"The U-MOB LIFE Project has received funding from the LIFE programme of the European Union"

Max. 1,500 words.

University	University of Torino, Italy
Title	S.U.S.T.A.I.N. (***S**pecific **U**ser **S**ustainability **T**hrough **A**ccurate **I**ndex **N**umber*)
Date of implementation	July 2018 - December 2019
Aims	Implementing an objective, data-based system of disincentives to car use for university commuters based on a sustainability index taking into account all relevant information available (mainly the origin-destination matrix and the travel options available) and easily obtainable on a large scale with low resource distributed computing
Background	University of Torino is very large scale Athenaeum, with a community of almost 80.000 students, faculty and staff, widely scattered in more than 100 locations around the city centre and the metropolitan area. The impact of its daily activities on the city life and environment is therefore massive: it actually is one of the largests organization shaping the urban landscape. In this context its *Green Office* (UniToGO) plays a central role in increasing the environmental sustainability of its community. UniToGO includes a special team focused of mobility issues that aims at building cultural, normative and structural conditions that can motivate the members of the UniTo community to change their mobility choices towards sustainability (active mobility + public transport + sharing). Among its tasks, helping to manage the access to existing parking lots located in university buildings on matters than involve sustainability, granting it to the members of the community who actually most need it, while discouraging car use (and parking) when other options are reasonably available to the individual. In 2012 the new Campus "Luigi Einaudi" (CLE) was opened, aggregating many teaching and research activities and involving several thousands people. Due to existing laws, the campus project had to include a large car parking area (about 500 places), both under and above ground, to avoid a large and negative impact of its users on the neighbourhood environment. While remaining largely unoccupied for years (also due to a monthly fee of 10€ - low but not free), the parking became a valuable and sought-after commodity in 2017 when public parking areas around the campus were turned into toll parking spaces at market prices, approximately 6-7 times higher than the internal parking fees.
Description	***Highlights*** • *Allow access to car parking to those who most need it, disincentive others* • *obtain information seamlessly and transparently from web platform* • *establish, test and deploy criteria easily extensible to other contexts* Starting from the context described above, but aiming to establish innovative and rational criteria to promote sustainable mobility through the whole university, the UniToGO team decided it was due time to move beyond generic, broad appeals in the vein of "please care for the environment", "please use your car less" that just invoked individual goodwill. It was necessary to acknowledge that different people may have differing constraints and needs in terms of mobility, involving heterogeneous levels of actually achievable sustainability, and that the best global results would most likely come through

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data-based combination of choices and opportunities, optimizing the overall sustainability levels while allowing for special needs and more difficult situations to maintain less environmentally friendly journey modes.

This approach was to be first applied to select the applications submitted to obtain a parking permit at the new Campus. Along with features related to family management (number and age of children, not self-sufficient elderly parents or relatives) and some points allocated to eco-friendly cars, the plan was to define a journey sustainability index that could, for any couple of origin-destination locations within the Piedmont region, summarize the comparative advantage (or disadvantage) of the standard door-to-door car journey versus the best multimodal solution involving active mobility plus public transport (including sharing) of any kind. Such index was to be automatically computed, based on the already existing geographical routing engines that the Piedmont Region maintained and updated regularly and used to power the web platforms that allowed individual citizens to enquiry about available public transport solutions to any destination (*www.muoversinpiemonte.it* and related sites).

The concept was therefore to allocate the parking permits to those having a very low value, i.e. to individuals whose home-to-university journey by car turned out to be much faster and easier than the best sustainable option, either uni- or multimodal. On the contrary, individuals who had the chance to commute by active mobility + public transport just as fast - or even faster - than with a car drive, would be denied the permit. Notice that this does not imply that the latter could not travel towards the campus by car - it would only impose the disincentive involved in paying the higher parking fees of the neighbouring public areas. In the meantime, bicycle parking spaces of the Campus were reorganised, with a strong increase in the number of places available to students (the largest part of the community) and the creation of a secure bicycle area where theft risk were minimized through a card only access system (free of charge).

Due to the complexity of the task, the initiative has been planned in two incremental stages:

- **in the first**, already in action, the campus was identified as the single arrival location; working through isochrone mapping, the whole region was scanned and spatially classified in terms of home-campus travel time in two different journey modes: unimodal car only and multimodal combinations of any kind, but excluding own car. The two isochrone mappings drew areas from where the campus could be reached in the two modes with specific ranges of journey duration. The desired index was derived as a function of the difference of isochrones on the two mappings (*car only* and *sustainable*) for any home address of a community member submitting a permit request. The individual has to identify the colours of his home area in the two mappings on the web platform; this simple information is then processed thorough an *ad hoc* algorithm that translates this into a final number.
- **in the second**, which will be developed and put into operation by the end of 2019, the web platform will compute in real time the specific journey time in the two modes based on any source and destination points. The engine will be configurable by setting possible combinations of modes with mode-specific constraints (no more than *XX* km. on foot, *YY* km. by bike, or even by car - in some cases a fully sustainable journey option may not exist, but allowing car use for, say, the first 5-10 miles as the first stretch could allow to connect to the public transport network and complete the longest section of the journey in sustainable ways), specific travelling hours during the day, possible constraints on number and timing of intermediate connections. Moreover, the algorithm will not be limited to travelling times com-

