SCUTUM

User requirements and services definition

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1 Introduction

1.1 Abstract

This document presents the analysis of user requirements and services definition, in relation to the use of GNSS (EGNOS/Galileo), applicable for SCUTUM. The content of this document is the output of the SCUTUM WP2.1 ("User Requirements") and WP2.2 ("Added Value of EGNOS/EDAS & Service Definition"). It will be used in the successive project phases, in particular the defined products and services serve as input to:

- the specification and design of the SCUTUM solution and system (carried out in WP2.3 "Technical Feasibility & Implementation")
- the standardisation activity of the WP4.3 "Data Security & Standardisation" (mainly for feeding the CWA work related to EGNOS/EDAS based services and interfaces)
- the elaboration of the business, exploitation and pre-commercialization strategy (to be performed in WP5).

Moreover, the work of WP2.1 and WP2.2 gets inputs from/provides inputs to the parallel analyses carried out in WP4.1 "Galileo Added Value & Service Enablers Analysis" and WP4.2 "Regulatory & Legal Framework".

1.2 Document Overview

This document contains the following chapters:

- The present chapter containing the main introductory elements;
- Chapter 2 describes the work methodology;
- Chapter 3 details the user requirements;
- Chapter 4 details the service requirements;
- Chapter 5 presents the description of the products
- Chapter 6 contains the conclusions and guidelines for next phase.

Annexes 1 and 2 reports the questionnaire prepared for the survey on user needs and the user community participating to the survey.

1.3 List of References

1.3.1 Applicable Documents

Ref.	Title	Code	Version	Date
[AD 1]	SCUTUM Grant Agreement	247851		18/01/2010
[AD 2]	Annex 2 SCUTUM DoW	247851		24/11/2009
[AD 3]	SCUTUM Negotiation Meeting	SCUTUM/004-2009		13/10/2009
[AD 4]	SCUTUM Grant Agreement amendment	247851		12/02/2010
[AD 5]	Annex 2 SCUTUM DoW 1 amendment	247851	V1	03/02/2010

Table 1 Applicable Documents

1.3.2 Reference Documents

Ref.	Title	Code	Version	Date
[RD 1]	SCUTUM Project Management Plan (PMP)	SCUTUM_PMP	V1	16/03/2010
[RD 2]	SCUTUM – Kick Off (KO) Minutes of Meeting	SCUTUM/001-2010		11/02/2010

Table 2 Reference Documents

1.4 Abbreviations

Abbreviation	Meaning
AD	Applicable Documents
ADNR	Regulation concerning the international carriage of dangerous goods by river
ADR	European agreement concerning the International Carriage of Dangerous Goods by Road
ANPR	Automatic Number Plate Recognition
CMR	Convention des Marchandises par Route
CORTE	Confederation of Organisations in Road Transport Enforcement
CS	Commercial Service
DoW	Description of Work
EDAS	EGNOS Data Access System
EGNOS	European Geostationary Navigation Overlay System
EIA	European Intermodal Association
ERF	European Union Road Federation
EU	European Union
FP	Framework Programme
GNSS	Global Navigation Satellite System
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSA	European GNSS Supervisory Authority
GSI	Gestione Servizi Interporto
HMI	Human Machine Interface
HPL	Horizontal Protection Level
HW	Hardware
ICAO	International Civil Aviation Organization
IMDG	International Maritime Dangerous Goods
IPBO	Interporto Bologna
KO	Kick-Off
LCS	LoCation Server
MEEDDM	Ministry of Ecology, Energy, Sustainable Development and the Sea

MENTORE	iMplemENtation of GNSS tracking & tracing Technologies fOR Eu regulated domains
MIT	Italian Ministry of Infrastructure and Transports
MoM	Minute of Meeting
M-TRADE	Multimodal TRAnsportation supporteD by EGNOS
OBU	On Board Unit
OMV	Österreichische Mineralölverwaltung
PMP	Project Management Plan
PRS	Public Regulated Service
RD	Reference Documents
RID	Dangerous Goods by Rail
SBAS	Satellite-Based Augmentation System
SCUTUM	SeCUring the EU GNSS adopTion in the DangeroUs Material transport
SW	Software
TPZ	Telespazio
WP	Work Package

2 Methodology

Next figure presents the WP2.1 & WP2.2 methodology and interactions with other SCUTUM WPs.

