“Accessibility Map” and “Social navigator” services for Persons with Disabilities

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Project KA432 of Karelia ENPI program "Journey planner service for disabled people (Social Navigator)"

Partners:

- Petrozavodsk State University (lead partner)
- Open Innovations Association FRUCT
- Ministry of Healthcare and Social Development of Karelia
- University of Oulu

Overview

- The significance, aim and objectives of development
- System architecture and information model
- “Accessibility map” service
- “Social navigator” service
- Results and conclusions

Significance

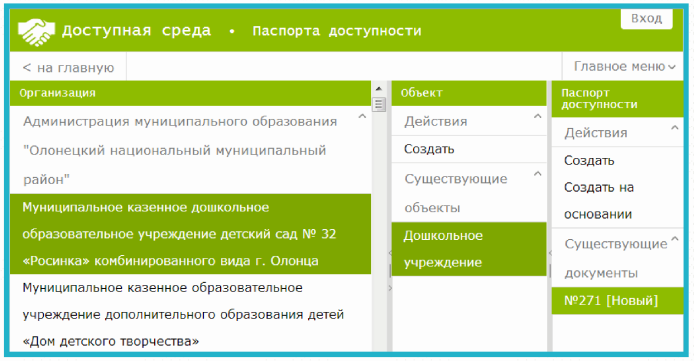
The project aim is to improve quality of life of people with disabilities by addressing issues related to their social exclusion, accessibility and mobility by means of advanced ICTs

- getting up-to-date information on accessibility of social facilities
- selecting a route

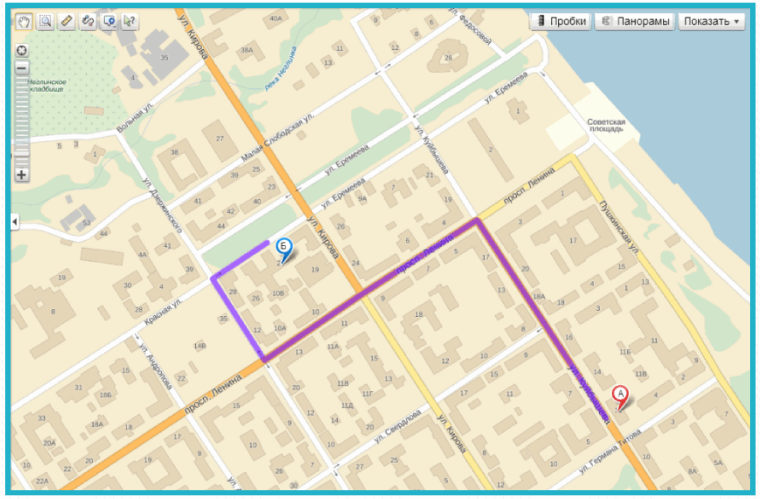
Actual accessibility information should be provided by services

