to the infrastructure itself. However, many studies on HSR have highlighted the importance of the provision of services (timetables, frequencies, fares, etc). A high performance infrastructure such as HST may not be so useful in terms of accessibility and reducing travel times unless adequate services are provided. Considering this service approach, the paper develops a utility indicator for HSR services. This indicator is based on principles of the Time Geography, considering the available time at destination and its associated travel costs for different travel purposes. The comparison of this utility indicator with the traditional accessibility ones for the Spanish HST network provides a new perspective of the real usefulness of this infrastructure. This comparison evaluates to what extent provided services in each city allow reaching the potential accessibility of HST network. The methodology provides a useful for transport planning and a better design for city strategies.

**[123] ACCESS TO HIGH-SPEED TRAIN: DEFINING CATCHMENT AREAS AT STATION LEVEL**

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Transit ridership has been always an interesting topic in transport research, especially for transport modes transport modes attached to hubs (stations). In these cases, the access to the hubs is crucial to define the potential of use of transit. This is even more interesting in the case of High-Speed Train (HST) because it’s defining characteristics: an ‘anchored’ transport mode, with few stops, mid and long run services and its integration within the cities (station location) and with other modes. In mid and small cities, where opportunities of transport are scarcer, these factors are of relevance when defining the access to HST services. The paper aims to define the catchment areas of the HST stations in the Spanish network by setting out a methodology which combines surveys of users at station level with accessibility models based on distance-decay weighted regressions. All this has been carried out at station level, taking its integration within the city and with other transport modes, car mainly. The main outcome is twofold: in one hand we are able to measure the extent of the influence of the HST services based on empirical surveys. On the other hand, the paper is able to connect the issue of the station location with the mode integration and modal coordination to fully take advantage of the opportunities given by the HST.

**[94] SPATIAL ANALYSIS OF ELDERLY COMMUTERS’ ACCESSIBILITY TO TRAIN STATIONS: A CASE STUDY OF PERTH, WESTERN AUSTRALIA**

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Objective: Approximately 12% of Perth’s population is aged 65 or older. Projections suggest that this proportion will continue to increase as a result of the large number of children born after the cessation of World War II (1946-1964); commonly known as the baby boomer generation. Accessibility to train stations for the aging population has become a more important issue as the number of elderly commuters continues to grow. The aim of this paper is to develop a complex accessibility measure at a fine spatial scale for understanding elderly commuters’ accessibility to train stations. Data and methods: A two-day intercept survey was conducted at seven, highly distributed, train stations in Perth, Western Australia, to collect accessibility data including origin and destination of commuters, departure and access time, trip purpose and activities and commuters’ perception and attitudes towards the facilities and service quality of train stations. Only data for patrons aged 60 years or more was used for this study. Three indices, including a network connectivity index (gamma index), market share index and service quality index are used to measure the accessibility of elderly commuters. The market share index is calculated from Smartrider data, which is a kind of electronic ticketing system used in Perth, Western Australia, that records when a user boards (colloquially ‘tags-on’) or leaves (‘tags-off’) a public transport vehicle. A doubly constrained spatial interaction model is used to estimate service quality index based on a function of generalised journey time (GJT) and the service quality survey data. Finally, a gravity model is used to generate an elderly commuters’ accessibility index for each station based on these three indices and individual travel time. Expected Results: The results from accessibility analysis will provide useful information on: a) perceived facility and service quality at each of the seven stations examined and thus feed service quality improvement strategies; and b) reveal any possible factors affecting elderly commuters’ accessibility to the train stations, thereby targeting the key areas that may need improvement.