The focus of the SCUTUM analysis is **the transport of dangerous goods** (i.e. the goods, whose types belong to the ADR classes) **via road and intermodal nodes**, and the **localisation/positioning functions**. However the analysis will also take into account the extendibility towards other freight types and modes of transport.

Moreover, the analysis targets Europe, but specifically the three countries **Italy, France and Austria**.

Basically the work is tailored on **user profile**, a user profile including users having same role/application scenario in the transport of dangerous goods. For each user profile, the relevant requirements and added value of EGNOS/Galileo are outlined.

This serves as basis for the definition of the products/services to be offered.

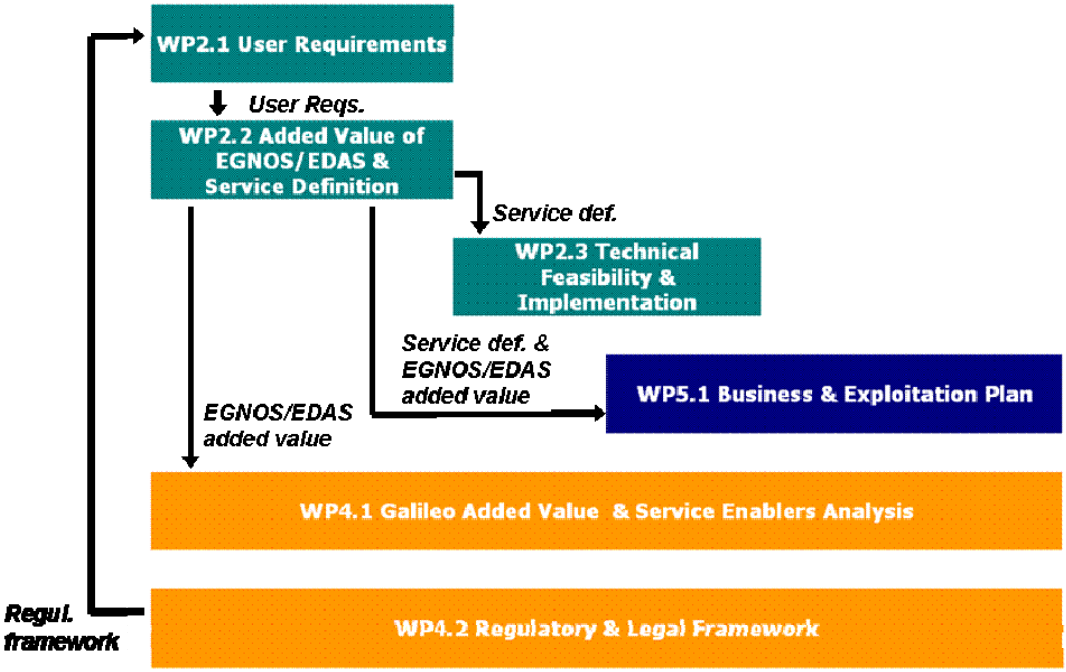

Figure 1 WP2.1 & WP2.2 methodology and interactions with other SCUTUM WPs

Above figure show the relations of the WP2 (WP2.1 and WP2.2) with the other project activities/WPs.

The WP2.1 characterises the user community, i.e. identifies the user profiles and relevant requirements for satellite navigation technology and services: needs for localisation, present use of position technologies, relevant limitations and requirement for positions services based on the application scenarios.

Being a regulated transport, the regulation plays a key role for all user profiles. Thus the analysis of the WP2.1 receives inputs from the WP4.2 in terms of regulatory framework (looking at Europe, and focusing on the three countries before mentioned).

