PARAMOUNT PROJECT : AN INFORMATION AND NAVIGATION SYSTEM FOR MOUNTAINEERS

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Introduction

PARAMOUNT is an acronym for Public SAfety & CommeRcial Info-Mobility Applications & Services in the MOUNTains. PARAMOUNT is a shared costs project supported by the IST programme (Cross Programme Action 3) at the European Commission.
An European Consortium has been constituted in order to develop the project, it is composed by three main contractors: IfEN GmbH (Poing, Germany), AGIS, (University of the Bundeswehr München), Institut Cartogràfic de Catalunya (Barcelona, Spain), and the Search And Rescue (SAR) services form Germany and Austria represented by BRK Bergwacht Bayern (Munich, Germany) and Oesterreichischer Bergrettungsdienst (Klagenfurt; Austria). The project duration is 18 months, from 01/February/2002 to 31/July/2003.
PARAMOUNT project aims at the development of a Location Based Service (LBS) for mountaineers and hikers in the Alps and Pyrenees. This service is being developed to improve the safety and the information of more than 150 million mountain users. It is important to remark that the design, development and implementation of the service is based on the actual state of the existing technologies: GIS, GPS and GPRS (UMTS when available). A web page with information on the project is available (www.paramount-tours.com).
In the frame of the project a prototype for those services is developed and evaluated in specific test areas.

Objectives

The **General** Objective is to contribute to the improvement of user friendly info-mobility services, especially for mountaineers, by combining: Satellite Navigation (GNSS) and Telecommunication (GNRS) with Geoinformation (GIS) technologies.
The main objectives are the following ones:

- Development of prototype Location Based Service (LBS) for mountaineers in test areas in the Alps and Pyrenees
- Integration of positioning, navigation, communication, coordination and information services
- Implementation of safety features (SAR functionalities; safety relevant information) allowing immediate and appropriate help from outside in critical situations
- Integration of appropriate information and coordination functionalities for mountain rescue teams
- Development of a procedure for capturing/updating GIS data involving the users
- Demonstration and proof of feasibility of such a LBS in mountainous terrain

Services Description

PARAMOUNT aims at developing a prototype for a user-friendly info-mobility service for over 150 million mountaineers in the EU. A mobile digital "TourGuide" device and several server based functionalities will allow them to use the different services and features.
The system is based on interactions between "Clients" (mobile TourGuides) and a Server Arquitecture for a Local Info Tourist and Local SAR centers. A combination of telecommunications and satellite navigation with geographic information systems is used for delivering various information to the "client" and increasing the information and safety of the user.
The two major components of the system are a mobile device carried around by the **User** and a set of **Services** provided by the PARAMOUNT servers (Fig 1).

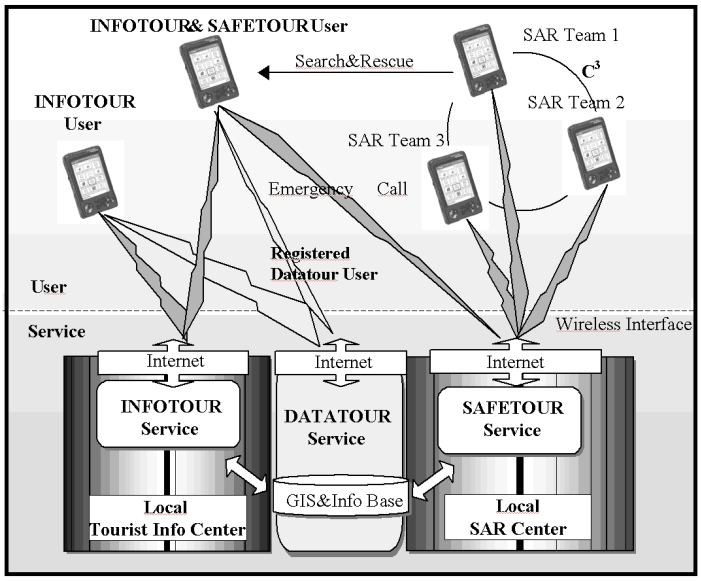

Figure 1 : Schema of functionality operation of PARAMOUNT. C^3 and SAR are acronyms for "Command, Control & Cooperation" and "Search and Rescue" respectively.

The **SERVER** system is constituted by three service packages, called INFOTOUR, SAFETOUR and DATATOUR. Both first are based on GIS database access and process. This GIS database (system core) stores the necessary data to give answers to the user requirements. The DATATOUR service has been designed to allow users to improve and update the GIS database.

INFOTOUR provides different kinds of information and functionalities, as topographic maps, routing functions, tourist information on points of interest (huts, summits, peaks, public transportation stations etc.), avalanche forecasting and local weather forecast. Those information could be displayed in different ways -even in 3D- on the mobile device.

SAFETOUR aims at increasing the safety of the users. Therefore it has been designed to be suitable during search and rescue (SAR) operations, as a guide to a distressed person or as an assistant in the coordination of different SAR teams.

DATATOUR has been designed to reduce maintenance costs for updating the database of the whole system. Data from willing users, mainly positioning information, will be captured and automatically verified against the information already in the database, and it will be used to derive new trails from the captured data and perform necessary updates of the database.

The **MOBILE CLIENT** system is constituted by a combination of PDA (display information and perform requests to the server and off-board navigation), with a GPS and an electronic compass

(give user position for location functionalities) and a mobile phone (allow communications with server).

The communications between components are carried out by internet (http. protocol). The establishment of the internet connection is made using General Packet Radio Service (GPRS). Data demand and its transmission are done using XML (extensible Markup language).

Development

The following phases have been defined to reach the project objectives:

- To define the users requirements: needs of SAR and mountains tourist
- To establish the project feasibility: availability of GPS, GPRS and GIS databases (G3)
- Definition of test areas: based on the G3 availability
- Services and System Design: definition of functionalities and system architecture
- System development: implementation of servers and its functionalities
- System Test and Evaluation: field test of different servers
- Dissemination and Exploitation

Cartographic Avalanche Forecasting

A special development for the INFOTOUR Service consisting of the definition of Cartographic Avalanche Forecasting (CAF) for Pyrenean Area has been carried out. CAF is the representation in the form of a map of the Avalanche Hazard Bulletin, a daily text file informing about the avalanche hazard conditions on the Catalan Pyrenees. This development is widely explained in another presentation in this congress (Moner et al 2003a).

Expected Results

The main constrains for PARAMOUNT implementation is the lack of GPRS coverage in some high mountain areas. This problem could be avoided using other telecommunication systems.
It is expected that at the end of the project a number of goals will be achieved. Among others:

- A navigation product integrating position-, orientation- and communication capability in on device.
- Improved SAR Command, Control and Coordination (C3) functionality with SAFETOUR, which can be extended to other public services (e.g. fire brigade teams, police special forces) in the future.
- Extensive local information with INFOTOUR
- Establishment of a “self-improving” GIS database with DATATOUR

The final consortium perspective is to transfer the System into commercial service

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