

# Cultural Metro in Rome

## A Sustainable Transportation Example Extending Public Transportation System in Rome

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**Abstract**—This work introduces a georeferenced model that aims to yield a sustainable transport system located in a part of the city of Rome. This is achieved by considering two urban walks as transport lines connecting existing metro stops in order to improve the transportation system in a sustainable way, thus reducing vehicular traffic. In addition, the proposed solution is designed according to a cultural heritage perspective in the sense that the paths introduced have been defined by following ancient Roman roads leading us to call them *Metro Cultural Heritage (Metro-CH) paths*. As an additional result, we obtain the advantage to improve the touristic flow and social life in the suburbs that now are poorly exploited areas compared with the heart of Rome. From the overview map definition, we derive a geo based mobile application system used to implement a local Web mobile application system tailored for the Metro-CH without any additional infrastructure. As discussion, we show how the solution is in line with the principles of European Convention of Faro for the Cultural Heritage and with the national Italian guidelines of historical paths.

**Keywords**—Cultural Heritage; Sustainable Mobility; Map Integration.

### I. INTRODUCTION

Sustainability is requiring a strong revision of technologies and studies related to the improvement of the quality of urban life. This is especially true for those urban areas rich in cultural heritage sites, but having poor quality of life, like the suburbs of Rome. In this case, a possible strategy to remedy the situation could be to consider a new form of smart tourism which can lead to a sustainable economic and social improvement [3]. In particular, in this paper we introduce a georeferenced sustainable mobility model that integrates existing natural paths and urban paths revisited in accordance to slow cultural tourism patterns. This mobility model has been used in order to follow old roman roads, such as the one close to the famous ancient Via Appia, thus connecting in a safe way the railway metro stations by walking there. The description is obtained by deriving a virtual map from the existing railway map through a virtual extraction of such ancient roads after a preliminary walking study and Web map annotation. The final characterization is strongly based on cultural heritage preservation in the sense that it is inspired by literary works of the famous writers Goethe and Gregorovius. Moreover, the model could be applied to other transportation systems such as local trains providing connections to other touristic areas close to Rome.

### A. Dynamic Revision of Cultural Heritage

From a general point of view, the main purpose of the proposed Cultural Metro is strongly related to the principles of European Faro Convention established in 2005 on the value of Cultural Heritage for the Society. Starting from the principle of Cultural Heritage as a set of resources inherited from the past upon which values and knowledge are expressed by the help of people living close to it (Art. 2 of the Faro Convention), we think that there is the need to propagate such a cultural asset to subsequent generations in order to guarantee a good evolution. This will be accomplished by enriching its knowledge and studying its value (Artt. 4 and 5 of Faro Convention in [7]).

### B. On the Sustainable Cultural Tourism

Improving new type of tourism in a sustainable way is a key factor for increasing the knowledge not only for historical monuments but also for all facts and issues related to living styles and traditions which are very rich in interpretations and with new aspects to be transmitted to future generations.

In particular, the increasing interest for slow tourism gives the chance to have a better interaction with hidden monuments and local traditions. Hence, our purpose is to combine slow tourism with existing public transport system by highlighting the ancient roads with their monuments nearby. It is important to note that this approach is effective because all roads are safe for walking and they respect the guidelines of Italian walking paths introduced at national level [9].

## II. CULTURAL METRO DESCRIPTION

The southern suburbs of Rome contain several walking tours of particular interest from a historical point of view which offer a strong potential in terms of slow tourism. With respect to the hearth of Rome often plenty of cars and people moving in a plethora of shops, museums etc., the suburbs offer a different perspective with many hidden interesting places. Our model aims therefore to cope with such issues trying to optimize public transport and to contribute to hidden cultural values extraction (see the integration schema proposed in Figure 1).

The interested area has been outlined on the Official Rome Transport Map as shown in Figure 2.

It corresponds to the south-east part of the city in which there are two main subway lines A and C with their starting stations.

Figure 2 gives the resulting integration schema with green lines evidencing the Cultural Metro lines (a sort of urban cultural trekking paths).