Starting from the user requirements previously defined, for each user profile the WP2.2:

- Identifies the role for EGNOS/Galileo with respect to the other technologies, and thus provides inputs to the WP4.1
- Defines the products/services, to be used as inputs from the WP2.3 for the SCUTUM system specifications and design
- Elaborates the products/service package to be offered to the different user profiles (tailored on their needs and application scenario), to feed the market analysis of WP5.1.

The activity has been deployed following a **user-profile oriented approach** and sequential steps:

1. **User profiles identification,** through an in-depth observation of the user community and identification of the **main user profiles** (representing different operations and responsibilities in relation to the transport of dangerous goods).
2. **User profiles survey**, to gather a picture of their present use of location technologies/services and needs (in terms of technical, operational, regulatory and cost drivers). This has been done by means of a survey through the circulation of a tailored questionnaire to selected stakeholders belonging to the previous identified user profiles.
3. **User requirements definition**, as resulting from the analysis of the survey, and
4. Identification of specific **EGNOS/Galileo added values**, especially with respect to their presently used technologies and in view of their future adoption of location solutions in their operations.
5. Defined user requirements and identified EGNOS/Galileo added values have the inputs for the specification of the **service requirements** to be provided by the SCUTUM system. Service requirements have been specified from the user perspective, thus as a combination of satellite navigation, communication and application features.
6. On the basis of user & service requirements and EGNOS/Galileo added values for each user profile, the last step is the definition of **SCUTUM products/services tailored to the user profiles**, being the users of the SCUTUM system and thus the target of the future commercialization. The defined products serve as input for the products/service offering, to be further elaborated in the business and exploitation plans.

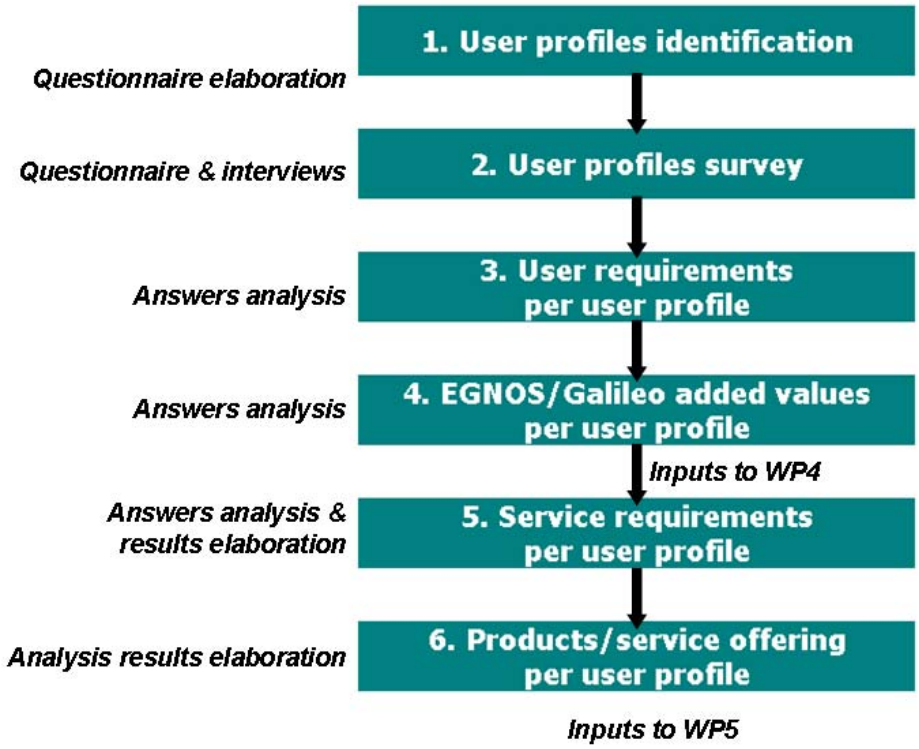

Figure 2 WP2.1 & WP2.2 implementation

A questionnaire has been prepared by the team and circulated to selected stakeholders. The questionnaire has been jointly prepared by WP2, WP4 and WP5 participants, to have a complete picture of the user community, thus also gathering information concerning regulatory, enablers and market aspects.

