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Intelligent Services for Context-Oriented Tourists Support in Karelia Region

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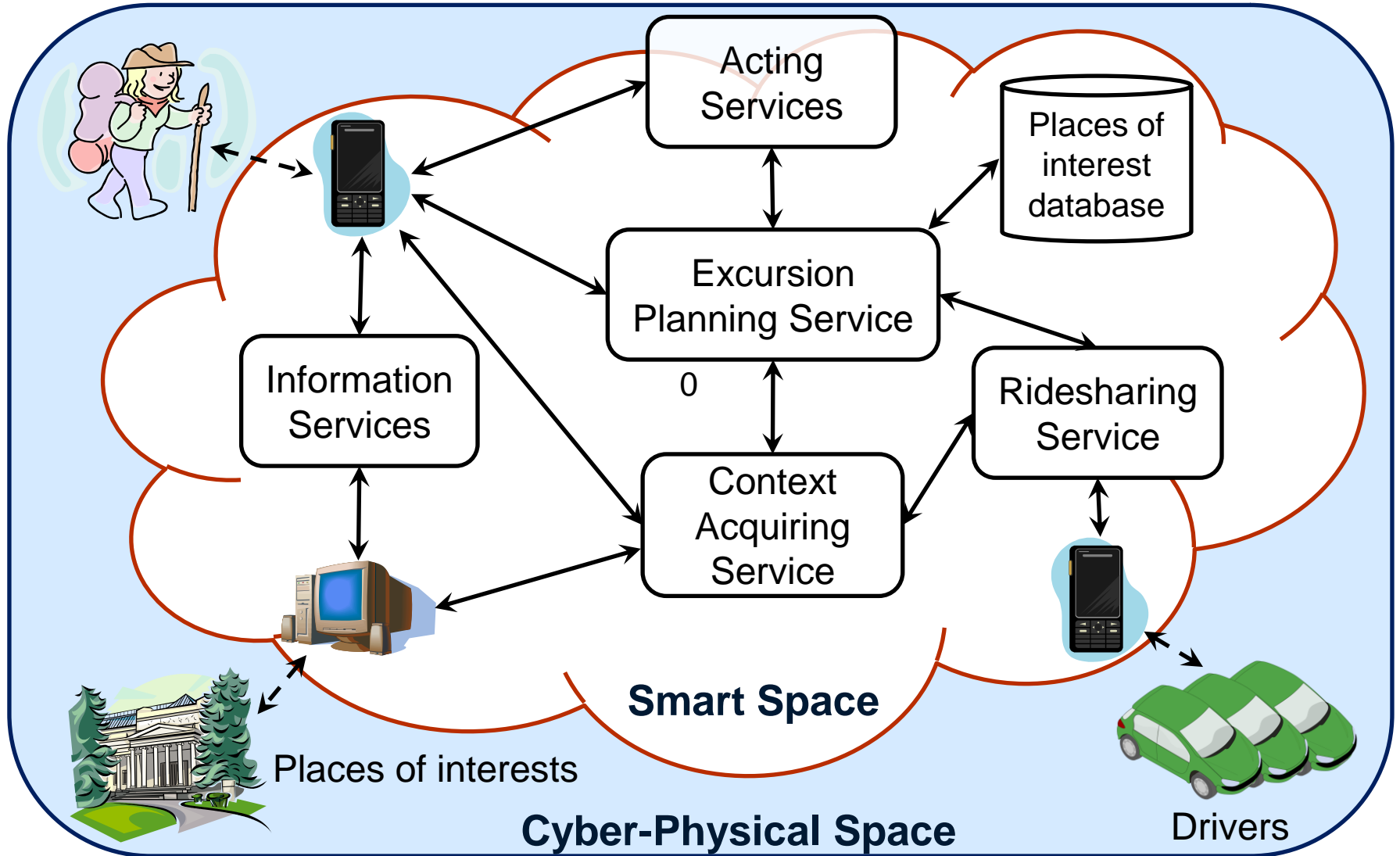
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Some Major Touristic Problems in Karelia

