

Capacity Area B1 Task 2.3 Deliverable 1**Standards for web-based publication of transport needs**

Current systems that let people find each other based on their spatio-temporal needs (e.g., offering and searching for a ride in a shared car in the context of carpooling) are built according to the conceptual model of service provider and consumer. Most of the time this only allows the offering party to publish their ads, and simply provides the demanding side with a query engine to retrieve the different offers. There are, however, several shortcomings to this approach, such as the fact that they are either highly specialized and rigid (e.g., job platforms) or too generic and broad (e.g., portals for classified ads) to match specific needs. The result are systems that provide different capabilities and user interfaces based on different data structures and system architectures, which require users to learn how to interact with all of them. The requirement to explicitly publish offers on the platform, before demanding parties are able to search for them, introduces a considerable delay between the posting of a need and a possible match.

Ideally, matching should work both ways, automatically capturing the intent of both offering and demanding parties, and matching it as soon as a complementary need is found. For this, however, the development of explicit standards for web-based publication of transport needs is needed. As deliverable, we present a framework that specifies the components, concepts and algorithms needed in order to process spatio-temporal match queries in real-time, making optimal and early matches possible. The standards are based on the notion of the duality of query and result. In particular, we treat every search query (e.g., “I am looking for a ride to Rome”) as a potential result for someone posting a complementary query (“I offer a ride to Rome”), thus ensuring earliest possible matches. Furthermore, our model takes into account the dependency of a search on a particular location and time. The standards are based on the formalization of states as snapshot graphs (of linked data). States consist of a time, and (spatial) statements about entities and agents. Transport needs are specified in terms of states (goals & facts), while actions transform and generate new graphs, as outcomes of agents collaborations. A graph similarity measure serves to assess the quality of the outcome of a matching process, as compared to goals specified by the agents. Figure 1, for instance, shows an exemplary goal of a system user “Alice”, who searches for a ride in a shared car with certain requirements, in this case enough space for her luggage.

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:AlicesGoal {
  :self a n:GoalState ;
    n:dateTime "2017-07-07T16:42:00Z"^^
      xml:dateTime .
  :Alice wgs84_pos:long 8.304375 ;
    wgs84_pos:lat 47.049545 .
  _:anyCar a :Car ;
    n:luggageSpaceLiters 800 ;
    n:hasPassenger :Alice .
}

```

Figure 1. An exemplary goal