The list of selected stakeholders includes:

- The members of the SCUTUM team, belonging to the user community (i.e. ENI, MIT, MEEDDM and IPBO[1]) and
- In order to get a picture of the user community as complete as it is possible, also users outside the SCUTUM team (such as IPBO and ENI contacts, ERF and EIA members and TTS Italia members).

In order to be effective, the survey has been conducted firstly by circulating the questionnaire via email and through dedicated phone interviews.

The questionnaire answers have been analysed and the results further elaborated.

[1] Answers provided by GSI, an IPBO controlled company, that manages the freight village internal services

2.1 SCUTUM user community

From the in-depth observation and based on the outcomes/experience gathered in previous projects (M-TRADE[2] and MENTORE[3] that performed a deep analysis of the transport of dangerous goods user community), **four user profiles** have been identified as representing different operations and responsibilities in relation to the transport of dangerous goods:

- ***Competent authorities*** are governing bodies/institutes enforcing local and international dangerous goods regulations and law (this profile also includes port authorities, safety and emergency entities)
- ***Infrastructure managers/operators*** include intermodal node operators, port operators and road managers/operators
- ***Goods owners*** include cargo owner and oil companies
- ***Transport operators*** include specialised transport operators, distributors, forwarders and couriers. This also includes equipment suppliers, third and fourth party "specialised product" distributors with own fleet of trucks/containers/tanks.

SCUTUM survey and successive analysis on user requirements are specifically addressed to the above user profiles.

[2] Multimodal TRAnsportation supporteD by EGNOS, 6FP GSA

[3] iMplemENtation of GNSS tracking & tracing Technologies fOR Eu regulated domains, 6FP

3 User requirements

3.1 Outputs, methods and tools

The WP2.1 outputs are the user requirements related to the transport and movement of dangerous goods via road and in intermodal node areas.

The outcome is the **characterization of the user community**, providing a complete and coherent view of the dangerous transport from the regulatory, operation and position-technology points of view. This includes the identification of user profiles, and for each of them:

- The relevant application scenarios (taking into account the constraints of the regulations and operation processes)
- The relevant needs for localisation and requirements for positioning services, based on the application scenarios
- The present use (if any) of position technologies (in particular GNSS) including their limitation
- The interests towards EGNOS technology and the opportunities that EGNOS can have
- The guidelines to be considered, also in the light of further extension to other freight transports and interoperability with other modes of transport (rail/waterways).

3.2 User survey

In order to benefit of the survey, the questionnaire has been prepared with the aim of gathering a picture of the user community as complete as possible. The questionnaire is reported as Annex of this document.

The questions are conceived to investigate on the different profiles':

- Existing working procedures and tasks, including regulation aspects
- Legacy systems, technology solutions and services, specifically in relation to the position technology and services
- Existing and future needs and requirements
- Interest towards EGNOS and willingness to invest in new technology/enhance present solutions
- Opportunities/advantages for EGNOS (for example to enhance security, efficiency, for regulatory reasons)
- Recommendations concerning possible market facilitators for EGNOS (and Galileo)
- Constraints posed by the necessity to extend in the future the use of EGNOS/Galileo also to other freight types and modes of transport.

The SCUTUM team already gathers at least one firm per user profile. This alone would guarantee a representative view for each of them.

The survey has been conducted primarily on the SCUTUM members representing the user community, and various stakeholders external to the SCUTUM team, belonging to different EU countries. The list of external stakeholders has been obtained by gathering the contacts of the SCUTUM team, for different user profile and especially in the three target countries. The questionnaire has been circulated to more than 70 users, also including users associations[4] that in turn have circulated it to their associated members.

The survey has been conducted with the purpose to have a more complete view of the user communities, so that to elaborate inputs for the next phase of the project enabling to implement a system, products/services and a proposal for a standard that have a large consensus.

Thus it is not intended to provide any statistical evidence.