Information environment

Accessibility Passport — information on social facilities

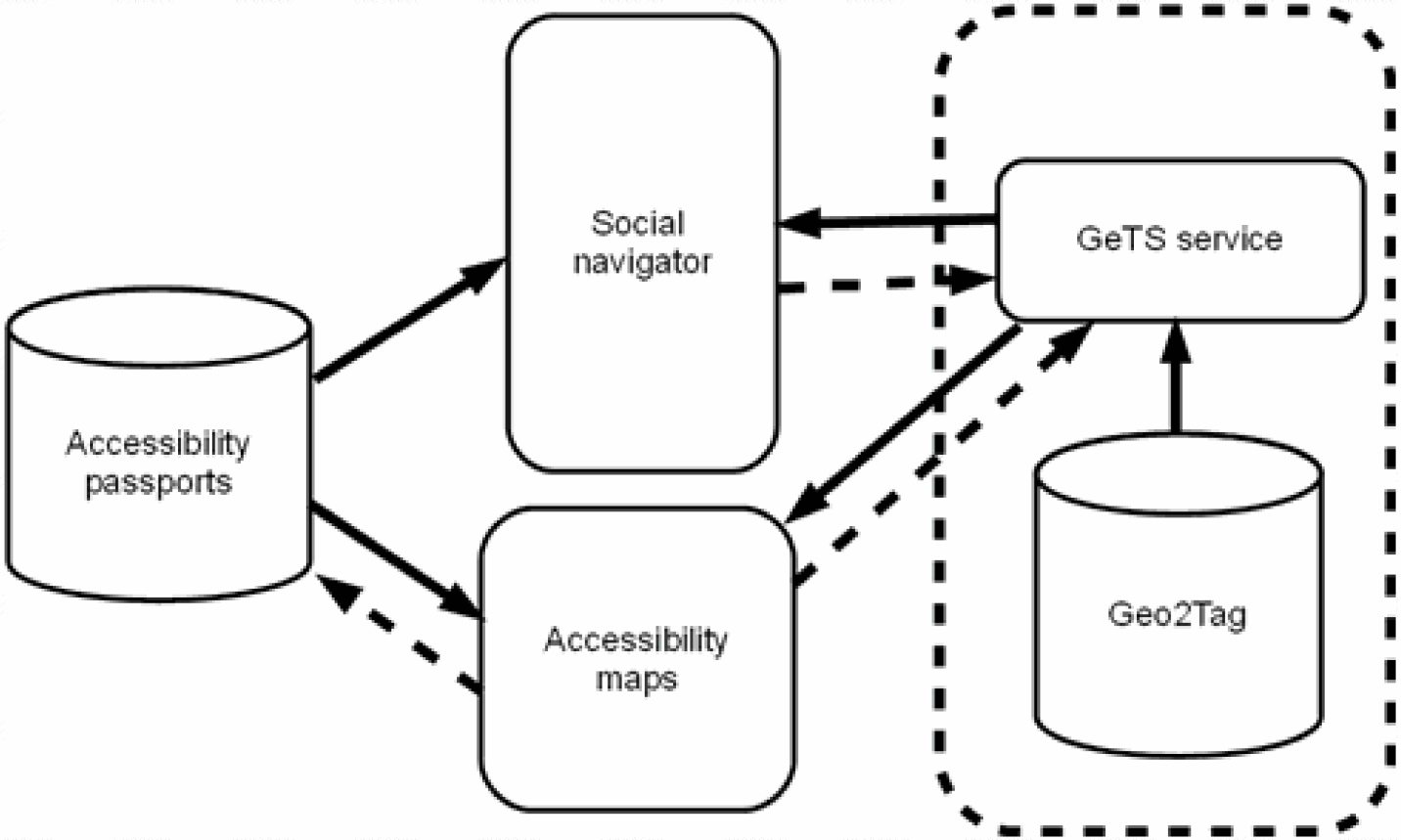


Accessibility Map — geographical map of the Region with socially significant facilities