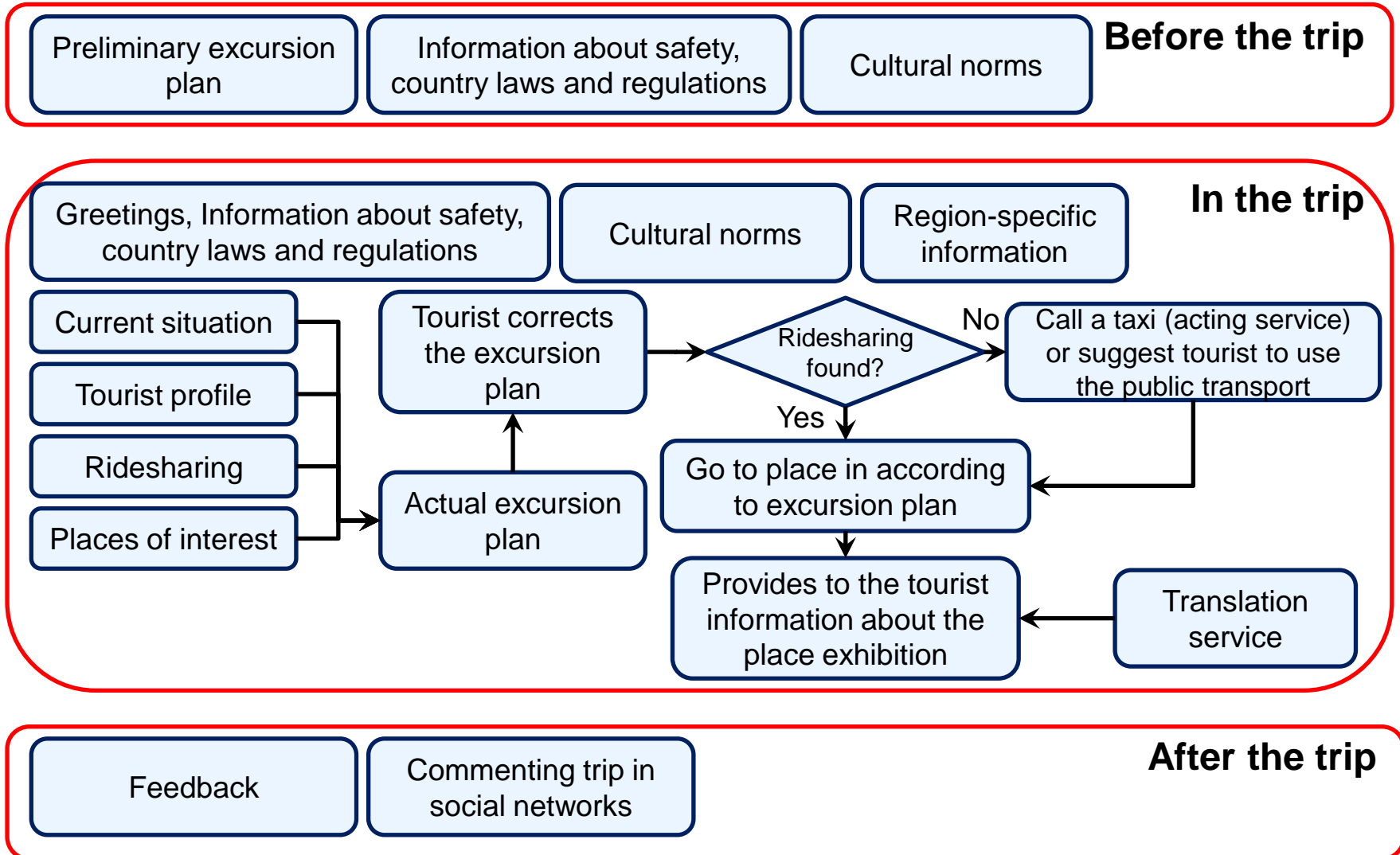
- Information
 - Tourist greetings (e.g., police and ambulance phones)
 - Country laws and regulations
 - Region specific information (e.g., how to use public transport in Russia)
 - Tourist safety
 - Etc...
- Transportation
 - Public transport
 - Taxi
 - Ridesharing possibilities
- Intelligent guides
 - Information about places of interests
 - Navigation in museums
 - Planning the best excursion for the tourist at the moment

