

## 1 Publishable summary

### 1.1 ROSATTE at a glance

ROSATTE is co-financed by the European Commission (DG INFSO)

Project coordinator: ERTICO – ITS Europe

14 partners from public and private organisations

Project start: Jan 2008

Project duration: 36 months

Project budget: €4.6 million with EC contribution of €3 million

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### 1.2 Background

Accurate and up-to-date safety related road network attributes are particularly important for safe driving along the European road network. With ADAS systems becoming technically and commercially feasible, high quality map content becomes a prerequisite for their success.

Providers of digital maps for in-vehicle applications continuously update their map databases, by driving the roads and using a multitude of sources of information. Today, map database updates are typically delivered as full map updates, e.g. once every quarter on files downloadable from an Internet client, on SDRAM cards, or even still on DVDs for DVD-based navigation systems. In the future this is expected to evolve towards instantaneous incremental updating, which means that changes to the map database are provided by subscription through a mobile Internet connection and are integrated to the onboard map database without the need to update the entire map. When this becomes reality, also the provision of a quality-controlled incremental map updating chain from map data owners to the map providers (and other users of such data) is required. This is especially important for safety attributes owned by road operators which are related to traffic regulations and traffic signs. As public authorities instigate these changes on their road attributes, they need to take a proactive role as map update providers.

The Digital Maps Working Group of the eSafety Forum investigated this subject and has recommended in its Final Report [1] to develop a closer cooperation between public road authorities and map providers for the provision and maintenance of road safety attributes. ROSATTE builds on the conclusions of the Working Group and aims to provide a significant contribution to implementation of the recommendations of the eSafety Forum.

### 1.3 Public/private cooperation key for quality map updates

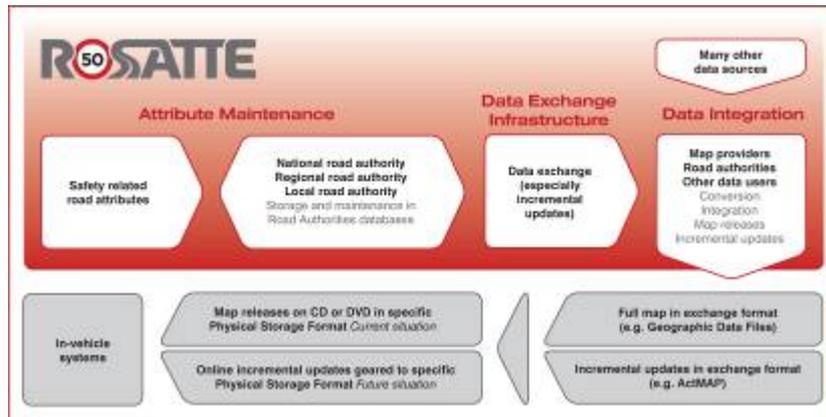


Figure 1 – Focus of the ROSATTE project

As shown in Figure 1, ROSATTE aims at establishing an efficient and quality ensured data supply chain for relevant core geographical data from public road authorities to commercial map providers with regards to safety related road content. The data provision chain addressed by ROSATTE concerns the flow of relevant attribute data from the road authorities to data users, who then integrate and aggregate the data. A major topic of the ROSATTE project is the design and development of an integrated set of flexible and interoperable tools for digital storage and maintenance of road attribute data by data providers (mainly public road authorities), for data exchange, and for data integration on the side of data users (mainly map providers). The road safety attributes will be processed further into suitable services to the end user. However, this processing is not within the scope of the ROSATTE project as the grey area in Figure 1 illustrates.

Special attention is also given to data availability and accessibility, data quality, and organisational aspects.

The project focuses on legal speed limits and traffic sign information as these both show the highest safety relevance and represent a real challenge in terms of maintenance. However, the developed specifications shall be equally applicable to any other ADAS attribute in real life situations.

### 1.4 Requirements and overall architecture: Who is involved in the system? What are their roles?

Based on the state-of-the-art and the inputs from road authorities and mapmakers, the requirements and overall architecture documented in D1.2 [3] describe the high level user requirements, use cases and data flow, both for road authorities and information providers from which functional and non-functional system requirements have been derived. Figure 2 provides an illustration of the connections between components, use cases and dataflow. Arrows indicate data flow, with names corresponding to the described use cases [3]. Thick arrows indicate flow of road safety attributes.