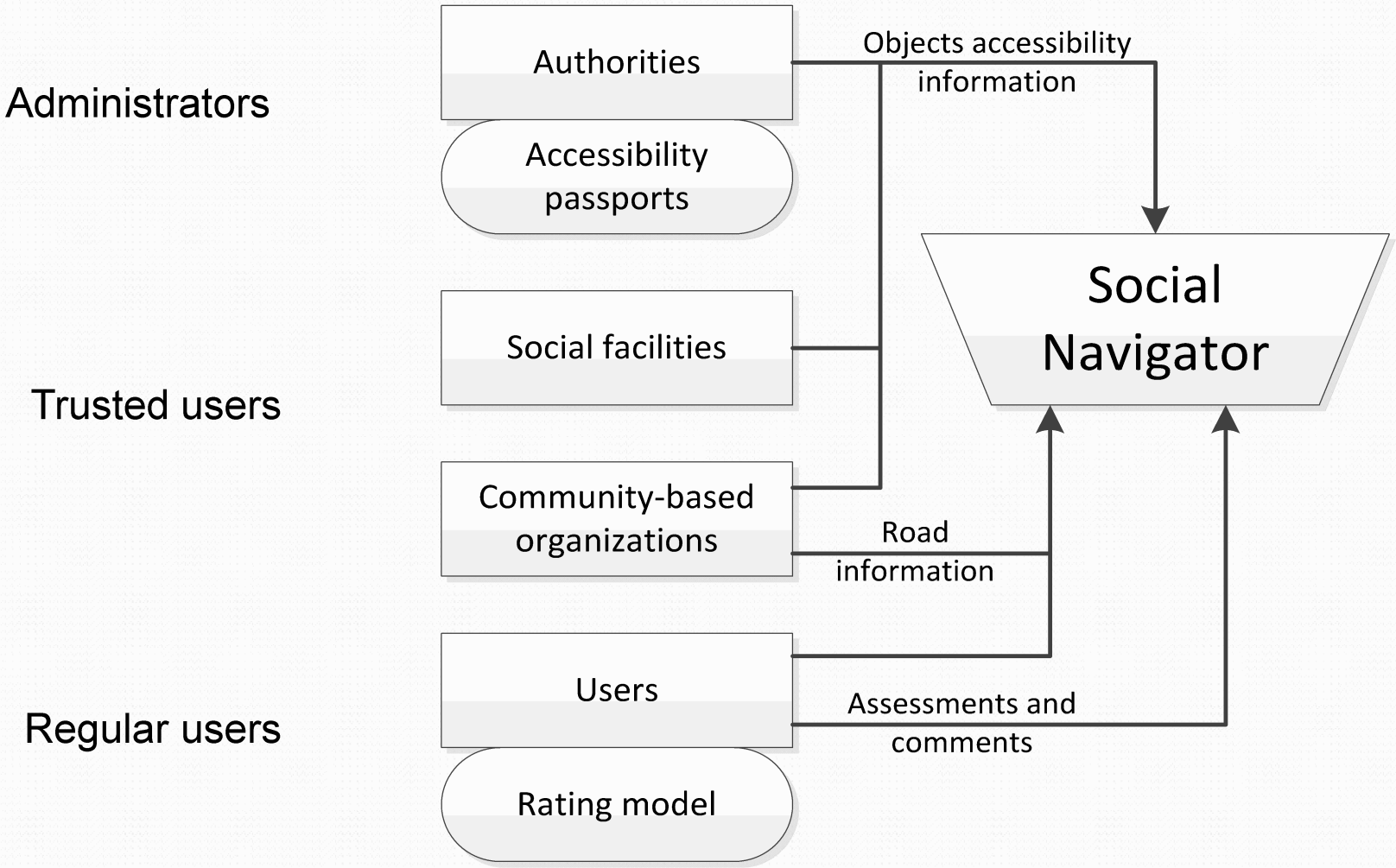


Social Navigator — route planning adapted for persons with disabilities

System architecture



Information model

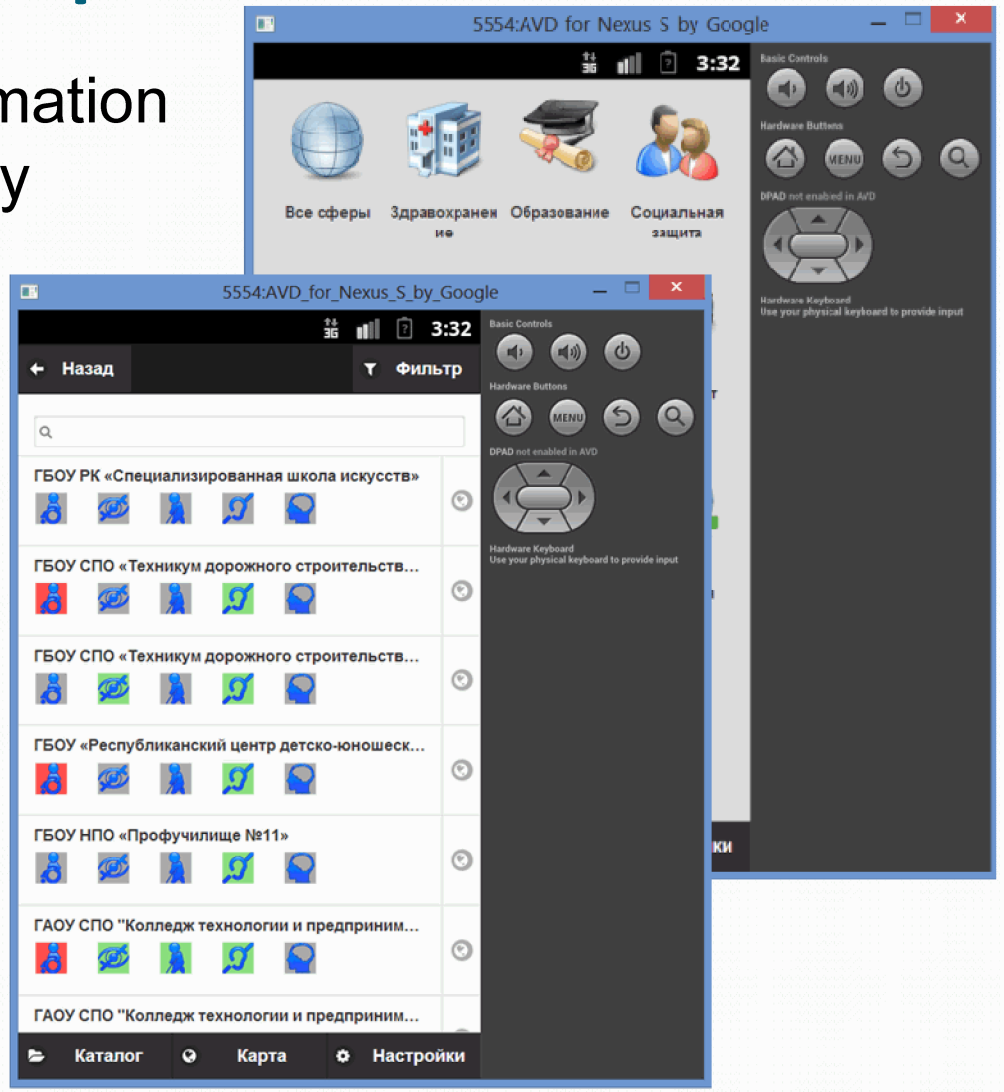


“Accessibility map” service