Architecture of Intelligent Tourist Support System



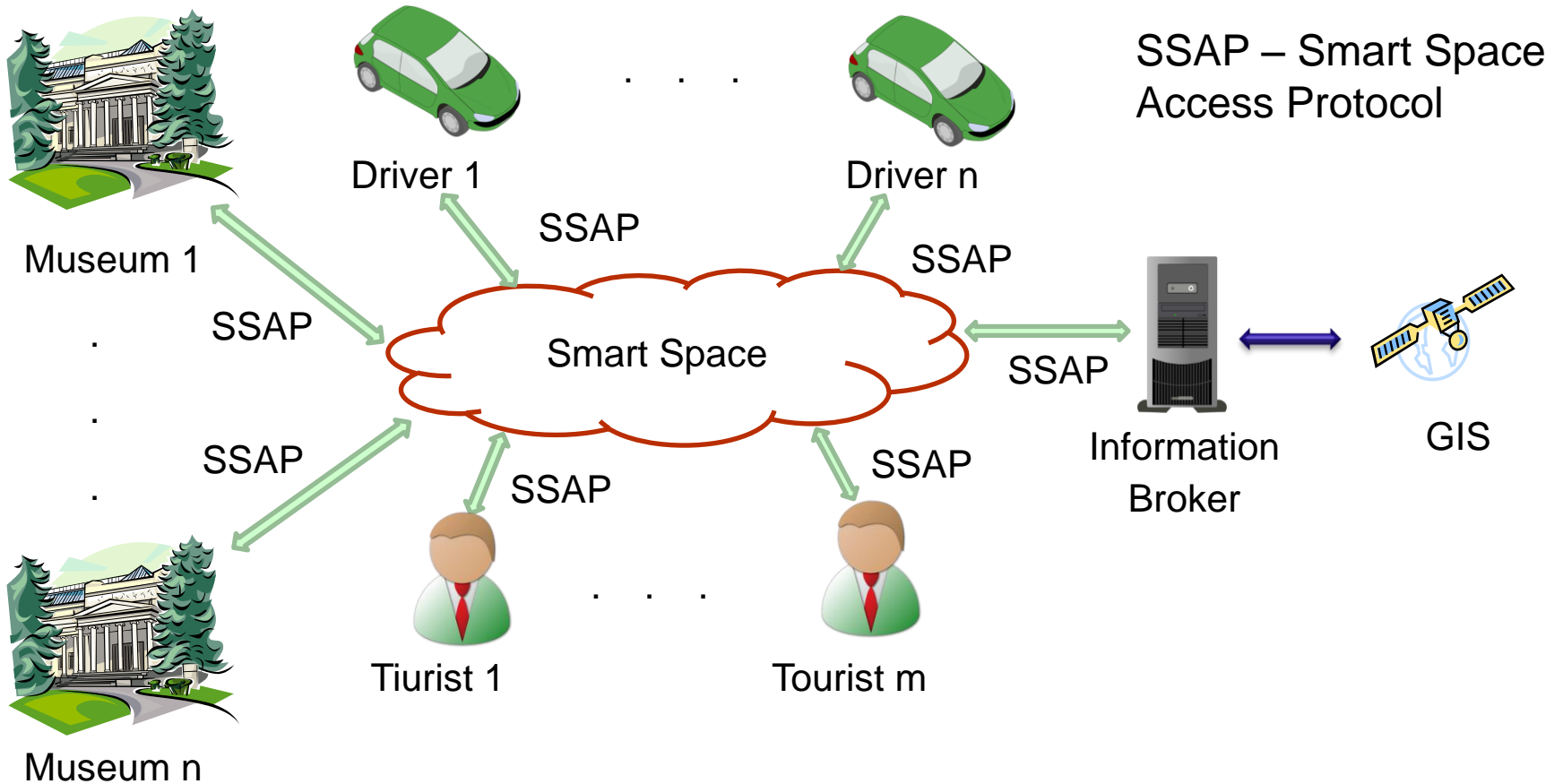


Intelligent Tourist Support System Scenario

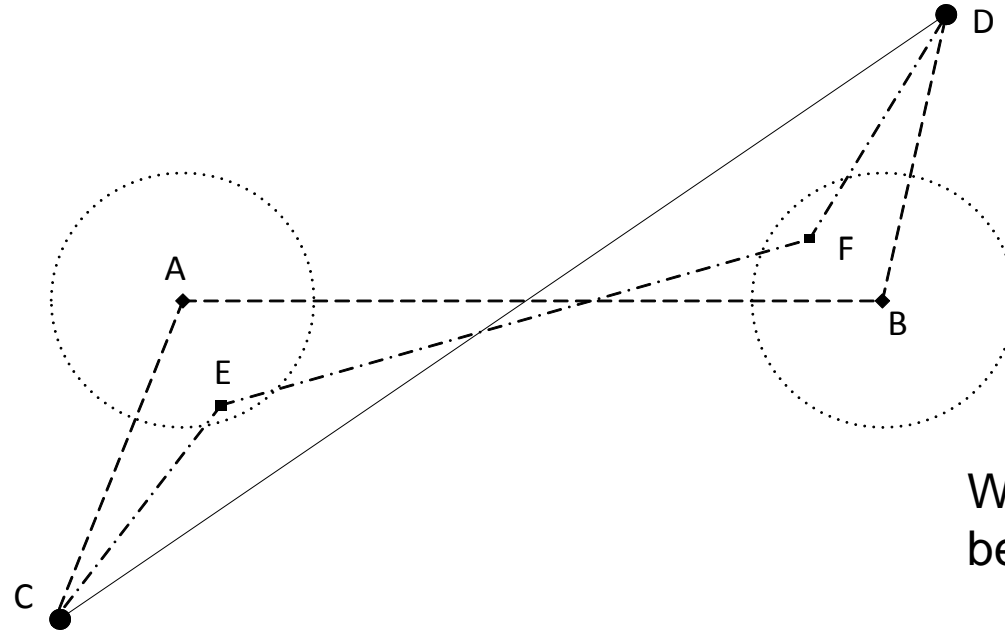




Architecture of Ridesharing Service



The Algorithm of Finding a Matching Path Between the Driver and the Passenger (1/2)



Which path will be better: CABD or CEFD?