Figure 3 shows in a more focused way, by means of typical transport icons and graphical elements, how this concept is used to optimize the transportation system in a sustainable way.

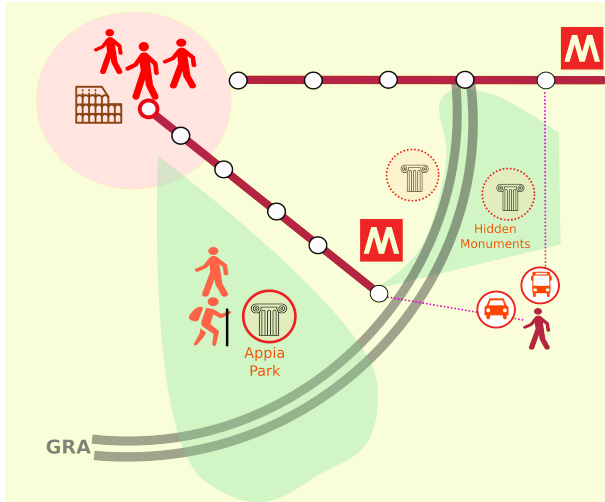


Figure 1. Cultural Metro Introduction Schema



Figure 2. The Metro Map of Rome with the green areas related to Cultural Metro proposal

These pathways are organized by selecting ancient paths close to *old Appia roman* street located to north-east of the Appia itself. They are named Goethe line and Gregorovius line respectively, in accordance to cultural heritage concept because, in the XIX century, they were extensively used by such famous writers. In fact, in the past they themselves have traveled the routes checking in person and recording in their studies / diaries what was catching their attention. In this way the proposed Cultural Metro system might be considered a way to preserve cultural heritage by handing down to posterity

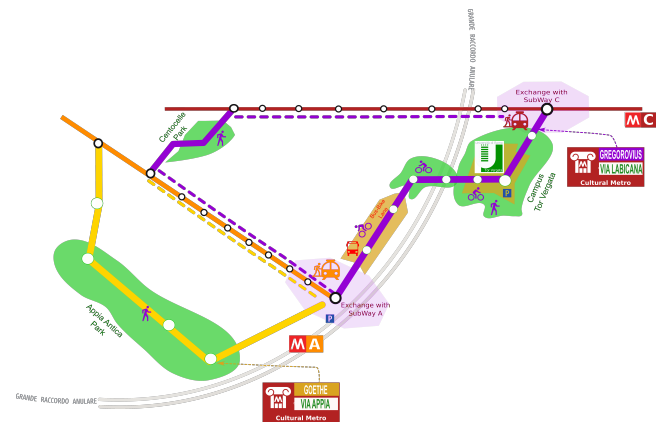


Figure 3. Focus with graphical symbols and sustainable paths integrated with railway metro lines

[Was du erbt von deinen Vatern hast,erwirb es, um es zu besitzen!.. (What you have inherited from your fathers, get it to own it!) (Goethe-Faust)].

- Goethe Line for the pathway along Appia and old Latina road towards Tuscolo Area.
- Gregorovius Line for the pathway corresponding to Labicana road close to Prenestina road.

The proposed general schema for the Cultural Metro might be organized by considering as terminus of the subway lines the Tor Vergata Campus (Figure 3). All of these lines allow to reach Metro lines A and C of the Rome Metro Railway system.

Each line of the Cultural Metro is a walking pathway designed in the area surrounding the Campus of University of Rome Tor Vergata. The Gregorovius Line has been associated to the old Labicana roman road while the Goethe line corresponds to eastern roman road such as via Appia and via Latina. In this way, such walking paths are very interesting from an historical point of view, providing a nice experience from the people.