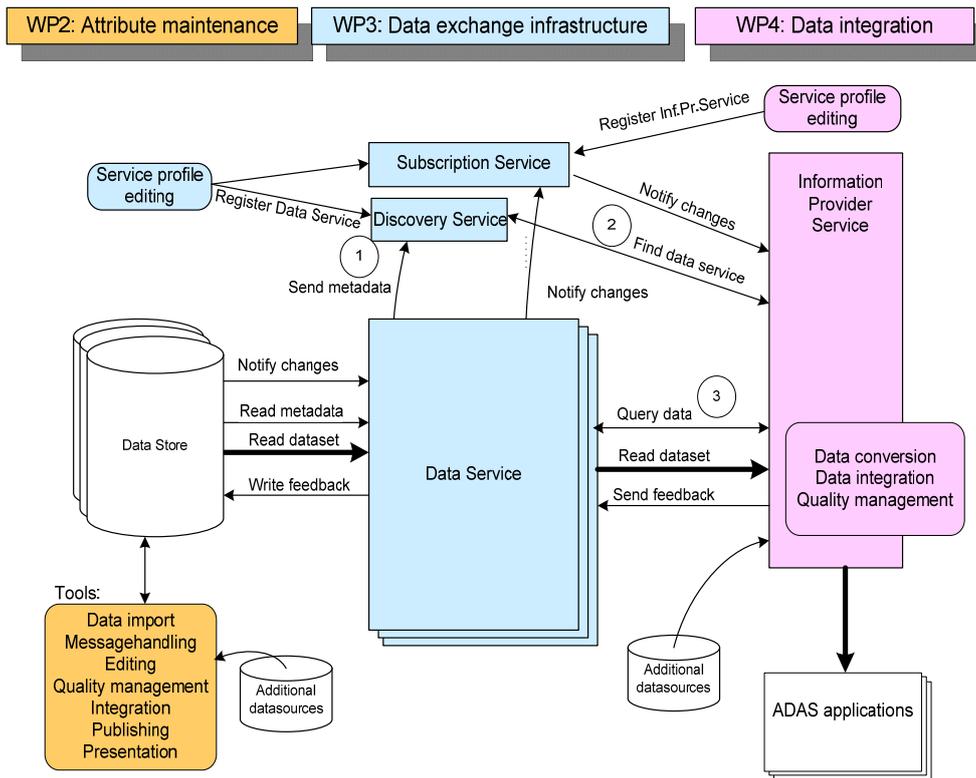


Figure 2: Component Viewpoint: ROSATTE framework dataflow [3]

The ROSATTE quality management is a vital part of the framework. Data quality requirements and management are identified including use of quality parameters describing the actual quality of the datasets, although these still depend on the choices made during implementation for road referencing, conversions, etc. In this respect, much of the work done in EuroRoadS [4] on quality management has been reused. As listed in Table , the data quality parameters categorised in three categories have been defined in order to measure and compare objectively data quality. This will lead to a rigorous data quality assurance process when the full scale implementation is ready.

Table 1: Data quality parameters based on the EuroRoadS [11]

Category	Data quality parameters
Dependability	Availability
	Up-to-dateness
Integrity	Completeness
	Consistency
	Correctness
Accuracy	Accuracy

It is important to note that the ROSATTE requirements and architecture are aligned with existing standards and the INSPIRE directive to ensure that systems are compatible.

## 1.5 Guidelines for the implementation of a map data store

The conceptual specification, reported in the ROSATTE deliverable D2.1 [5], describes how to establish a data store by giving concrete help, recommendations and guidelines for road authorities and other organisations gathering basic road data, to establish and maintain a data store from where safety attributes can be provided according to the ROSATTE infrastructure. Indeed, the guidelines follow the requirements and overall architecture established in D1.2. This description should serve as a model for road authorities and any other actors who needs to maintain and exchange safety-related map data.

Different pre-conditions at different road authorities and different situations regarding availability of the safety attributes are taken into account and existing processes and workflow on the road authority side are supported.

The guidelines cover the following points:

- Availability of safety attributes
- Availability of digital road network and location referencing attributes
- Compile attributes from local, regional and national authorities (source, media, etc.)
- Conduct a field survey
- Location referencing (Indirect (linear) Referencing, Direct geographical Referencing)
- Storing the attributes
- Techniques for compiling data
- Quality aspects
- Updating process
- Receiving feed back from Information Provider
- Publish data
- Tools
- Organisational aspects

The purpose of the document is not to suggest and specify a fully harmonized solution for road authorities but to rather try to overcome the diversity present across the European actors. Following the guidelines in the D2.1 will facilitate the exchange of data according to the ROSATTE architecture.

