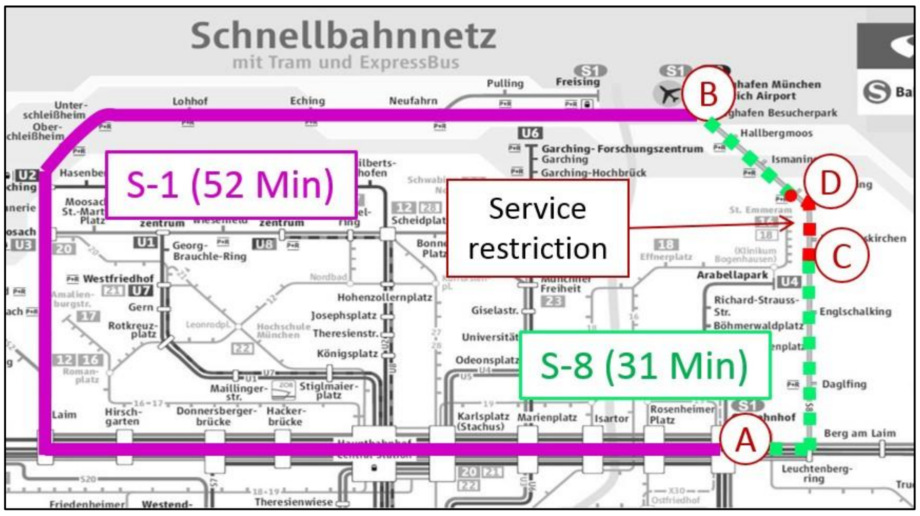
Improving real-time public transport journey planners through the consideration of the travelers' subjective route expectations

Master's Thesis of Roberto Emmanuel Corral Martínez

Supervision:
Dr.-Ing. Antonios Tsakarestos

Mentoring:
Dipl.-Math. Werner Kohl (Mentz Datenverarbeitung GmbH)



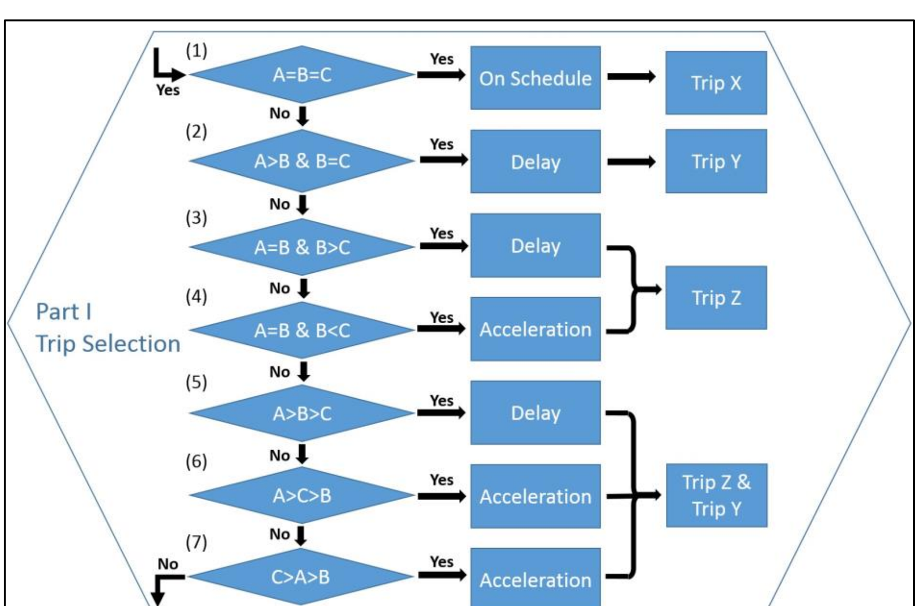
Whenever a user of a journey planner finds a trip different to the one he is accustomed to without an explanation, his trust on the public transport service is undermined. Even worse, the passenger may be misled from his destination. Doubting the received information, he may follow his own mind ending up caught by the service restriction at hand, without the possibility of having anticipated it because he was never warned by the journey planner. The causes for displaying these unfamiliar connections in a journey planner are the planned timetable changes and/or real-time incidents leading to a service restriction. By the comparison of both it is possible to detect a transit vehicle deviating from its programmed route. These different behaviors will be analyzed in three operational scenarios, to be later matched with their corresponding notification for the passengers.

Crucial for the scenario identification was the selection of the *best trip.* The decision made by the journey planner complies to the following conditions : 1) concerning "departure at" : *i.* earlier arrival to destination, *ii.* same arrival and later departure or *iii.* identical departure and arrival time, but less transfer; or 2) concerning "arrival till": *i.* later departure from start, *ii.* same departure and earlier arrival or *iii.* identical departure and arrival time, but less transfer. It is important to mention that it may be possible to meet the three conditions of the best trip criteria or at least two of them in the same trip, but that may not be always the case. As a choice hierarchy, if the three conditions are splitted among the total of the possible trips, the minimum travel time (criteria *ii*) will be taken conveniently as the first selection parameter above the other two variables. If more than one trip is found satisfying that condition, then the second deciding parameter will be the number of transfers (criteria *iii*). Whenever trips fulfill the past two conditions, the indisputable best trip will be that meeting also the third variable (criteria i), which is unique.

Departure at 08:00				
ID	Departure	Arrival	Duration	Transfers
1	08:01	08:40	00:39	x2
2	08:04	08:40	00:36	x2
3	08:08	08:40	00:32	X1
4	08:08	08:40	00:32	x2

Arrival at 14:00				
ID	Departure	Arrival	Duration	Transfers
1	13:35	13:52	00:17	X1
2	13:35	13:52	00:17	X2
3	13:37	13:56	00:19	X2
4	13:37	13:58	00:21	X2

Arrival at 19:00				
ID	Departure	Arrival	Duration	Transfers
1	18:33	18:55	00:22	X2
2	18:33	18:55	00:22	X1
3	18:36	18:51	00:15	X2
4	18:38	18:53	00:15	X2
5	18:39	18:58	00:19	X2
6	18:39	18:56	00:17	X2



The found best route option belongs to the scheduling of either one of the following timetables: 'A' *Published Timetables,* 'B' *Planned Service Restriction* or 'C' *Real-time Incident*. Furthermore, for the same trip input (origin-destination, departure or arrival time) each calculated timetable has a corresponding connection. The comparison between them leads into the selection of the considered scenarios, namely, *Trip X: Normal Operation*, *Trip Y: Planned Service Restriction* and *Trip Z:* Real-time Incident, Each scenario considers an effect (delay or acceleration of the trip), proposes a notification standard and specifies the type of information to be displayed for the travel time (planned and or real-time data). In the analysis flowchart of the thesis, the presented communication interface between an ITCS and the journey planner, was enhanced to isolate a planned service restriction data from the published timetable database. This enabled the classification of 13 different combinations of trips, leading to the successful pairing of each passenger with his corresponding trip notification.