A is the start point of the pedestrian's path

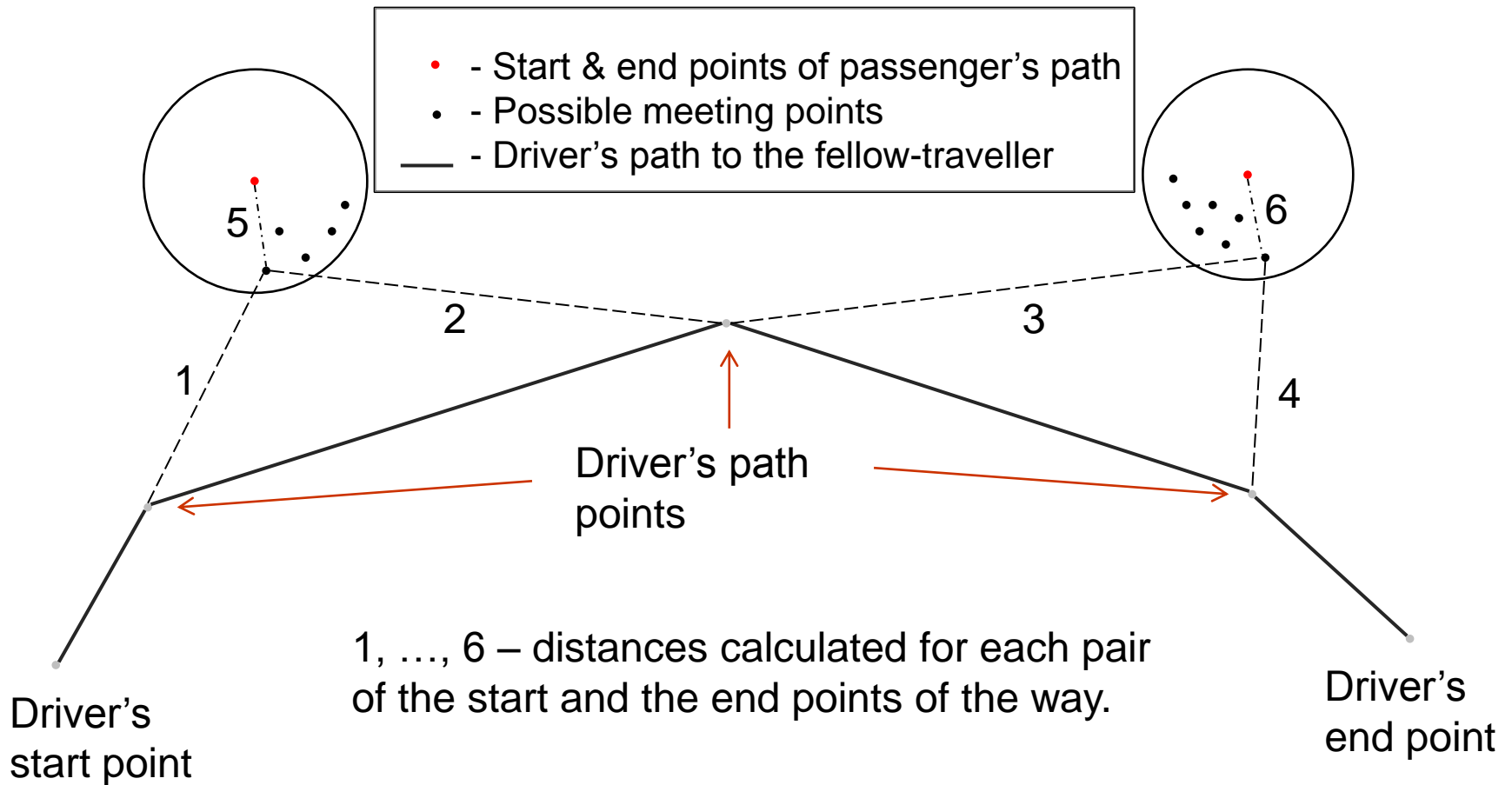
B is the end point of the pedestrian's path.

C is the start point of the driver's path

D is the end point of the driver's path.

