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Stefano Bazzolo- PhD Thesis	***Abstract***

The current paradigm of urban mobility, still heavily unbalanced towards private cars as the main means of transport, clearly shows its unsustainability from a social, economic, energy and - consequently - environmental point of view. Nonetheless, private car remains the main way by which passengers satisfy their transport needs in urban areas, due to the undoubted advantages that it shows, such as the complete customization of the journey in terms both of route and of scheduling, the high standard of comfort and the lowest perceived cost.

It is therefore necessary, in order to remove the limits of the evolution of the cities and the quality of life of citizens, to define a transport supply able to maintain the typical strengths of the private car, but to remove its unsustainable points, providing the traveller the possibility to use his time during his mobility.

In this context, as part of the PhD program and jointly with the Italian company "Dimensione Ingenierie", which has been operating in the ropeway sector for decades, the innovative *CableSmart* transport system was developed. It is a hybrid system derived from the cable-car technology, whose vehicles can move in two alternative ways:

- Through the automated gripping to a hauling rope, as a conventional gondola ropeway;
- Through motorised wheels installed on the bogie, in a similar way to a monorail system.

CableSmart fits in the contexts of the C-APMs (Automated People Movers derived from the cable car technologies) systems and merges the advantages:

- of a typical cable car system, in terms of overcoming of natural and anthropic obstacles with a low soil impact;
- of a rail-based system, in terms of easiness of insertion in the urban fabric and definition of curvilinear paths;
- of a PRT (Person Rapid Transit) system, in terms of passenger comfort, very low waiting time and customization of the path.

The reference normative for the design of C-APMs is made up of the UNI/TR 11735 document: "Guidelines for the design of fully automated people transport systems with

cable traction. As highlighted by the title, the standard aims to present guidelines for the design of the system which can be the basis for drafting a Technical Specification, but does not in itself constitute a specific regulation. In addition to the main guideline about the transport design of a CableSmart urban line, its structural computation and the line calculation based on the Italian cable-car regulation framework, an in-depth analysis about the specific energy consumption [kWh/(passenger·km)] and specific emission [gCO_2/passenger/km] is performed with several load configurations, hourly carrying capacity, path and technologies, and shows the high energy efficiency of the CableSmart system.

In addition, an overview of the main design challenges that the hybrid system can overcome is presented, with reference to three real case studies, corresponding to as many feasibility studies:

- Sorrento- Sant'Agata: Connection between the city centre of Sorrento and the village of Sant 'Agata sui due Golfi, placed on a hill area at the centre of the Sorrentine Peninsula. In order to minimize the impact of the plant in the Sorrento city centre, the rail stretch is designed in underground tunnel; while the cable-car stretch allows to run across high differences in high;
- Angri- Maiori: Connection between the railway station of Angri, in the Neapolitan hinterland, the coastal town of Maiori, consenting to define a mobility link between the Amalfi Coast and the Pompeii archaeological area. The vehicles equipped with thermic comfort system allow passengers to travel comfortably the almost 15 km - 50-minute journey;
- Genoa- Forte Begato: Connection between the port area of Genoa and a mountain zone beside the Ligurian capital city. The line is divided by an intermediate station in two stretches with different situations: the first one, crossing the highly urbanized and anthropised Genoa district of Lagaccio requires technical solutions to manage urban needs, while the second one presents characteristics typical of a mountain line.

Through a multi-variable analysis that took in consideration the needs the requirement imposed by the path, the needs of the demand and the energy consumption, the above-mentioned feasibility studies demonstrated that, in circumstances where the needs of urban integration and passenger comfort are key requirements, the hybrid

system is able to match the needs of the demands and the necessity of the context in a better way than the traditional systems for overcoming differences in high.

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