
REQUIREMENTS ENGINEERING 2019/2020: SYSTEM B

URBAN MOBILITY SIMULATOR

ORGANIZATION

The Municipality of Wonderland (MoW) is facing serious problems with traffic congestions within the city, both in the city center and in the city ring. This is leading to increasing dissatisfied citizens, who are confronted with endless lines to reach their destination, especially during peak hours. Furthermore, to make things more difficult, activists started arguing about the adverse effects of traffic congestions on the environment. MoW's urban mobility department has decided to purchase an urban mobility simulator to investigate and improve the situation, and the company you are working has been contracted to build the system. First things first: you need to go talk to Mr. Dalpiaz first, the head of their urban planning department.

AS-IS SITUATION

Mr. Dalpiaz has already provided you with a high-level overview of how the department is currently deciding on the traffic planning. He wrote that they continuously experiment with micro-level management: whenever a problem is encountered, the department opens a project that focuses on improving that problem. For example, recently, the Northern section of the ring, which surrounds the entire city, had a serious issue during the peak hours, and they have decided to introduce adaptive traffic lights to reduce the inflow of cars from the North West entrances of the ring. This decision was taken via a focus group with three citizens, two police officers, a professor from a technical university, an urban mobility planner from a nearby city of approximately the same size of Wonderland, the vice-mayor, and four members of the department itself. During the workshop, they have evaluated different solutions that were proposed by the various people who were involved in the focus group. In case of urgencies, instead, the decisions are typically taken internally by the department, and the major source of inspiration consists of replicating solutions that the people in the department have seen in other towns or cities.

Unfortunately, it seems like the effectiveness of these techniques is low and there seems to be no easy way out. The department, however, has equipped the city with a whole number of sensors, and there is now a knowledge base that represents traffic flows for around three weeks. The department has recruited two smart mathematical modeling people. They created some models that seem to be able to reduce traffic congestions, at least in theory. However, there are serious doubts on the environmental friendliness of the proposals that were made.

VISION

After a thorough discussion with these mathematical modelers, it became clear that their models work well to improve flows, but they are not geared toward reducing pollution, noise, and they do not provide a fair treatment to all the areas of the city. A more interactive solution is necessary. Mr. Dalpiaz was told to look into urban traffic simulators, which seem to be much more powerful, customizable, and easier to use by the urban mobility planners. He said he would like a reliable system; he can't afford, financially, to pay for the construction of a system from scratch. However, he has heard that several platforms exist, although they do not readily support the creation of alternative scenarios and the identification of solutions that minimize pollution levels and keep noise levels under control. He would like a platform that can be operated independently by the people in the department, without the necessity of asking an expert to execute a simulation. Furthermore, he wants this simulator to execute on premise, for cloud-based solutions are not allowed by the municipality regulations. Finally, the simulator should have a simple way to embed real-time data to make sure the executed simulation regards the current situation in the city, and not an old one. However, it should also be possible to take snapshots of specific days, or parts of the day, and to execute simulations against those scenarios.

Mr. Dalpiaz is willing to provide you with additional information through a face-to-face interview in his office. He has some ideas himself that he would like to share too; he is certain that his ideas can help you shape the system to be built.