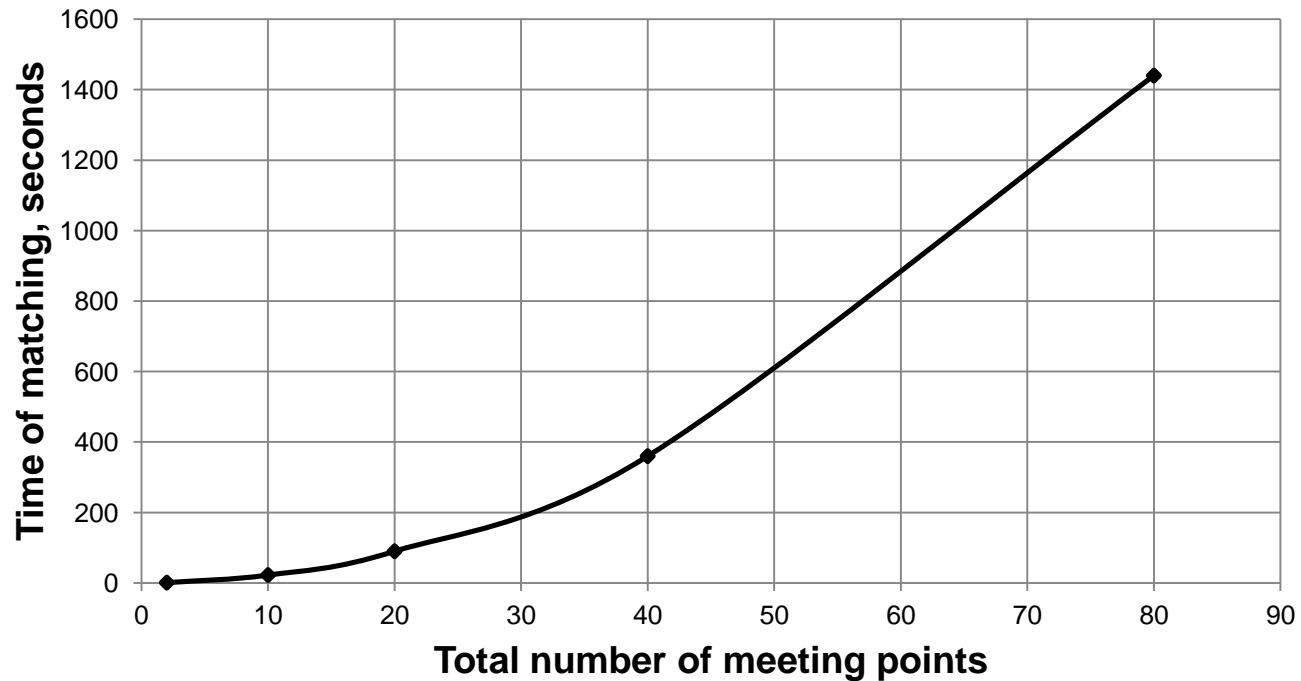
CD is the shortest driver's path, which is found with the help of GIS

The Algorithm of Finding a Matching Path Between the Driver and the Passenger (2/2)





Complexity Estimation of the Algorithm



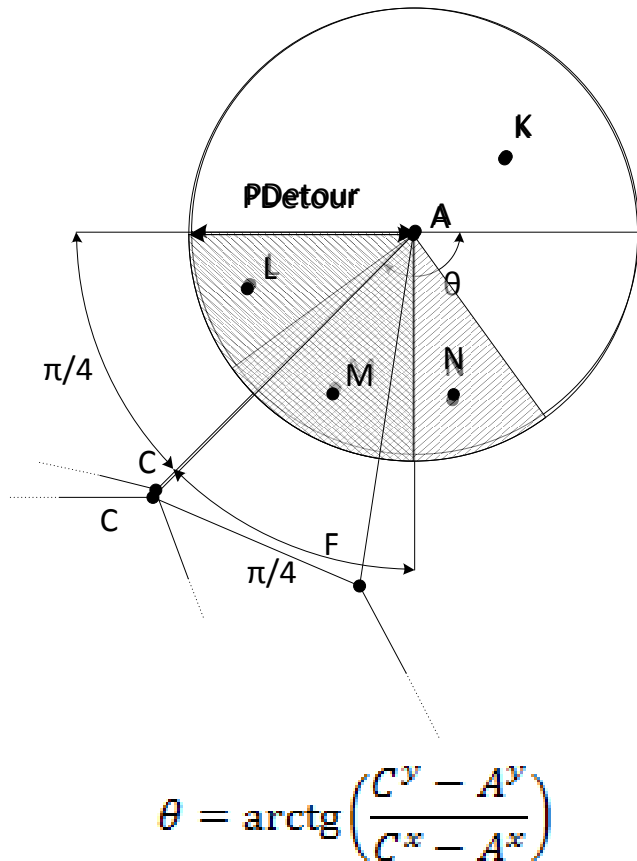
$$T_{\text{work}} = N_{\text{MPS}} * N_{\text{MPE}} * N_{\text{counts}} * t_{\text{one counting}}$$

Complexity depends on the amount of start meeting points - N_{MPS} and the amount of end meeting points - N_{MPE}

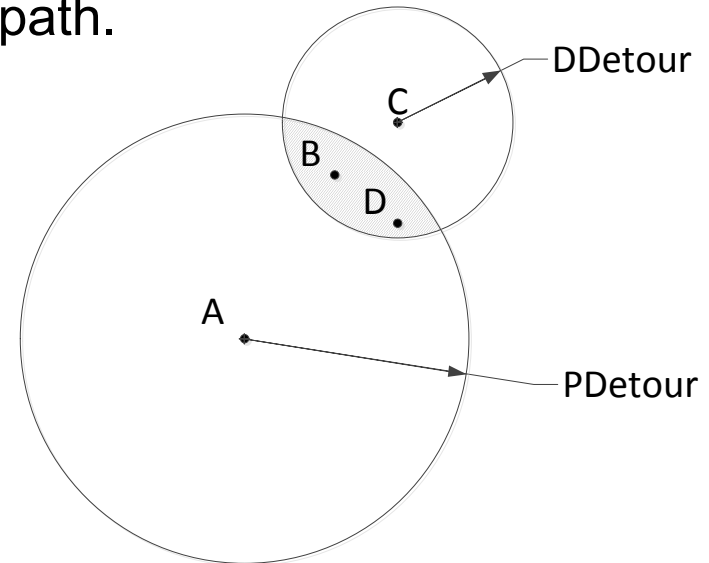
Proposed Heuristics for Reducing Algorithm Complexity



First heuristic. Selecting points of the sector from which the driver starts



Second heuristic. Selecting points in the intersections of the circles around the passenger's start and end points with the circles around the points of the driver's path.