Provides well-structured information on accessibility level of socially significant facilities.

All organizations are grouped by activity:

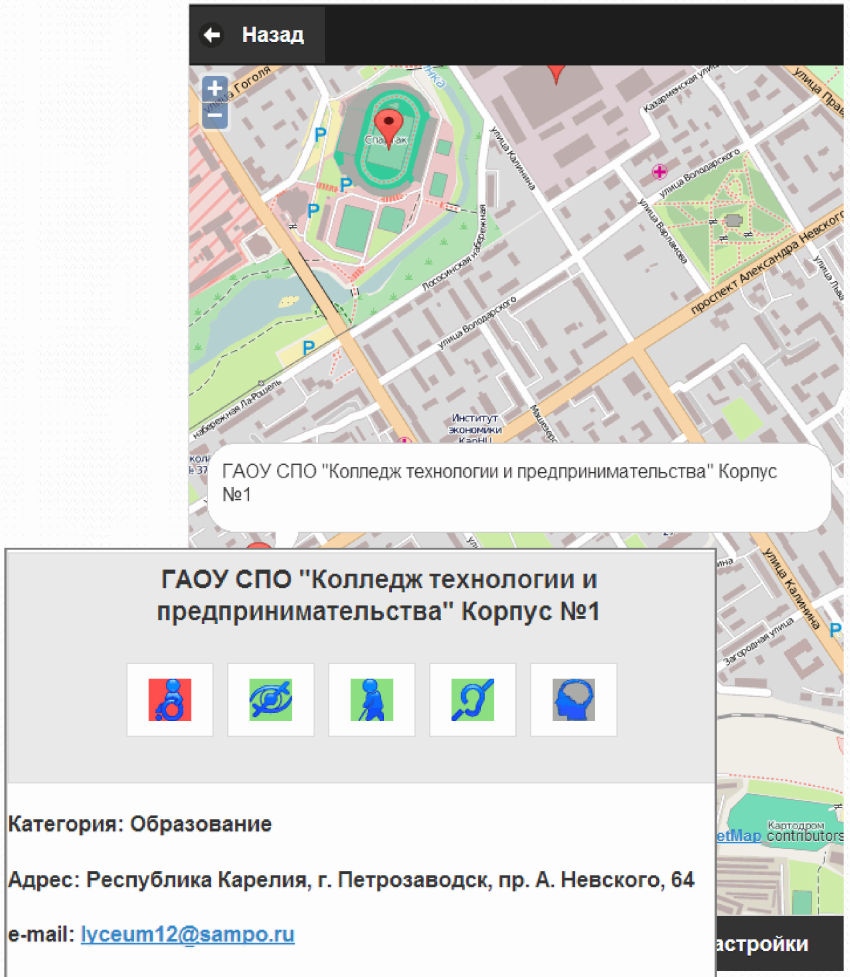
- Healthcare
- Education
- Social care
- Sport
- Culture



“Accessibility map” service

Provided information:

