Visualizing Decision-Relevant Map Layers to Support Travel Planning

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Maps perform a valuable function and are involved throughout the whole travel process. This master thesis contributes to a startup's project that builds a novel decision support system in the context of sports travel (e.g., surfing/kitesurfing, skiing, hiking, mountaineering).

The study contributes insights on what information can be relevant for making travel-related decisions and proposes how map layers and map elements can be visualized in different zoom levels. A prototype showing how decision-relevant map layers can be visualized was implemented.

OBJECTIVE

The main objective of the thesis is to define, visualize and evaluate decision-relevant map layers of a web-based application.

BACKGROUND

The startup's product is based on a recommendation algorithm that provides a list of recommended areas and ranked items depending on selected filters. Besides the recommender system, the main idea of the startup is to show areas, subareas, groups of items, and individual items depending on zoom levels (global, local, and spot).

METHODOLOGY

The methodology comprised seven main stages, presented in Fig.1. The decision-relevant information was divided into three main groups:

1. Decision-relevant map layers.

2. Decision-relevant places information (e.g., accommodation, food & drink, local facilities, etc.).

3. Decision-relevant weather information (weather widgets displaying current weather, daily forecast, historical data).

APIs as a widespread issue have been evaluated in many different ways [1], [2]. However, there is no standardized methodology on how to evaluate an API.

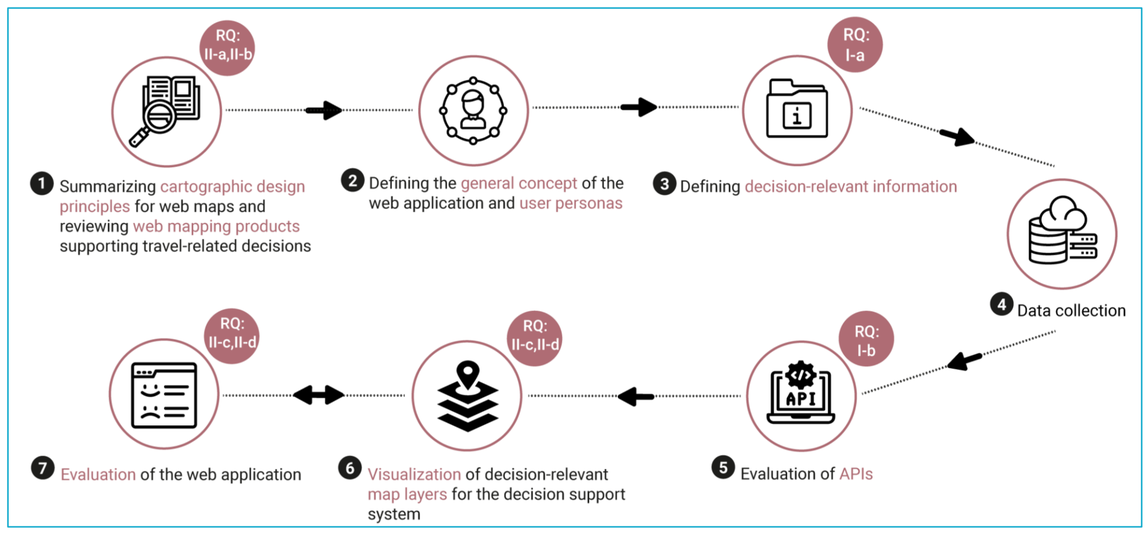

Fig.1. The workflow of the methodology.

Thus, criteria for each required API were defined to compare existing APIs and choose suitable to obtain necessary data for the web app development.

PROTOTYPE

Thus, Google Maps API, Overpass API (hotels, restaurants), Outdooractive API (hiking trails) were used. The prototype's visualizations were divided into three zoom levels: so-called "Global level", "Local level", and "Spot level" and compared on three different basemaps: customized basemap, terrain, and satellite. The visualizations on the global and local levels were the system's recommendations and top 10 hiking trails within the recommended areas (Fig. 2, 3).

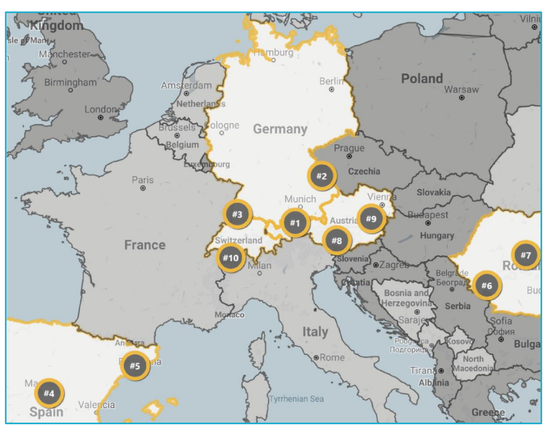

Fig.2. Visualizations on the global level.

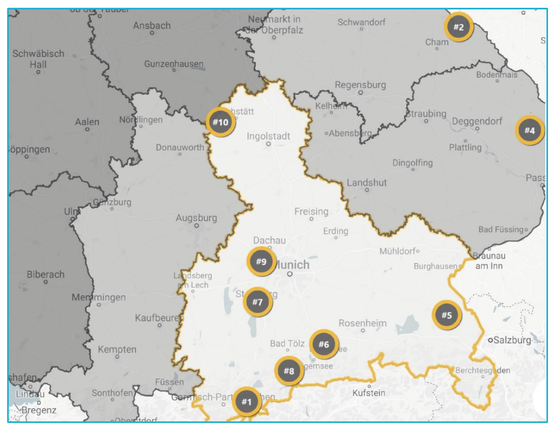

Fig.3. Visualizations on the local level.

The visualizations corresponding to the spot level were clusters of available hiking trails based on a difficulty level, individual hiking trails, and points of interest.

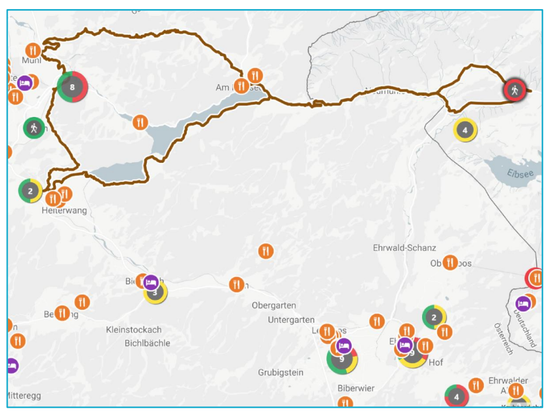

Fig.4. Visualizations on the spot level.

Besides, an itinerary with all selected items by the user were visualized by days and available on all zoom levels.

USER STUDY

The user study was conducted as an online questionnaire based on static screenshots of the prototype. 60 volunteers participated, of whom 53 completed the entire questionnaire.

RESULTS

The user study produced predominantly positive results and gave ideas on how to improve the proposed visualization of decision-relevant map layers further. The summary is presented in Fig. 5.

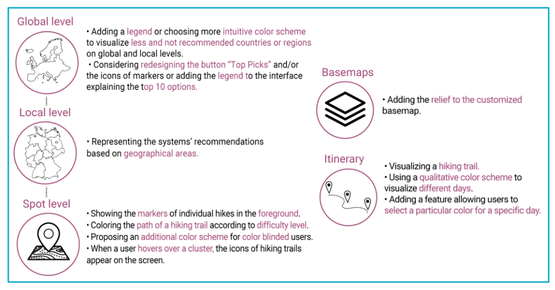

Fig.5. Future work based on the survey's results.

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