Project: Accessible Smart City	**Document:** Accessible Smart City

1. Project Description

One of the main goal of smart city research is improving the quality of life for people who live in the cities, according to different points of views, even though the ICTs. In this context supporting people with disabilities is relevant and innovative. In particular, this can improve their independency in everyday life and it can also increase their social inclusion.

The main aim of this project is to study some research topics related to user profiling and to adapting cooperative context aware applications. Such issues will be investigated in contexts where users' devices and profiles can be useful and decisive in these applications behavior.

In particular, during this project the following topics will be studied: definition of extensive users' profiles (which can describe users with different abilities and devices), profiles transmission, gathered data security.

In order to better investigate these topics, during this project an application prototype will be designed and developed. This application will be devoted to map urban area accessibility and to share gathered data about architectural barriers faced by people with disabilities. This data can be collected and shared thank to users' activities (who explicitly collect data) and to automatic sensor networks activities (by exploiting sensors already installed on users' mobile devices or sensors which can be suitably applied).

Mobile devices (i.e. smartphones) are becoming more and more widespread. Thus, most of the people are equipped with a device which can communicate GPS coordinate and send and receive data in real time. Moreover, smartphones are provided with sensors (i.e. gyroscopes and accelerometers) that can collect detailed data related to users' contexts. This means that by exploiting this kind of mobile devices it is possible to obtain data about gradient of roads or drops, steps, ramps or some other similar obstacles. Information about these barriers can be automatically recorded by users' mobile devices. Finally, during this project, additional sensors can be installed on users with disabilities aids, so as to collect more precise and accurate data.

When a user (equipped with a smartphone and/or some other additional sensors) meets some kind of barriers during his/her path (i.e. crossroads, buildings and rooms entrances, lifts), the application prototype will collect data and will share them through a geo-referenced social network. In order to reach this goal, GoogleMaps and Foursquare are currently the best candidates to be exploited.

The more data about users' experiences will be collected (recorded and shared) and the more related data will be more accurate and detailed, describing situations really faced by users with disabilities. Once data are collected, users will receive adapted information, on the basis of their own profile and their geo-referred position. This way, people can decide how to better move in the city, improving their independency and sharing more accessible and preferred paths, avoiding barriers and critical conditions.

The application prototype design and development will take into account the following topics:

- Profiling: users' preferences and devices capabilities will drive both data collection and data sharing on mobile devices. For instance, a path accessible to a user with specific movement ability will be proposed only to users with similar abilities.
- Privacy: this data has to be shared only in a secure way, complying with users' privacy. Users' profiles must be recorded in an anonymous way.

- Data fusion: gathered data has to be analyzed so as to create a model of urban architectural barriers. This can be done by exploiting mathematical model and techniques which will be adapted to this specific aim.
- Context awareness and adaptation: gathered data has to be adapted and then sent each user, on the basis of a specific user's context.