

Location-Aware Mobile Multimedia Applications on the Niccimon platform

— Abstract —

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I. INTRODUCTION

Mobility and mobile applications are becoming essential, both in our private life and our pursuit of business [1]. The evolution in the field of mobile devices invites and at the same time demands support for rapid mobile application development. In the Niccimon project [2] we built a modular system platform that supports the rapid development and deployment of such mobile applications. The flexible modules of the Niccimon platform provide functionality for the specific requirements of mobile multimedia applications, such as the heterogeneity of the mobile devices and their limited device capabilities, location-aware mobile navigation and orientation support, multimodal user interface, and location-based information and services. First prototypical applications in the field of tourism demonstrate the practical use of the technology developed and promise that the Niccimon platform contributes to the efficient development of next generation timely mobile applications.

II. THE NICCIMON PLATFORM

When developing mobile applications, an observation that can be made is that different applications need similar basic functionality like location-sensing, location-visualisation, presentation of points of interest, etc. Based on our research in the field of mobile application development [3], [4], [5], we developed a flexible, modular, and mobile architecture, the Niccimon platform (Figure 1).

The platform's modules provide generic functionality to location-aware mobile applications: A **Niccimon mediator** integrates the different modules into the platform and manages their interaction via suitable interfaces and communication protocols. The **Niccimon component interface** realises different general subtasks like lifecycle control, visualisation, network communication, and inter-component communication.

Task-specific modules provide mobile applications with the functionality necessary for navigation and location-awareness as well as location-aware information presentation. The **location information** module provides the user's position to the mobile application abstracting from the underlying positioning technology. A **POI** module manages the geo-referenced points of interest. They can be fixed spots such as hotels or restaurants but also moving such as mobile friends. The **mobile GIS** module provides visual navigation support on the basis of a location-aware map including the user's position and POIs, provided by the Location Module and the POI Module.

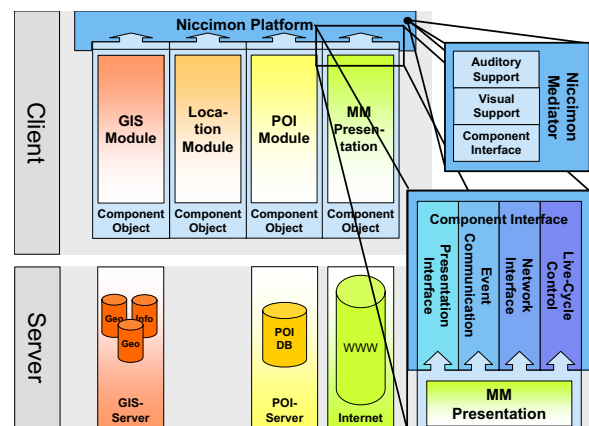


Fig. 1. The modular Niccimon platform

Generally, each client module is complemented by a suitable server component which manages and provides the necessary information such as maps, POIs, or multimedia content. For example, a selected POI can use any available **multimedia format** for its presentation. As a complementary component, we developed a software framework for the dynamic generation of such personalised location-aware multimedia presentations [6].

A specific, **auditory support** [7] module (Figure 2) allows for the development of multimodal user interfaces. With this, orientation and navigation support can be provided both by a visual as well as by an auditory map.

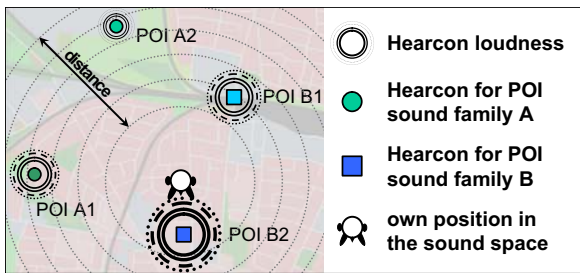


Fig. 2. Auditory support by the usage of Hearcons

III. LOCATION-AWARE MOBILE MULTIMEDIA APPLICATIONS

To demonstrate the flexibility of the platform we built two prototypical mobile applications. The personal mobile assistant (mobiDENK) [8], [9] can be used by a pedestrian to display his current location on a map. mobiDENK focuses on drawing the user's attention to historic sites and provides location-based multimedia information at the different sightseeing spots. With AccesSights [10] we are currently introducing multimodal orientation and navigation support for blind users. Our mobile paper chase game [4] realises a location-aware game that allows its players to find a set of geo-referenced checkpoints and solve the associated hypermedia riddles. The checkpoints are proximity-aware, exploiting the player's location. After the riddle is solved, the player physically moves on to another checkpoint indicated on the map (see Figure 3). The paper chase game has also been enhanced by auditory support to support the players with weakly intrusive navigation and orientation support.



Fig. 3. The location-aware mobile paper chase game

IV. CONCLUSION

The development of our sample applications demonstrated that we achieved the main goals of the Niccimon project, the development of a system platform that allows for a rapid development of mobile applications with its flexible, modular components. The mobiDENK application in particular has been a huge success, especially of interest to partners working in the domain of tourism. We are constantly evolving the system architecture and integrating new modules such as the specification and visualisation of context-aware points of interest.

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