#### A. Map Building Activity Description

From the Metro description, we can see that the map definition could be obtained by deriving the walking routes in a standard format for each path and adding to them the occurring annotations (building information and monuments, next stop station close to the current position, etc). The adopted map building strategy is defined as follows:

- 1) Starting from the campus and walking towards metro C in a way similar to the walking routes from Goethe and Gregorovius travel books, we have marked points of interest on the map with the purpose to use them also as reference point like metro stations, leading to a virtual metro line composed of a sequence of cultural metro stops placed at regular intervals between the starting point and railway Metro C (Gregorovius Line).
- 2) Again, after starting from Via Appia Park close to metro A (Villa dei Quintili), we executed another traced route by walking towards the Metro A and by following ancient monuments like Acquedotto

Claudio and ancient roads connecting Romana Appia to other roads to the North (Goethe line).

- 3) Hereafter, GPS (Global Positioning System) routes and monuments informations have been included on digital maps downloaded from Open Street Map website ([www.openstreetmap.org](http://www.openstreetmap.org)). Green areas extracted by OSM (Open Street Map) map in form of shapes have been checked and compared with GPS tracks in order to guarantee that there is a good chance to obtaining a well sustainable complete walking path.

### B. Description of Pedestrian Walking System in Cultural Metro

The map shows that every line is defined as a sequence of small walking paths (each of them long from 10 to 100 meters), without any slope and easy to be crossed due to presence of sidewalks on all busy roads. In addition, the presence of a public bus on the campus might be used to replace some walking paths.

### III. A LIGHT MOBILE INFORMATION SYSTEM FOR CULTURAL METRO

In order to optimize the cultural value of the proposed Cultural Metro, it is important to introduce a mobile application system that could be used to help people while walking in Cultural Metro, thus leading to a particular innovative *cultural navigational digital system*. The main advantage of considering walking paths as a metro line for walking people is the fact that its implementation requires only that each path must be available for pedestrians and does not require external infrastructure except for an adequate infosystem able to show what are the nearest stop and physical route towards the next stop. Figure 4 shows an example of Mobile Application View with Augmentivity Reality (AR) Interface (called MetroGO) to navigate towards subway metro stop of Line A.

The main idea is to consider that visual annotations on the screen can be used not only for explaining old monuments, but also for helping to move towards next metro station.

It is important to note that the AR solution provided by MetroGO APP is more sustainable with respect to other solutions based on localization devices (or tags/beacons) in the sense that environment is respected and there is no need to make use of additional things or hardware often considered for intercepting monuments and helping to find direction. For instance in the works [1] and [2] it has been introduced a geo tag based info model named **Street Web** characterized by local wifi internet able to support mobile smartphones of visitors in a context based navigation useful in places rich of monuments and for which is hard to obtain the same result through 4G connections. Hence this work can be considered a new way to make use of AR for cultural navigational system and it is first example of this type to our knowledge.

### IV. CONCLUSIONS

Improving the quality of urban life in Art cities like Rome according to Smart City paradigm, requires a careful design to avoid dangerous effects (traffic congestion and pollution). Moreover the need to involve citizen must be kept onto account especially in the case of Art Cities. A sustainable approach is to consider Human Smart City in which cultural areas hidden to citizen can be reused in terms of smart tourism

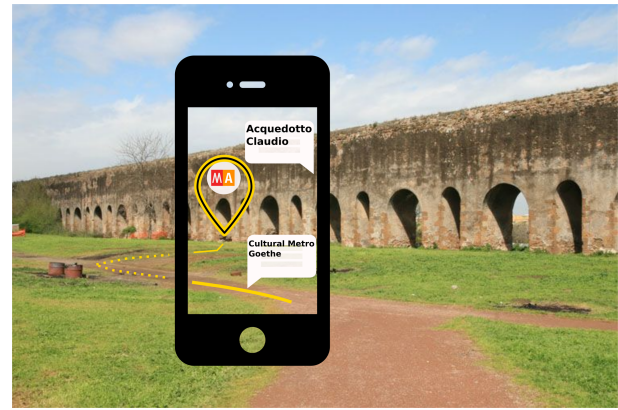


Figure 4. MetroGO APP with AR of cultural types

and slow tourism. In this work we showed a preliminary example designed with the aim to reach a tourism-based slow transportation system enforcing the emerging styles of slow tourism for which touristic walking tours close to big cities must be re-discovered and used in the planning systems of the urban future.

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