Location Aware Multimodal System: a prototype

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ABSTRACT
In this statement, we introduce the motivation for the development of a multimodal support system to location aware applications. We also show the promise of such an approach through the brief description of an implemented prototype and its main features.

Keywords
Location awareness, multimodal interaction, usability.

INTRODUCTION
The actual usability of current location aware applications for ordinary users can be improved by the possibility of accessing the applications' functionalities in a fast and simple manner, increasingly integrated on more human senses and interaction modes. In particular, the pursuit (and reaching) of modern pervasive and ubiquitous computing envisaged among the others by early works of Mark Weiser can be helped by the effort of providing location aware applications with at least the following characteristics: 1) the ability of automatically and transparently tracking users (both indoor and outdoor) at a customisable level of accuracy; 2) the availability of a reliable and fast multimodal interaction with services and content. However, it still seems possible to detect in most of the location-based mobile solutions currently offered in the market a few limitations. Firstly, users are still forced to explicitly communicate with often cumbersome mechanisms the information about the site they are in and/or the one they are willing to go to. Moreover, input/output information is mainly exchanged visually and therefore not in a very suitable format while on the move when location aware applications are instead mostly useful. In general, it seems that there is not yet a full exploitation of available location-based services in a simple fashion and through intuitive and really easy to use interfaces. In our opinion, this has also contributed to prevent location awareness to be eventually perceived by users as an actual "plus" and an added value for real services and applications.

THE SYSTEM
Recent experimental activities in the WLab have been focussed on the main objective of developing a multimodal support system to location aware applications. This system should include: a) a plethora of location techniques (Cell-ID, GPS, A-GPS, TOA, E-OTD) which can be arbitrarily selected (automatically by the system or manually by the user depending on configuration choices and profiles) and with different levels of coverage, accuracy and measured performance; b) the possibility of a visual, voice and touch-based interaction (both strictly sequential and integrated in a synchronized way) with location-based services and content. The main experiments with such a system have been carried out emphasising the analysis of potential benefits for location aware applications arising from two main issues. On one side, the impact that explicit information about users' location have on a multimodal interaction and on the other side, the added value that a multimodal interaction can provide to location-based information.

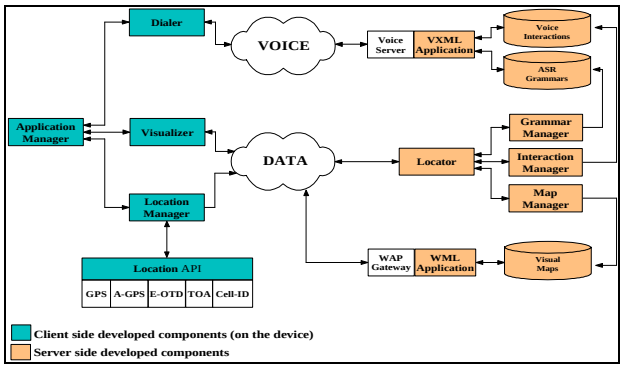

Figure 1. System architecture

The current prototype, whose overall architecture is depicted in figure 1, allows a voice retrieval of location specific visual information. In particular, it is possible for a user through a Symbian OS application (and a J2ME one soon) to speak up on the cell phone the name of the street where she happens to be and to receive on the display the map of the area surrounding the street at a desired level of accuracy, accompanied by specific recognition grammars, voice comments and indications. The following features have been explored and used so far: Cell-ID location technique; visual and voice sequential interaction; background transparent communication of location information on either voice or data channel; the use of location information to customise ASR voice recognition grammars with ad hoc algorithms developed in the WLab.

BIOGRAPHICAL NOTE
Stefano Puglia received a MSc in Computer and Software Engineering and a MEng in Cooperation Engineering for Development both from the University of Rome "La Sapienza". Former member of the Middleware & Mobile Applications research group at Telcordia Technologies (ex Bellcore) Applied Research, USA, he is now supervisor of R&D projects at WLab Ltd. in Rome, Italy and consultant at the University of Rome "La Sapienza". He is a member of the IEEE, the IEEE Computer Society and the ACM.