24 stakeholders belonging to different countries (Italy, France, Czech Republic, Luxemburg and Switzerland) have taken part to the survey, i.e. have answered to the questionnaire/interview. Furthermore, 2 associations, a European and a non-European one, are also included. The four user profiles include:

- For the “authority” profile, both national authorities (from Italy, Czech Republic and France) and a local authority (from Italy).
- For the “goods owner” profile, 2 big oil companies from Italy and Austria (being two of the countries addressed by SCUTUM) and the Italian association of chemical producers
- For the “infrastructure manager/operator” profile, motorway operators (in Italy and France) and facility managers
- For the “transport operators” profile, different typologies (i.e. big sized and small/medium sized companies) from various countries (Italy, Switzerland and Luxemburg), using not only road but also rail transport[5].

The complete list of respondents to the questionnaire/interview is reported in a dedicated Annex of this document:

- 5 authorities
- 5 infrastructure managers/operators,

[4] Such as the members of Unione Petrolifera Italiana, the Italian association of oil companies/producers

[5] The survey has been targeted to transport of dangerous goods via road, in line with SCUTUM objectives. However, since SCUTUM concepts include the extendibility to other modes of transport, rail operators have been interviewed, considering that rail has the highest share of dangerous goods transport after road in Europe.

- 3 goods owners
- 11 transport operators.

Next figure provides a quick view of the user community participating to the survey per profile and per belonging country.

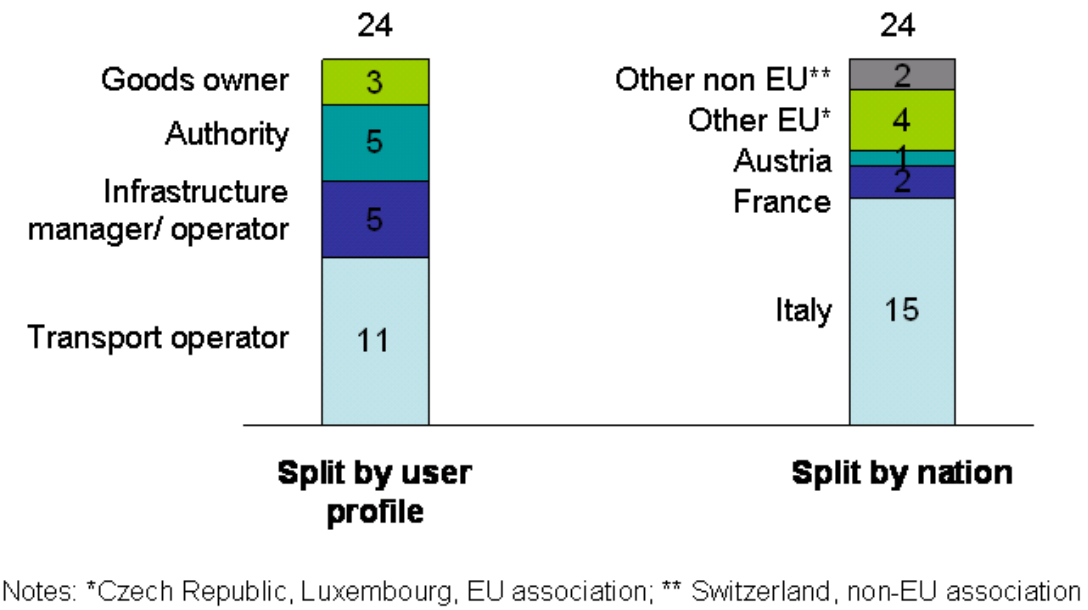

Figure 3 Profile of respondents to the questionnaire

3.3 Analysis of the questionnaires

The analysis has been carried out with the aim of obtaining the following main results:

- Definition of user requirements for each profile, depending by the regulation scenario, tasks/responsibilities, existing operational procedures, presently adopted solutions and relevant limitations, needs in terms of effectiveness and safety and how these needs can be fulfilled by satellite navigation technology and services.
- Evaluation of EGNOS/Galileo added values, both perceived and real driven by the user needs before defined. This also includes the user interest towards EGNOS and willingness to invest in new technology and/or to enhance present solutions.
- On the basis of the user needs, the specification of the service requirements, and then identification of the products (technology solution or services) for each user profile. Identified products are based on the use of EGNOS, i.e. as they are provided by the SCUTUM system. Thus identified products are the subject of the project pre-commercialization and exploitation activity.

