

# CERIS-ST, the Central Europe Road Information System for Security and Tourism

## A Joint project of the Universities of Novi Sad, Trieste and Verona for Precise Data Acquisition on the Trans-national Road Network and the Extension to the ALADIN Group

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### 1 Project Description

A Road Information system is strategic for sustainable development, both for commerce and industries and for tourism. Thanks to the funding provided by the European Union (through the INTERREG Program), the Regione Friuli Venezia Giulia and the ICE-CRUI<sup>4</sup>, about 1,200 km of roads have been already surveyed in the Balkan Adriatic Coast area.

The Universities of Rijeka, Podgorica, Tyrana, Sarajevo and Novi Sad actively took part in the project. In the meantime, working in partnership with the University of Verona<sup>5</sup> (from which we received helpful suggestions and contributions), we tested the application of the data gathered to tourism and territorial planning in the Verona area as well as in the Marche Region. The positive results of the work carried out convinced us to intensify the efforts and survey a wider area (the ALADIN one), aiming at covering the whole of Central Europe (which is not yet fully surveyed, though research such as this is needed here).

The first step in this project will be to better identify the technological methodology needed to acquire, store and distribute the detailed road network data used in urban planning for construction and maintenance of the road network (within the area of the Autonomous Province of Vojvodina). Resorting to satellite navigation systems will imply both the use of GALILEO - when ready - and of EGNOS (which is currently available).

This project consists of the application of instruments and methods that are currently available but are to be used in an innovative way (also in view of the European EGNOS and Galileo Systems). Therefore, it is potentially in synergy with those financed (and supervised) by the Galileo Joint Undertaking, Bruxelles. Moreover, it could be consistent with the INTERREG projects, which deal with the preservation and increase in value of cross-border cultural heritage. There is, also, a direct link between this project and the Road Cadastre prototype (already produced); a project coordinated by the Regional Government itself and concerning the roads in the four provinces of the Friuli-Venezia Giulia Region.

In addition to this, a type of survey is planned - and just begun - of regional harbour access, including piers and service roads. Applying the results of these prototypes to the road segments in the PAO areas will also be of use in order to maintain homogeneity with the Italian rules and conceive a coherent and official set to refer to. The participation of the PAO Partners is very important for adjusting, if necessary, the Italian rules for road information systems, taking under due consideration the unique conditions characterizing the PAO road network. The same revision could be necessary after surveying the harbour infrastructures (the width of the piers etc).

The project draws on previous researches carried out by Italian Universities (under the coordination of the University of Trieste); activities carried out under projects of

<sup>4</sup> A joint programme by the Italian Institute for Foreign Commerce and the Italian Universities Rector College.

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national relevance (PRIN) in 2000, 2001, 2002. In addition, the results were obtained in part thanks to cooperation with the University of Warmia and Masury (Poland), the University of Prague and the (ex) Austrian GPSNETZ (Differential GPS by using DARC data radio broadcasting). These results have been distributed within the Central European Initiative (CEI) WG on Satellite Navigation Systems, during several meetings in Trieste and in the CEI Countries.

The project refers to some (general) recommendations and decisions of the European Commission. In the document titled "The Transport and Energy Infrastructure in South East Europe" (Bruxelles 15<sup>th</sup> October 2001) we read the following: "Improving the transport and energy infrastructure in the region and integrating the countries of South Eastern Europe with the rest of Europe is important in order to support improved quality of life through economic growth, regional integration, social cohesion and adequate environmental conditions" (p. 5). The document then continues, saying: "Three recent planning exercises involving countries outside the EU and the region focused on are specifically relevant and have been taken into account: the decision of the Pan-European Transport Conferences, particularly those held in Crete and Helsinki, concerning the concept of Pan-European transport corridors and areas. A number of these Corridors and Areas (PETrAs) cross or concern the Balkan region: Corridors IV, V, VII, VIII, X and the Adriatic-Ionian PETrA" (p.6). In the same document: "The state of the network is very variable, although in general it shows a serious lack of periodic and current maintenance. The maintenance problem is becoming particularly acute in certain cases. In the Federal Republic of Yugoslavia it is estimated that only 30% of the roads are in a satisfactory condition. Furthermore, many roads do not comply with the requirements of European trucks. This needs special attention" (p.7). Among the principles, the same document states the following: "Priority is given to the existing infrastructure by repairing and rehabilitating it. Upgrades or new infrastructure components should be kept to a minimum" (p. 9).

Moreover, in the same document, we see the following criteria among those listed for the selection of network sections: "The network definition will take account the infrastructure planning of the UN-ECE European agreements, the E-routes for land transport to which the South East European countries agreed to" (point 1, p. 9). "The network should concentrate accessibility to only a few Adriatic ports, with the aim to support short sea shipping that requires the convergence of substantial traffic flows. These ports should be adequately linked to the land transport network and equipped for combined transport" (point 4, p. 9). "Furthermore, the ports of Rijeka, Split, Ploce, Dubrovnik, Bar and Durres should be connected to the network" (point 5, p. 11).

Describing the project now in more detail we could say that **its first segment (as designed by Zora Konjovic)** defines the data model that accurately describes the road network. The model is based on recommendations defined by the **EuroRoadS** project<sup>6</sup>. The **EuroRoadS** project has

defined an outline for the European Directive (to be issued) governing the field of data related to the public road network. It covers the framework of the Pan-European road network data infrastructure and the implementation of the national/regional databases. This segment of the project covers:

- the information model,
- the core data,
- the data exchange model.