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	parison, but will further examine the features of the sustainable travel options from the point of view of comfort and ease: this could include the length and modality of the first stretch straight out of home, the length of the last stretch leading into the campus as well as the number and length of possible transfers for intermediate connections, and their timing compared to a reference "ideal" connection time (e.g. too risky if under 10 minutes, too long if above 15 minutes). Apart from the features of single specific travel solutions, the involved transportations services running frequency during the whole day or for particular time frames could also be taken into account. In the end, the index will therefore represent a measure of comparative overall quality of the home-to-university journey with the least possible car use, vs. one fully made with your own car.
Indicators	The first release of the Sustainability Index has already been used to manage some 500 parking permits applications for 2019
Expense & Financing	The project is supported by a joint effort from the University of Turin and Turin metropolitan city council, in cooperation with the Piedmont Regional administration
Conclusions and Lessons learnt	The new index and the allocation criteria for parking permits based on it will help to sensibly and easily manage arbitrarily large numbers of applicants giving priority to those who suffer actual difficulties with public transport, in terms of: • scarcity of services • too long first and last stretch to be covered on your own • too many/too unreliable intermediate connections • services with low commercial speed In other words, those that would have to experience a long and uncomfortable commute if they gave up their own car use, or limited it to just a short first stretch of the full journey. Using this criteria will result in a disincentive to car use specifically targeted to drivers which most easily could try alternative, more sustainable transport modes. After some testing, it could then became standard policy for the whole University, and more - if acknowledged and shared by local administrations (as it is planned), it may in the near future inform all allocation policies for parking on public soil in the city of Turin and beyond. These policies will thus become a powerful and accurate tool to promote sustainable mobility.

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Photographic documentation for the proposal

The new Campus view with the main outdoor bicycle parking

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The new Campus outdoor car park and a section of the bicycle parking

Access to the underground car and bicycle parking

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The underground car parking

Reserved places for pregnancies and newborn parents

An example of the bicycle underground parking sections

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Part of the information campaign for the new safe bicycle parking space