These results are reported in the following sections of this document.

As explained before, the questionnaire has been prepared as complete as possible to allow gathering information necessary with a single survey. Some questions are oriented to WP4 (regulatory framework) and WP5 (economical and market data). These have been analysed and the relevant results given as inputs for being elaborated in WP4 and WP5.

The questionnaires/interviews answers have been elaborated in two phases:

- First, a detailed analysis has been done separately for each user profile, to analyse comparable answers
- Then a qualitative analysis has been done among the different user profiles, to make a comparison between the different needs, mainly due to different procedures, responsibilities, operational constraints, present use of technological solutions for monitoring the transport of dangerous goods, etc.

In the following part of the document a summary of the answers per user profiles is given, highlighting commonalities between different respondents belonging to the same profile and between different profiles. In case of discrepancies or specific aspects, these have been considered and investigation has been done to identify key reasons, e.g., differences in user typology (for example, big sized or small/medium sized companies, especially for the case of transport operators) or country (for example, due to different national laws regulating the transport of dangerous goods).

3.3.1 Applicable regulation

Considering the nature of the transport of dangerous goods, the main communality relies on the applicable European and National laws, governing operational procedures, safety standards and liability chain.

Key regulations cited from respondents are:

- International regulations, mainly IMDG[6] for maritime and ICAO[7] for aviation, but also CMR[8]
- European regulations, mainly ADR[9] for road, RID[10] for rail
- Specific cross-border and national regulations, imposed by national laws or ratifying the international and European regulations.

On top of these, some respondents cited as relevant regulatory aspects for them also health/safety protection, security aspects and homeland security issues.

[6] International Maritime Dangerous Goods

[7] International Civil Aviation Organization

[8] Convention des Marchandises par Route

[9] Carriage of Dangerous Goods by Road

[10] Dangerous Goods by Rail

3.3.2 Present use and need for monitoring of dangerous goods transport

The survey has allowed to gather a picture of the state of the art and needs concerning the real-time monitoring of dangerous goods transport per user profile, also identifying possible differences within entities of the same profile (belonging country and/or entity typology, for example the size of the company or the type of managed infrastructure).

3.3.2.1 Authorities

The survey has regarded 5 respondents belonging to this profile: the European Confederation of Organisations in Road Transport Enforcement[11], 3 national authorities and 1 local authority.

The present situation, as resulting from the answers, shows that:

- With the exception of the local Italian authority that has implemented and use as a local best practise a system for the real-time tracking & tracing of dangerous goods based on GPS + GPRS and web technology, none of the national authorities make use of a dedicated system for the dangerous goods transport monitoring
- There is a common need for a system dedicated to the real-time monitoring of dangerous goods transport, mainly for safety and security.

In view of the possible implementation of such a system, in general, the recommendations are:

To base it on the commercial solutions and interoperable solutions

To evolve towards a common format for data exchange (to ensure interoperability/avoid proliferation of formats)

To use GPS/EGNOS-enabled OBU[12].

Present solutions have been chosen upon their easiness-to-use, however according to the authority viewpoint this is not among mandatory criteria.

A special case is the transport of nuclear material performed by the Czech Republic, that, according to the received answers, is more devoted to military purposes (this is also in line with their interest towards Galileo PRS[13]).

3.3.2.2 Infrastructure managers/operators

Users belonging to this profile are 4 motorway operators (1 operating in France, and 3 in Italy) and 1 rail/shunting operator (i.e. it is in charge of operating rail infrastructures in terminals/node area, during shunting manoeuvres).

[11] CORTE brings together national bodies from various European countries having a responsibility and interest in the field of road transport

[12] On-Board-Unit

[13] Public Regulated Service

Despite all operators have confirmed their common need to monitor dangerous goods for safety, regulation and traffic management reasons, only 2 respondents out of 5 are currently using a solution to monitor dangerous goods. This leads to a huge market potential for satellite navigation solutions, and in particular EGNOS, still to be addressed.