## 1.6 Data exchange methods

In D3.1 [6], the ROSATTE partners have detailed the data exchange methods which enabled automatic and timely exchange of safety attributes between road authorities and map makers. It also provides a reference implementation for the exchange of data which have been tested during the test and validation phase of the project.

The core part of the D3.1 provides the specification of a mechanism for data exchange of road safety information. It provides especially:

- A conceptual specification of the data content (information model). This is done using UML (packages, class diagrams, attributes, associations and OCL constraints).
- A physical exchange format (structure and coding using GML schema) to specify a coding for the various types of data listed under the conceptual model.

- A service specification implemented using UML (class diagrams) in order to facilitate the actual data flow between the various actors within ROSATTE. This service specification is inspired by INSPIRE network services architecture.

In view to promote faster deployment of the ROSATTE infrastructure within any interested road authorities or operators, the data exchange specification will be provided as a toolbox implementing the conceptual specification as xml-schema definition (.xsd) together with an implementation of the service specification as web-service.

### 1.7 Implementation in order to test and validate the framework

Five test sites have been implemented with the aim to validate the ROSATTE framework: two in France (ASFA and BALI [7]), one in Bavaria (OBB [8]), one in Flanders (Flanders Overheid [9]) and one joint test site in Norway and Sweden (NRPA-SRA).

The ROSATTE test and validation plan [10] describes each test site implementation, specifying what kind of attributes were supported, which administrative levels were involved in the collection of the data, and what evaluation methods were applied.

The document defines the evaluation methods relying on map providers' requirements, road authorities' requirements and system requirements, defining validation indicators that have been checked.

Another key aspect is the detailed description of the ROSATTE quality management which is a vital part of the framework. A series of data quality parameters categorised in Dependability, Integrity, and Accuracy, were defined in order to be able to measure and compare objectively data quality. This lead to a rigorous data quality assurance process.

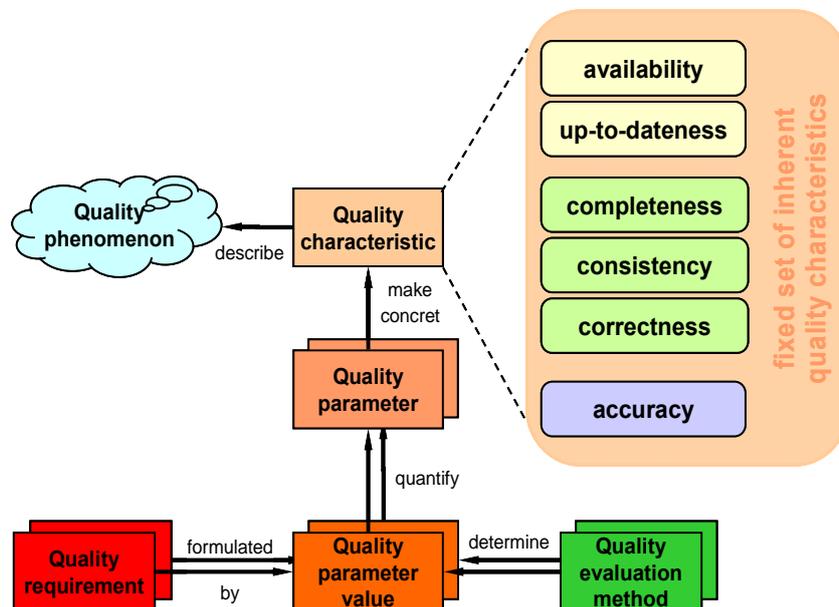


Figure 3: Data quality management process based on the EuroRoadS report on quality frame for information [11]

The validation work in each test site has shown that:

- The ROSATTE framework was viable for all the involved actors
- The success rate of the exchange of data and its quality depends also on the complexity of the locations chosen
- Further work is necessary to solve location referencing issues

The ROSATTE framework can be promoted more widely across European Member States and beyond. In addition, it should help to refine the guidelines and toolbox for any future implementation.

## **1.8 Organisational issues adapted to Member States' needs**

Beside the technical issues, one additional point of the framework is its organisational aspects. ROSATTE partners have been investigating diverse organisational options on the basis of a consultation across most member states. In D6 [12], the organisational aspects, Expected benefits and deployment aspects are reported.