A is the point of the pedestrian's path
 C, F is the point of the driver's path
 B, D, K, L, M, N is the possible meeting points

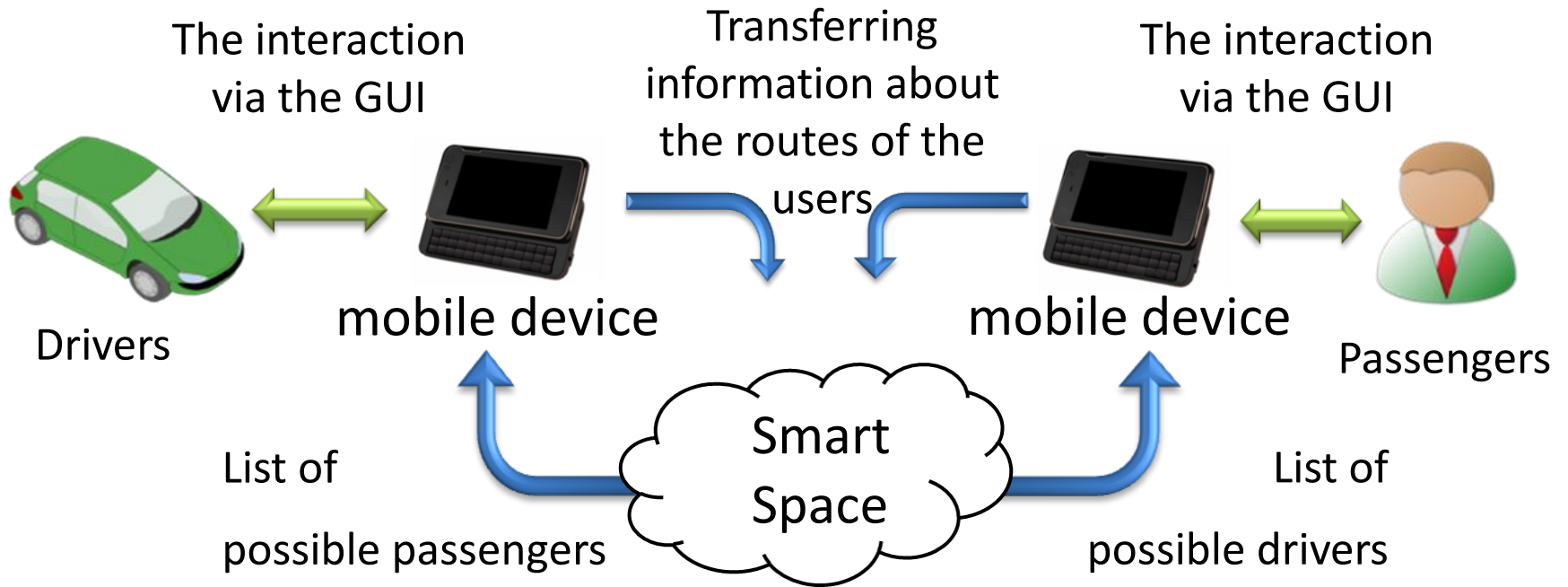


Assumptions for Using Proposed Heuristics

- A lot of drivers. Heuristics have strong limitations and filter out a lot of points. If there are no many drivers, then the use of the heuristics will rarely get positive result.
- A small value of DDetour. Heuristics will not be helpful with a large value of DDetour.
- Uniform distribution of roads on the map. The uneven distribution of roads (rivers, lakes, etc) leads to a lack of roads in some sectors, which could lead to the loss of possible meeting points due to the need to detour around the obstacles and to pick up the pedestrian on the other side.



System Working Scenario





Case Study: User Profile Configuration (1/2)

The screenshot shows a mobile application interface for configuring a user profile. The screen is titled 'User Profile' and has a status bar at the top showing '14:32' and 'Systlog'. The interface is divided into several sections:

- Personal:** Includes a 'Name' field with the text 'Name Surname'. Below it are two buttons: 'Driver' (highlighted in blue) and 'Car'.
- Photo:** Features a placeholder image of a person in a green shirt and red tie, with a 'Change Photo' button below it.
- Vehicle Information:** Includes 'Vacant seats' and 'Vacant Item place', both set to '4' with minus and plus buttons for adjustment.
- Coordinates:** Includes 'Max delay' (10 min), 'Max detour' (40 hundred meters), 'Home Location' (Longitude: 54, Latitude: 17), and 'Work Location' (Longitude: 42, Latitude: 158).