The two entities that are presently using systems to remote monitoring dangerous goods transport are:

- One of the Italian motorway operators (Autovie Venete) makes use of a solution relying on optical technology (Automatic Number Plate Recognition - ANPR). Even though it is currently satisfied with such a solution, it is keen to evaluate EGNOS expecting strategical and operational benefits.
- The rail infrastructure manager (GSI, an IPBO controlled company, managing the freight village internal services) that makes use of satellite navigation technology (GPS+GPRS). This company, in the past, successfully proved EGNOS[14] and expressed its interest towards the enhancement of the present solution into EGNOS (the rationales being higher safety in shunting operations and quality of services to customers), provided that legislative measures need to be established to support a wide EGNOS adoption. GSI answers the SCUTUM questionnaire have confirmed such a position.

The 3 respondents that are not presently monitoring dangerous goods transport, have different positions:

- One is planning to adopt a satellite navigation system for enhancing circulation safety and better controlling of transport regulation compliance.
- One is not planning to adopt a satellite navigation system (mainly due to the difficulty to force hauliers and transport operators). However it recognises that the main advantage is in the capability to have real-time data (position, and type of goods) on the dangerous goods traffic along the road network.
- One is not interested in the use of a satellite navigation system in the short-tem, notwithstanding that operational advantages and a higher safety can derive. The adoption of this type of system shall be triggered by a European regulation.

Even though the 5 respondents have heterogeneous experiences and positions concerning satellite navigation and EGNOS, they have a common understanding of EGNOS added values in comparison with GPS, relying in operation improvement, safety increasing and enhance performances (also in difficult environments).

Finally, even if it is reckoned that the main driver to facilitate the use of solutions for monitoring and tracking dangerous goods is legislation, broadly there seems to be no specific circumstance that could oblige the usage of EGNOS, being its selection among other solution more a commercial matter (cost and quality of service). In particular, cost for final

[14] EGNOS CS-based tracking & tracing of locomotives during shunting (M-TRADE project, GSA 6FP)

users, followed by reliability of service and diffusion of GPS system seems to be the strongest issue that EGNOS has to overcome to penetrate the market.

3.3.2.3 Goods owners

All the respondents use various modes of transport and monitor dangerous goods for safety issues, but also for other reasons (e.g., efficiency, regulation, liability, statistic purpose).

From the technical point of view they appear as very advanced users, as they all use GPS systems coupled with other technology to improve GPS features (e.g. EGNOS, RFID, sensors) mostly tailored to their specific needs.

Respondents appear satisfied with their current solutions. Nevertheless, even if legislation is seen as the main driver for adoption, the majority of respondents are keen to evaluate EGNOS even if there is no legislation obliging them to do so to obtain better performances (e.g., more precision and liability).

Cost followed by management of the signal and privacy are the main barriers that can hinder the development of a specific solution for tracking and tracing. In particular EGNOS ramp-up could be smoother than expected should high level precision not be required by legislation.

3.3.2.4 Transport operators

Respondents within this user profile are equally split among road and rail operators, plus an intermodal operator. The majority of respondents are from Italy, 2 respondents are from Luxemburg, 1 from Switzerland, and 1 represents the world road association. Furthermore, respondents are very different concerning their size, ranging from less than 10 to more than 50.000 employees.

The majority of respondents need to monitor dangerous goods for safety and security issues (real time control and monitoring of transport), but some respondents cited also efficiency, regulation, customer-care and liability (management/planning and quality control).

Some of them presently use a system, based on various technologies: GPS, RFID, video surveillance, network of buoys along the infrastructure. The selection of the current solutions (off-the-shelf for smaller companies and customised for bigger ones) has been done according to a technical/ economical trade-off.

Most of the respondents are quite satisfied with their systems, and in principle are not very open to prove a new technology such as EGNOS.