**The second segment** defines the technological background, standards and procedures for model-specified data acquisition.

- the technological background for precise data acquisition comprises remote sensing, GIS and GPS technologies;
- the standards are related to measuring equipment, communication protocols and data formats;
- the procedures are aimed at the specifications of acquisition protocols according to best practices.

**The project verification** will be carried out by deployment of the pilot installation.

- the first step will be the selection of certain areas in Vojvodina. The basic criterion for selection will be the presence of the various road categories (city roads, magistral roads, regional roads, etc.). Additional criteria will concern the existence of appropriate digital maps for the region as well as the measurement infrastructure supporting the availability of data acquisition (precise GPS positioning, communication infrastructure, etc.) and remote sensing data (satellite and airborne images, etc.).
- the second step will cover the acquisition of data for the selected regions. The acquisition of the data will be carried out deploying technologies, standards and procedures defined by the Project.
- the third step will be the creation of the electronic database. The database will be created following the **EuroRoadS** framework. The data base will be accessible via the Internet.

The expansion of ALADIN (the ALpe ADria INitiative Universities' Network) has been already presented and is under analysis, particularly for the cost (having the SISA Project given good information on cost and feasibility). The ALADIN group covers **the following Universities**: *Graz, Rijeka, BW München, the University of Trieste, the Novi Sad Business School and Košice.*

## 2 Project Organisation

### 2.1 The University of Trieste, GEONETLAB

The Centre of Excellence for Telegeomatics, GEONETLAB, approved as a centre of Excellence and also co-financed by the Italian Ministry of University and Scientific Research, carries out research in GPS and Glonasss applied to general and thematic cartography, as well as in several applications of the geographic information systems methods (GIS), including Road GIS by means of its surveying vehicle. It

<sup>6</sup> <http://www.euroroads.org>

includes Telematics infrastructures, tools and norms, services and Operational Research for transport optimisation. The Centre is Coordinated by the principal proponent: Prof. Giorgio Manzoni (Full Professor of Topography, Faculty of Engineering, Department of Civil and Environmental Engineering, University of Trieste), under the Administrative Management of CSPA, Centro Studi e Progetti Avanzati, University of Trieste, directed by Mr. Bernardo Sannino.

## 2.2 The University of Novi Sad, CGITS

The University of Novi Sad, Centre for Geo-Information Technologies and Systems, Faculty of Technical Sciences, provided instruments and experience in the Geomatic field (including a GPS net), in order to carry out tele-informatic support activities during the survey operations. It will also collaborate in the dissemination and provide support in finding cartography and geodetic nets in Serbia; the University of Novi Sad also employs highly skilled software specialists (particularly in the field of Internet programming), who are relied on for setting up proper web based communication systems for the Project.

## 2.3 The University of Verona – DESIGEO (Dpt. of Economics, Society and Institutions, Geography Section)

DESI (an interdisciplinary department) has experience in local industrial spatial development (analyzing business strategies, their behaviors and their impact on the territory) and, recently, mainly in the following fields: Tourism and Transport Logistics. It adopts methodologies based on both the GIS/GPS and the quantitative/qualitative approaches used in social sciences. It processes data for geographic tourist itineraries (also on PDAs), focusing on landscape, agricultural and cultural heritage in the Adriatic Regions. On one hand, the work aims to get a better understanding of how tourist typologies are evolving and, on the other, at matching tourist needs (at the global level) with the localized richness of locations. In this latter area, they could benefit from the use of ICT tools and design/implement local

economic policies that are sustainable and able to achieve greater competition among the various destinations in the Mediterranean countries. DESI also works at analyzing the way local/global logistics networks grow and how the role of Verona as a logistic node (with regards to a continental or world-wide situation) adjusts to changing (global) economic processes.

## References:

The proceedings of the Workshop "BALKANS: A LABORATORY OF EXCELLENCE, Results of the SISA Interreg Project, Trieste (Chamber of Commerce and Central Europe Initiative Secretariat), September 18, 2006, in printing at the University of Trieste

Contributions by GUESTS:

- Antonio Arrighi, Italian Military Geographical Institute, Florence, "The Institutional Italian Contribution to Balkans Cartography"
- Ali Dedei, Institute for Transport Studies, Tyrana, "Albanian Road Network"
- Francesca Krasna, Dipartimento di Scienze Geografiche e Storiche-Sezione di Geografia Economica e Politica del Territorio, Facoltà di Economia dell'Università degli Studi di Trieste. "I Balcani nello scenario geopolitico mondiale",
- Giacomo Borruso, Facoltà di Architettura dell'Università di Trieste, "Cultural Heritages in Balkans and International Cooperation"
- Claudia Robiglio, University of Verona, "Gli itinerari turistico-culturali per la qualità della vita"

Contributions by the University of Trieste SISA STAFF:

- Bernardo Sannino, "Management del Progetto SISA"
- Luca S. Rizzo, "Satellite Navigation Technologies and Hypothesis of Development in Balkans"
- Giorgio Manzoni, "Road Information System for Countries across Adriatic Sea"
- Giulia Grandi, University of Trieste, "Automatic road extraction from satellite images"
- Giorgio Bolzon & Andrea Piemonte, "Survey, Mobile Mapping System GIGI One, Data collection and elaboration, Output formats"
- Raffaella G. Rizzo "The use of MMS data for tourism".