**[15] BICYCLE ACCESSIBILITY AND ACCESS MODE CHOICE TO RAILWAY STATIONS IN THE NETHERLANDS RANDSTAD SOUTHWING**

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The main objective of this paper is to examine cycling accessibility to the railway station. Particularly, the study verifies the Influence of impedance factor of a cycling route to the railway station. StedenbaanPlus is a regional transit oriented development with aims to densify urban areas around 35 railway stations approximately. This paper is based on data and analysis from the NWO project called ‘Transit Oriented Development in the Randstad South-Wing’. This research project studies pedestrian and cyclist accessibility to Dutch stations under the program StedenbaanPlus. The data set in this paper is mainly composed by: sociodemographic, land-use and bicycle network data spatially georeferenced. The analysis is composed by three parts: 1. Station index: includes the status of bicycle and pedestrian facilities at station, amenities, cleanliness, safety, etc.. 2. Diversity index: represents the station as node. This index is composed by measures such as
number of jobs, population, companies, and places for shopping within the influence area. 3. Connectivity index: represents the network connectivity, from both local and regional approaches. This index is composed by measures such as number of railway lines, type of trains reaching the station, quality of bicycle and pedestrian network, lightness, etc. Spatial and statistical analyses are conducted to calculate an impedance factor of the route to the railway station. These results are used as input of two discrete choice models for both walking and bicycle access share. The expected results will show: (1) the perceived utility of the route by pedestrians and cyclists; (2) the influence of connectivity measures in the bicycle and walking access share. Hence, the main findings will contribute to improve both walking and bicycle access share in Dutch railway stations, as consequence to increase the number of train passengers.

SS 6. A - Transportation Safety and Security Issues
Amphitheatre III; Chair: Luca Zamparini

[18] NON-RECURRENT ROAD CONGESTION, ACCIDENTS AND INCIDENT DURATION
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Road congestion is one of the main externalities of car use. We focus on the effects of car accidents and other types of incidents (e.g., breakdown of car) on non-recurrent road congestion on the Dutch highway network. By estimating a location-fixed-effects model, we aim to determine the causal effect of incident duration on non-recurrent congestion. We demonstrate that conditional on an accident, incident duration has a strong, concave effect on non-recurrent congestion for the first three hours of incident duration. For example, an increase of incident duration from 60 to 70 minutes increases non-recurrent congestion by 160 vehicle-loss-hours. From the macro perspective, this increase of 10 minutes in average incident duration on the 25,000 reported annual accidents entails a 40 million € loss to society. This suggests that there are strong benefits of incident management.

[31] WILLINGNESS TO PAY TO REDUCE THE RISK OF TRAFFIC ACCIDENTS: A STATED CHOICE EXPERIMENT IN THE CANARY ISLANDS
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We compute the willingness-to-pay (WTP) for reducing the risk of fatal and serious road accidents and also derive, for the first time in Spain, the value of a statistical life using discrete choice models estimated using data from a pivot-based stated choice experimental design. Specifically, we estimated a series of discrete choice models incorporating the risk of accidents via the use of variables referring to the expected number of annual fatalities, seriously injured passengers and pedestrians (either fatal or seriously injured). Our results clearly identify the importance of differentiating among frequent and occasional drivers. We found that the estimates for frequent drivers were more reliable, and used values for this type of drivers to derive WTP. Specifically, a value of €4.49 million was derived for reducing the risk of having a seriously injured passenger, which is approximately 17% of the value obtained for reducing a fatality (a proportion that it is line with values reported in the literature). The study also obtained (for the first time in Spain) a value of approximately 9.35 million Euros for reducing the number of pedestrian victims in a road accident. This value is, quite reasonably, an intermediate figure between the previous two values.

[62] IMPACT OF SECURITY ISSUES ON CYCLING MOBILITY: A SURVEY IN THE APULIA REGION
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The economic literature has often analysed cycling mobility through a safety perspective since the risk of injury is considered as the most significant barrier for the increase in bicycles’ use worldwide. The huge number of accidents involving cyclists represents a great concern for both public administrators and citizens’ communities. For example, in the UK, 19,215 accidents involved cyclists, with 107 fatalities (Rospa, 2012), while in the United States the number of fatalities in 2010 was 618 (NTHSA, 2012). The recent international campaign ‘Cities fit for cycling’ demonstrates how sensitive is the public opinion with respect to this problem. Empirical evidence shows that, alongside safety issues, the level of security are another important factor, which needs to be considered when examining cycling mobility (see Jain and Tiwari, 2010). Nevertheless, the problem of cycling security has not yet been investigated punctually and has been sometimes underestimated. The lack of security for both cyclists (muggings, robberies) and bikes (vandalism, thefts) can considerably affect the effectiveness of local transport policies for sustainable mobility. In Southern Italy, cycling mobility is still underdeveloped. There is nonetheless a growing public interest towards the promotion of this transport mode. In Apulia Region, transport policies have increasingly been oriented to the promotion of cycling mobility by improving cycle tracks and lanes, cycling facilities, bike sharing stations, promotional and communicational activities for enhancing citizens’ attitude towards this transport mode. The aim of this paper is to investigate the current state-of-the-art of security of cycling mobility in the Apulia Region. The chosen methodology is an empirical survey based on questionnaires to be