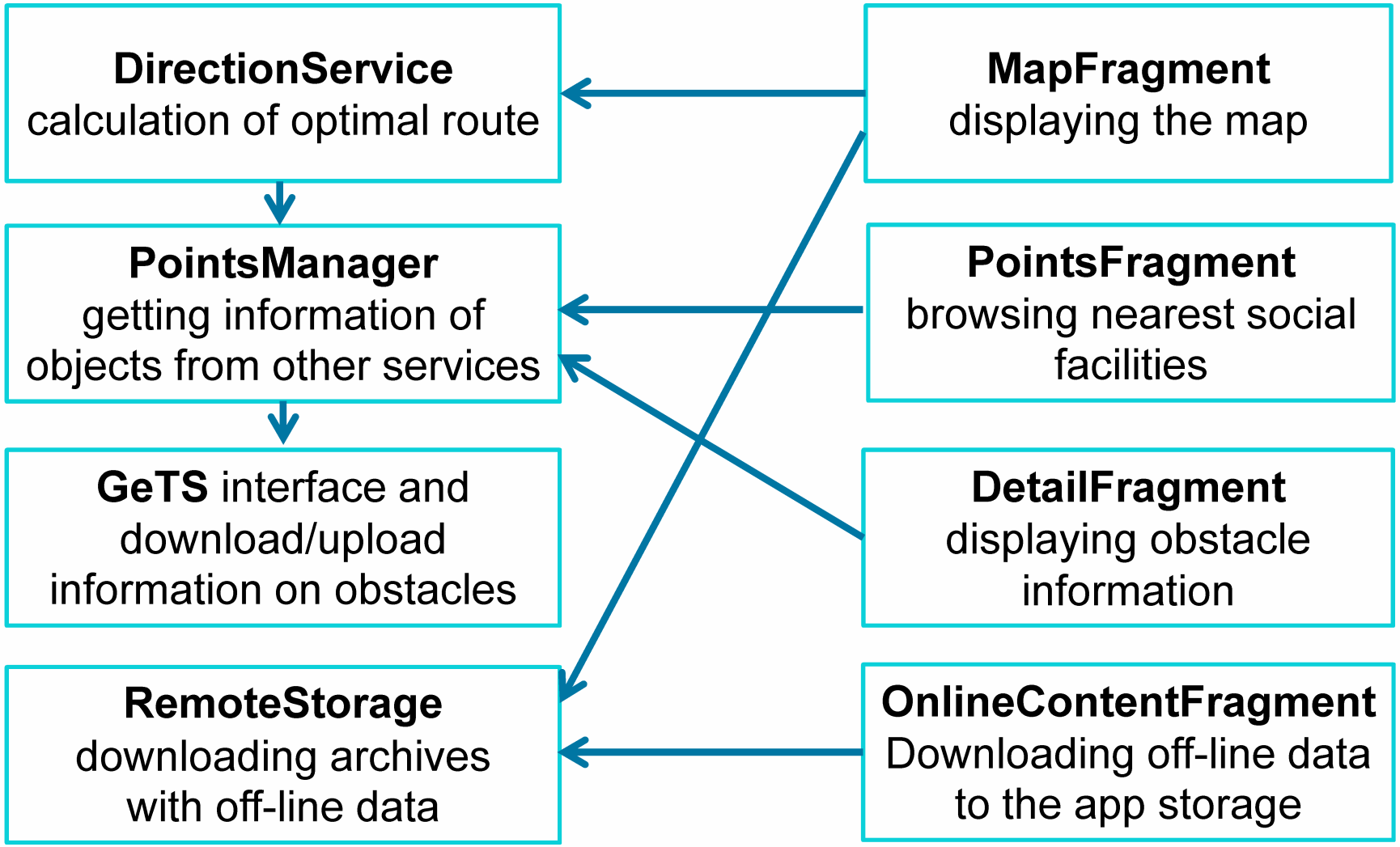
- name of the facility;
- description of activity;
- description of routes to an object;
- accessibility information related to disability types is marked by color;
- estimates and comments provided by users who have visited the facility.



“Social navigator” service

- Journey planning taking into account individual restrictions of the user (also off-line);
- Collecting users information about road obstacles;
- Collecting user feedback regarding conditions of selected route and routes sharing;
- Analyzing trip planning requests and users feedback service can discover travel bottlenecks and unfriendly areas.

“Social navigator” service



External libraries and frameworks

- **Geo2Tag** — open source LBS platform
- **MySQL** — content storage
- **HTML5, JavaScript, CSS3, Jquery, JQuery Mobile, AngularJS and PhoneGap** — create mobile application
- **graphhopper** – navigation library
- **Osmdroid** – library for showing OpenStreetMap maps
- **Mapsforge** – library for rendering maps and generation map tails

Route accessibility estimation

The route $\boldsymbol{r} \in \boldsymbol{R}$ contains m edges with corresponding distances l_k

Accessibility of edge k for category i of disability:

$$r_k^i = \frac{1}{N}\sum_{j=1}^{N} e_{kj}^i, \qquad i = \overline{1,n}, \tag{1}$$

e_{kj}^i – an assessment of the edge k by user j; $k = \overline{1,m}; j = \overline{1,N}$.