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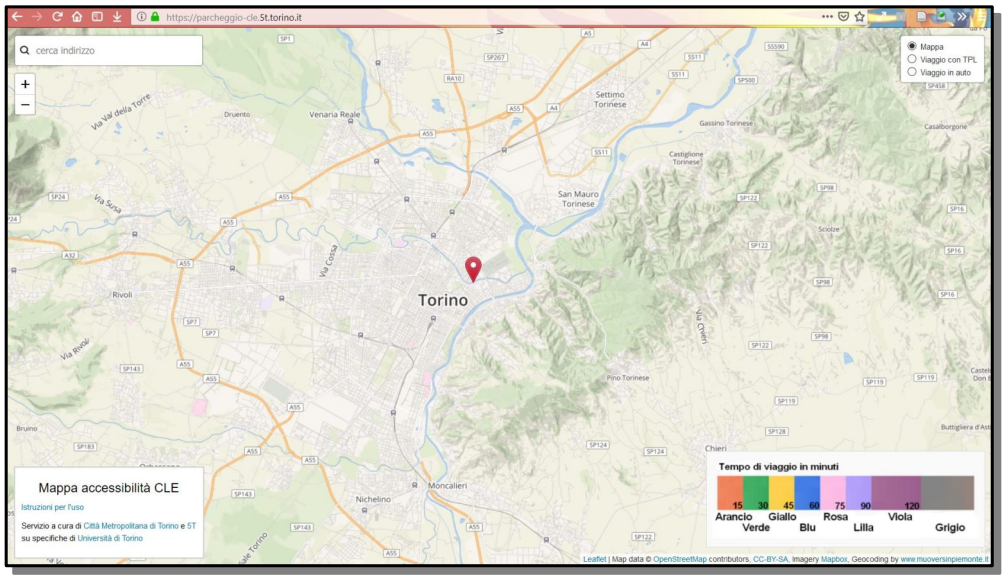
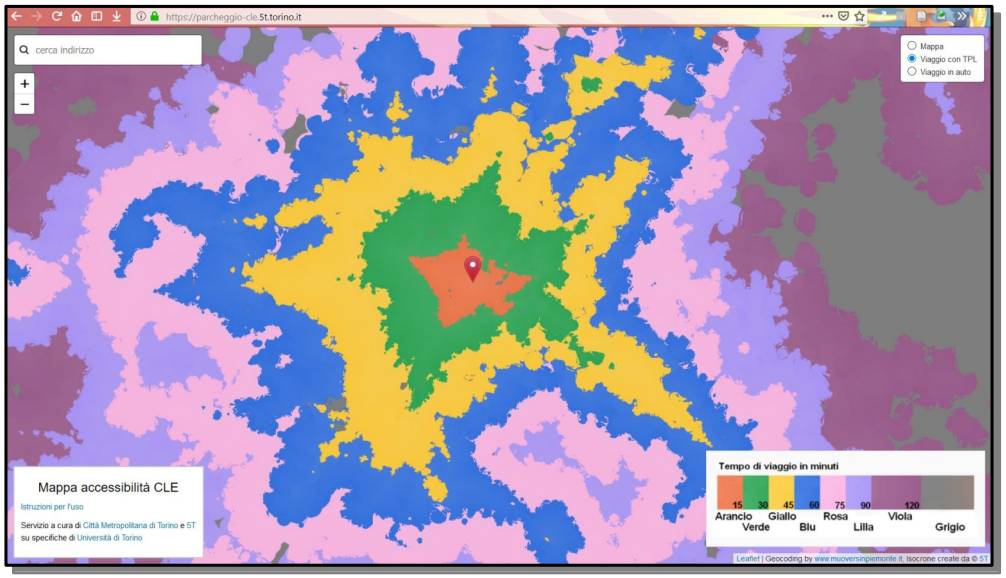
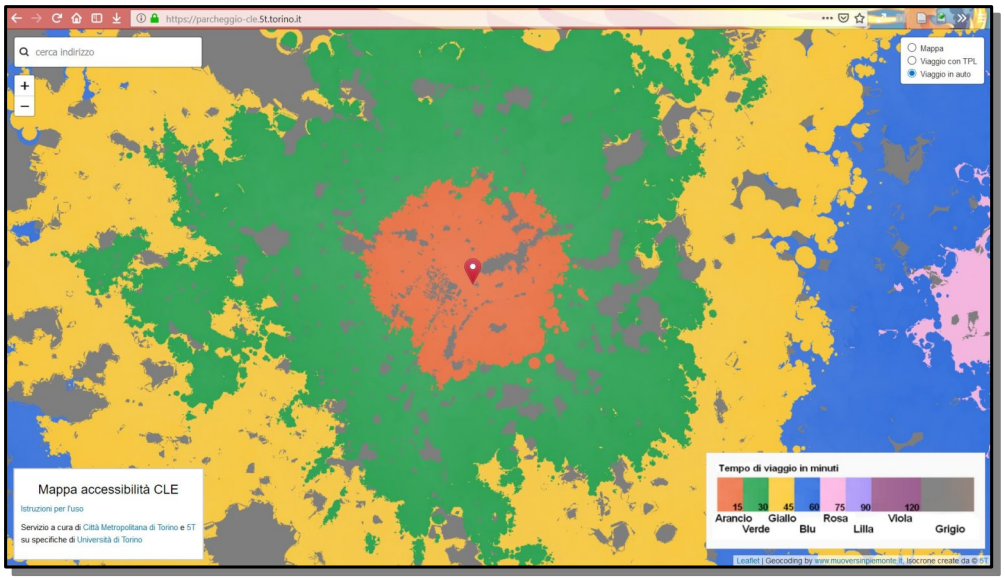