The organisational options should offer solutions to the major issues mentioned by the member states and map makers such as the fragmentation of responsibilities, the poor availability of the data, the data conversion issues, the legal and IPR issues and, finally, increase the willingness to set up the infrastructure.

In terms of benefits, member states and map makers agree to say that the main impact of ROSATTE will be to support and facilitate processes needed to apply more efficiently the INSPIRE directive and the national SDI initiatives. The improved data accessibility, the better data quality and its monitoring, and the common exchange formats are also mentioned as key decision factors for implementing ROSATTE. On the other hand, the complex data chain, the implementation and maintenance costs, and simply the lack of qualified people are negative aspects which need to be addressed.

When asked about the best way to implement the ROSATTE framework, more than 30% of the member states answered that a legal framework would have to be defined. However, before this can be done, more work needs to be done to fully validate the framework in terms of standardisation of the components and processes, and in terms of quality certification procedures.

In order to increase awareness of the involved stakeholders, map makers, road authorities and motorway operators suggest to communicate about win-win of database, inform stakeholders about requirements and responsibilities, establish agreements, and stimulate cooperation public authorities/map makers. The communication about the win-win situation is the action that most road authorities that answered this question would do in order to increase the awareness of the all involved stakeholders.

## **1.9 ROSATTE implementation platform**

Having reached the end of the project, the ROSATTE partners realized that there is room for improvement and that it is important to gather the core group of experts in order to set up a forum to advice public authorities and map makers, support standards and make specifications. For this reason the ROSATTE community expressed its support to the establishment of an implementation platform consisting of both public and private partners and exploiting the results of the ROSATTE EC-funded project.

The overarching mission of the implementation platform is to provide support to the realisation of ITS Directive Actions 1.2 "Collection and provision of road data" and 1.3 "Accurate Public Data for Digital Maps" and stay in line with the new eSafety recommendation on digital map database.

The implementation platform is assumed to provide the following supporting role for its members:

- Gather an extensive list of active public authorities at local, regional and national levels committed to the deployment of a road data exchange infrastructure,

- Create a pool of experts to support the implementation of a road data exchange infrastructure in the member states,
- Maintain and update the ROSATTE specifications through a centralised change request process,
- Write comprehensive implementation guidelines to support new implementations,
- Define procedures for making ROSATTE services searchable in (third party) metadata platforms. Where possible, implement metadata supply to such platforms,
- Offer map-related tools and services especially with regards to quality assurance and on-the-fly location referencing issues,
- Clarify with member states the legal and licensing aspects related to using the ROSATTE framework for public authorities who provide data to commercial map makers,
- Raise awareness and cooperate at international level on the topic.

### **1.10 Conclusions and next steps**

This summary retraced briefly the status of the ROSATTE project which was completed in December 2010. The ROSATTE framework has been proposed as a solution to the technical issues which have been validated within the project. In addition, organisational options have been investigated to increase the acceptance and viability of the framework and increase the chance to see a European-wide adoption. The collaboration between ROSATTE and EasyWay is of particular interest for the next steps to accelerate the deployment of speed information solutions.

The expected added value will have a direct impact on both public and private sectors and is expected to provide a significant benefit to all European citizens in their role as road users. ROSATTE results shown that the project can contribute to:

- Considerably decrease the time delay between the update of an attribute in the road database at a road authority and its availability in the end-user map database;
- Significantly extend the coverage of up-to-date safety-related road information in digital map databases;
- Provide mechanisms to assure high attribute value quality;
- Establish at road authorities more efficient processes for maintaining safety related data;
- Facilitate smooth and efficient data integration at map providers.

It is expected that the ROSATTE results in the long term will contribute to decrease the number of casualties and injuries on European roads by enabling the deployment of map-based ADAS applications. The establishment of a ROSATTE implementation platform is seen as a necessary step to help the member states to setup and run the needed infrastructure. This platform supported by the member states and the map makers in the project would have for mission to inform and train the relevant actors, promote the benefits, guarantee a harmonised implementation of the ROSATTE framework and provide a solution for certification and quality monitoring. In addition, the platform could have operational responsibilities, such as maintenance of a ROSATTE toolbox, etc... The ROSATTE partners are currently preparing a Support Action proposal to be submitted early 2011.

The ROSATTE partners would like to acknowledge the financial support of the European Commission, DG Information Society and Media without which this kind of pre-competitive research would not be possible.

## 1.11 References

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PS: ROSATTE deliverables can be found on its website at the following URL:

<http://www.rosatte.eu/>