route.”

Participants may present a standalone mobile application, an interactive web map, or integration with existing navigation systems (Yandex Maps, 2GIS, etc.)

Possible Development Directions

● A map or application where users can see route quality based on microclimate and urban conditions
● Interactive visualization of “points of attraction” and rest areas
● A recommendation system for routes for different user groups: parents with children, people with limited mobility, tourists
● An analytical tool for municipalities to analyze and plan urban infrastructure

Input Data (Example: Berezniki)

● Population: 145,967 people (as of 01.01.2025)
● Urban structure: industrial development, uneven terrain, restricted-access areas
● Green areas and public spaces: data provided to participants
● Pilot project budget: up to 3 million rubles
● Approximate implementation cost: ~1.5 million rubles

Constraints

● Potential uneven network coverage and limited access to the Internet
● Lack of microclimate and noise monitoring sensors
● Need to protect users’ personal data
● Pilot budget: up to 5 million rubles

Expected Deliverables from Participants

1. Concept and visual prototype of the digital solution
2. Model of the route-building algorithm
3. Implementation plan and economic justification
4. Forecast of social impact — improved urban environment quality, development of urban mobility, increased resident engagement in conscious use of urban infrastructure

Additional Materials

Appendix 1. Input data for the presentation
Appendix 2. Template of initial data. Maps of the street-road network and green zones
Appendix 3. Data on temperature, humidity, and noise levels

Sample Report / Presentation Structure

The presentation must include answers to the following sections:

1. Introduction: About the Team

Brief information about the team members, roles, competencies, and motivation for participating in the project.

2. Problem and Context

● Describe what causes discomfort or poses safety risks in the urban environment (pedestrian routes, noise, pollution, etc.)
● Explain why this issue is significant for the residents of the chosen city (Berezniki, Prokopyevsk, etc.)
● If available, include photos, maps, statistical data, or quotations from residents or media sources.

3. Project Objective

Create a digital solution that enables residents to choose comfortable routes taking into account microclimate, noise levels, and greenery.

Develop an interactive map visualizing comfortable pedestrian zones of the city of Berezniki (or the selected city).

4. Analysis and Data

● Data sources (OSM, open data platforms, weather services, manual data collection)
● Specify which parameters were used and how the data was processed.

5. Concept and System Structure

Provide a detailed description of the proposed algorithm, application, service, or system architecture.

6. Prototype / Visualization

● Screenshots or a map (e.g., a QGIS map with a color scale of route comfort).
● Interface mock-up (Figma, Tilda, or other tools).

7. Route Evaluation Algorithm and Logic

● Explain how “route comfort” is evaluated (formula, scale, scoring).
● Describe how routes are compared (weights, filters, ranking, visual indicators).

8. Social and Environmental Impact

- How the project will help residents
- Potential user groups

9. Implementation Plan

Step-by-step plan, timeline, stages of development and deployment.

10. Economic Justification

Estimated costs, budget structure, possible efficiency gains, expected ROI.

Recommended Tables for Route Evaluation

Route Evaluation Parameters Table

Indicator	Units	Source	Impact on Comfort
Noise	dB	open data / model	Affects auditory comfort and stress levels
Greenery	%	NDVI / map	Improves perception, reduces heat, increases comfort
Shade	% of coverage	Satellite imagery / OpenMap	Reduces heat load during movement
Air pollution	AQI	open data	Affects health and environmental comfort

Table of Climate and Environmental Parameters (Berezniki)

Parameter	Average Value	Units	Period / Data Source	Source
Mean annual air temperature	+2.1 °C	°C	Long-term average for 1981–2020	“Weather and Climate” portal; Weatherspark (climate statistics)
Mean air temperature in July (warmest month)	+18.4 °C	°C	Long-term average	“Weather and Climate” portal; Weatherspark
Mean air temperature in January (coldest month)	−15.2 °C	°C	Long-term average	“Weather and Climate” portal; Weatherspark
Mean annual relative humidity	~74%	%	Climate reference / regional meteorological data	Roshydromet (via Wikipedia — Berezniki)
Relative humidity in January	~84%	%	Average climate data for Perm Krai	Climate-data.org
Relative humidity in July	~67%	%	Average climate data for Perm Krai	Climate-data.org
Urban noise level, central streets	65–70 dBA	dBA	Municipal report “State and Environmental Protection”, 2019	Administration of Berezniki
Urban noise level, residential areas	50–60 dBA	dBA	Estimate based on sanitary norms and comparable industrial cities	SanPiN 2.1.3684-21
Maximum permitted noise level	55 dBA (day), 45 dBA (night)	dBA	Sanitary norms of the Russian Federation	SanPiN 2.1.3684-21