The weights of edges can be defined as follows:

$$w_k^i = l_k \cdot \left(1 - r_k^i\right)^q, q > 0; \tag{2}$$

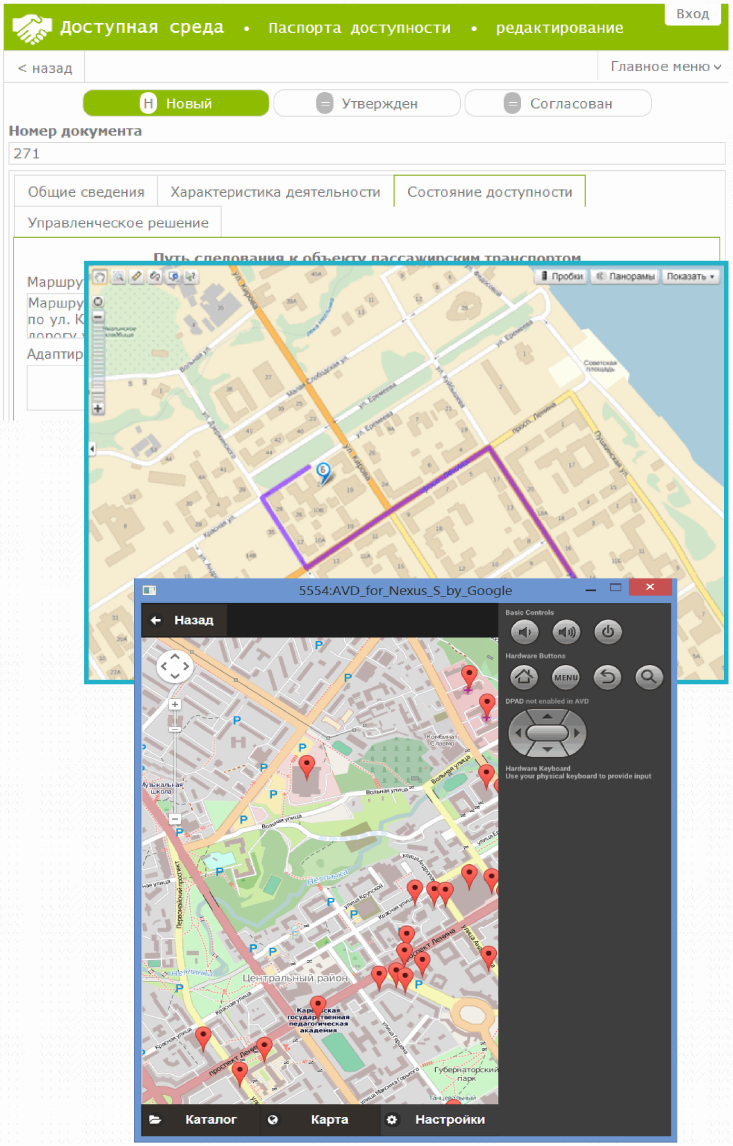
$$w_k^i = l_k \cdot \left(1 - \ln r_k^i\right), \qquad r_k^i > 0;$$

The optimal route for category i of disability is defined by:

$$\boldsymbol{r}^i{}_{opr} = \left\{\boldsymbol{r}:\ l_i\left(\boldsymbol{r}^i{}_{opt}\right) = \min_{\boldsymbol{r}\in\boldsymbol{R}} l_i(\boldsymbol{r})\right\}, \qquad l_i(\boldsymbol{r}) = \sum_{k=1}^{m} w_k^i \tag{3}$$

Conclusion

- Currently the database of “Accessibility passports” service contains about 450 objects in Karelia Republic
- Information is used by “Accessibility Map” and “Social Navigator” services
- The services with fully functional will be presented on FRUCT’16 conference
- “Social Navigator” service uses the rating model for getting information on obstacles and mathematical method for estimation of routes accessibility
- Geo2Tag is used for storing and processing data and developing the user interface.



Next steps (by October 2014)

- Completing the services development
- Development of regional “Social Navigator” portal and additional mobile services to support for persons with disabilities.
- Dissemination of information about the possibility of usage of developed services, also via social network which connects people with disability, local authorities, social and community-based organizations, Project team

Thank you for attention!