Callouts provide additional context for these fields:

- 'User's type in the system' points to the 'Driver' button.
- 'User's vehicle type' points to the 'Car' button.
- 'How many peoples and items this user can get on board' points to the 'Vacant seats' and 'Vacant Item place' fields.
- 'How long user can wait for the another user and how fair he can move to the meeting point' points to the 'Max delay' field.
- 'Coordinates of user's home and work locations' points to the 'Home Location' and 'Work Location' fields.

At the bottom of the screen are 'Ok' and 'Cancel' buttons.



Case Study: User Path Configuration

Fellow Traveller Coordinates

Start:

Longitude 54 Work Location

Map Latitude 17 Home Location

Date 01.01

Time - 00:00 +

End:

Longitude 42 Work Location

Map Latitude 158 Home Location

Date 01.01

Time - 00:00 +

Submit Trip Show Trip Ridesharing Info

Start point properties

Set coordinates of work location as start point

Set coordinates of home location as start point

End point properties

Shows merging path and information about fellow-travellers

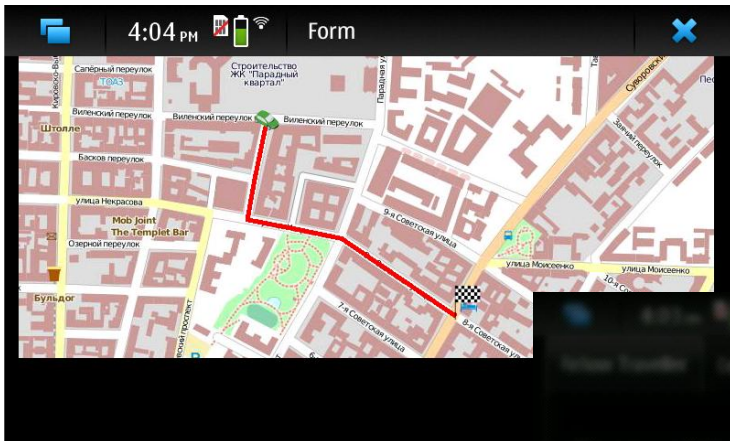
Send information to the Smart Space

Shows path of the user when he goes alone

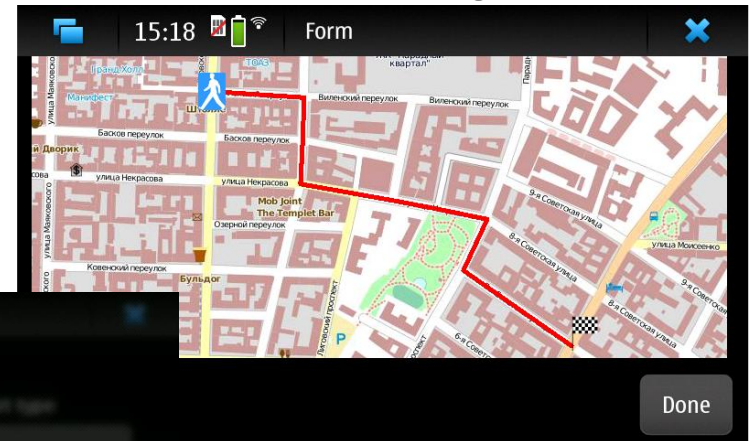
Case Study: System in Work



Driver



Passenger



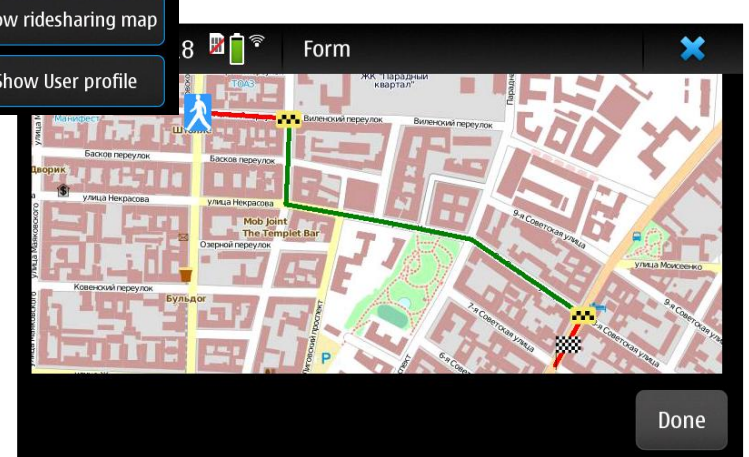
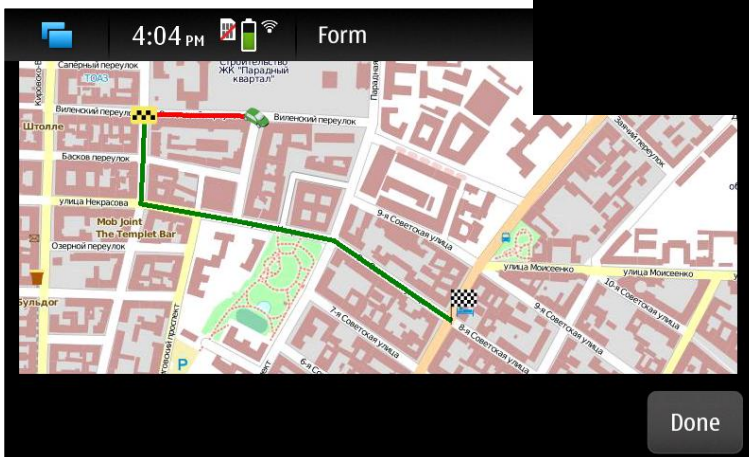
Merging

Match was found!