The OpenStreetMap cartography of the web platform with the Campus location



The Sustainable journey isochrones for the city and surroundings



The car-only journey isochrones for the city and surroundings

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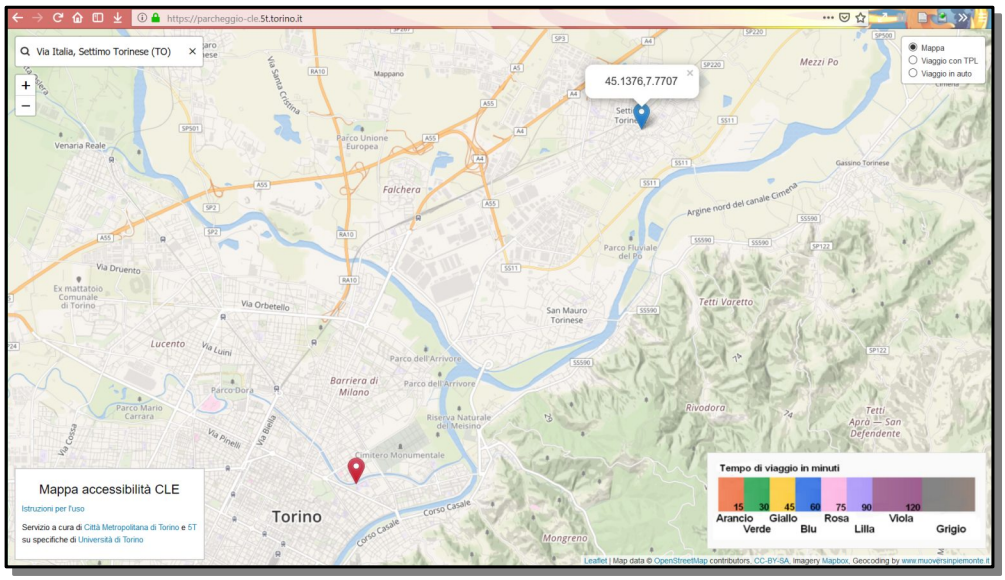
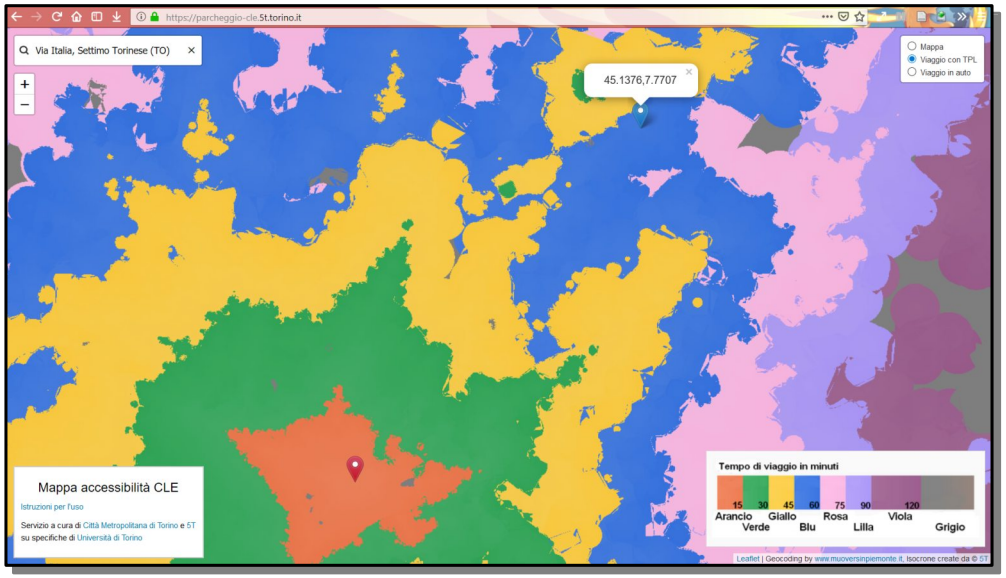
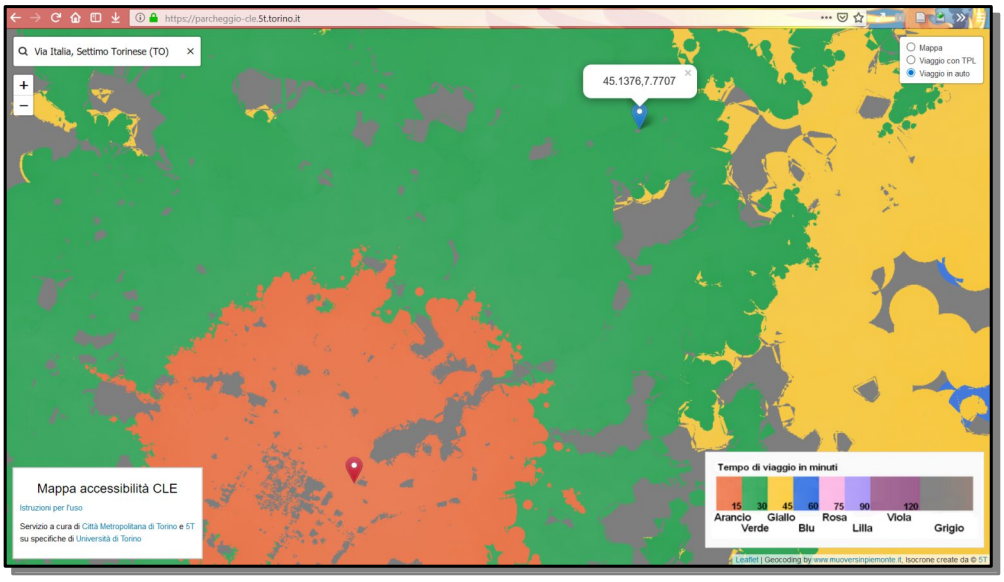


The OpenStreetMap cartography with an example of a metropolitan area address



The specified address in the "blue" isochrone for sustainable journey



The specified address in the green isochrone for car-only journey