Ok

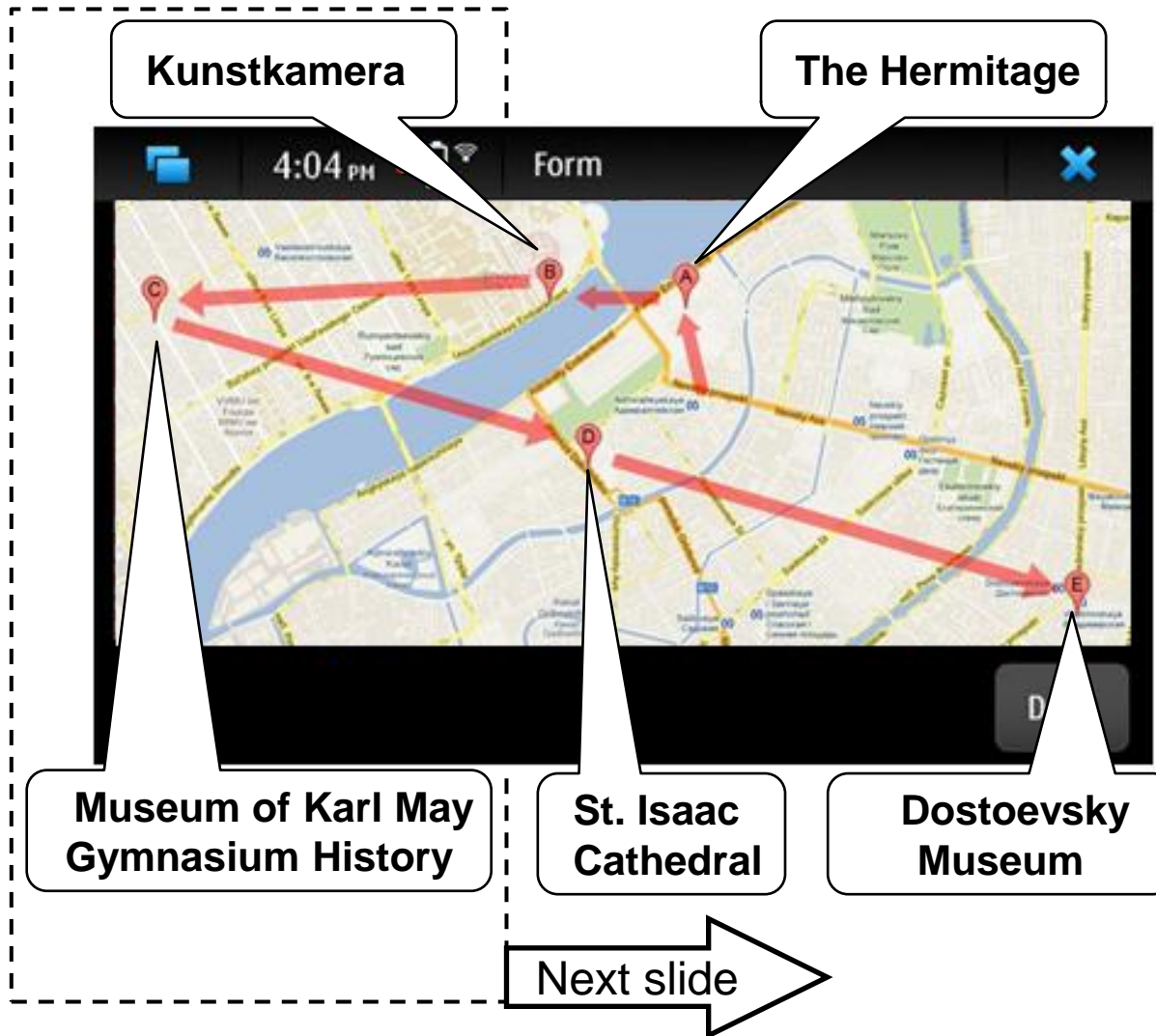
Show ridesharing map

Show User profile





Case study. Excursion Plan Service





Conclusion

- Some major touristic problems in Karelia region have been considered.
- The architecture of the system for context-oriented tourists support in Karelia region has been proposed. The system consists of set of services which interact in smart space.
- Possible scenario for using this system has been proposed.
- Detailed description of ridesharing service has been presented.
- At the end the case study has been presented.

**Thank you for Attention
Questions are Welcome**



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