4 users highlighted EGNOS advantages and broadly support its adoption:

- 2 see EGNOS advantages in the capability to provide standardized services at European level, and for this reason its adoption shall be extended to all transports of dangerous

goods. These two users have already proved EGNOS in the past, thus they have knowledge of its features[15].

- 1 is a European large operator, and sees EGNOS advantages in the capability to provide standardized services, with consequent operational and economical benefits.
- 1 sees the technological innovation as the main EGNOS advantage.

All respondents perceive the cost as the principal barrier of EGNOS adoption: cost of the technology and for its introduction in present operations.

However, all of them recognise that legal requirements and obligation to comply with standards (for example in the case specific standards eventually oblige to use EGNOS), can act as a facilitator.

3.4 User requirements

Unlike the previous qualitative evaluation of the survey, this part of the survey has been carried out through a quantitative assessment of main requirements (on a scale from 1 to 10), according to the weight of importance provided by the respondents (see section 3 of the questionnaire). On the basis of these weights, the analysis has identified required, important and nice to have features for the four user profiles.

3.4.1 Authorities

The analysis of the answers provided by the authorities has derived the following results:

- Required features – service liability, interoperability with other systems, availability and continuity of the signal, data security, additional services possibly tailored to specific needs are considered key elements for choosing a specific solution.
- Important features - data accuracy, service guarantee, service accessibility via a web interface or via a dedicated system at users' premises, exportability to different modes of transport belong to this class.
- Nice to have features are the possibility for the solution to be compliant with HW and HW+SW constraints of the user, price, extendibility to other freight types (not ADR), customer-care.

In particular, extendibility to non ADR freights seems to be linked to national priority (both the two Italian authorities have expressed interest towards this feature, as in line with the national strategy to extend the use of satellite navigation for tracking & tracing of whole freight traffic).

[15] EGNOS CS-based tracking & tracing of dangerous goods transport via rail and road (M-TRADE and MENTORE projects, GSA 6FP)

3.4.2 Infrastructure managers/operators

The interviewed infrastructure managers/operator include motorway and rail operators. The analysis of their answers has derived the following main results:

- Required features – data accuracy, data security, service guarantee, interoperability with other systems, extendibility to other freight types (not ADR), service liability, availability of the signal are considered key elements for choosing a specific solution.
- Important features – price, service accessibility via a web interface or via a dedicated system at users' premises, easiness of use, continuity of the signal, additional services possibly tailored to specific needs belong to this class.
- Nice to have features are the exportability to different modes of transport, possibility for the solution to be compliant with HW and HW+SW constraints of the user, customer-care.

It is worth noting that road and rail operators have a similar position concerning interoperability with other systems and extendibility to other freight traffic (ADR): they are all generally interested in having a solution that is flexible to be interfaced with their own existing legacy systems, and can be easily used to monitor other types of traffic.

However, rail operators showed a greater interest than road operators in customer service support.

3.4.3 Goods owners

The interviewed goods owners belong to two countries, Italy and Austria, and represent big firms (oil and chemical). They mostly transport their goods via road, with a small percentage via rail (even though the trend is to progressively move towards rail transports). The following outcomes have been derived from the following results:

- Required features – data security, availability and continuity of the signal, data accuracy, price and extendibility to other freight types (not ADR) are considered key elements for choosing a specific solution.
- Important features – exportability to different modes of transport, service liability, additional services possibly tailored to specific needs, service guarantee, service accessibility via a web interface, easiness of use belong to this class.
- Nice to have features are the service accessibility via a dedicated system at users' premises, customer-care, interoperability with other systems, possibility for the solution to be compliant with HW and HW+SW constraints of the user.

3.4.4 Transport operators

The interviewed transport operators are very heterogeneous in terms of size and mode of transport (road and rail), that is naturally linked to the fragmentation of the relevant markets. This is consequently reflected in the provided answers. For this reason the relevant analysis can provide a summary view, provided that there are deviations due to specific needs:

- Required features – Data security, price, easiness of use, service guarantee, service accessibility via a web interface, service liability are considered key elements for choosing a specific solution
- Important features – interoperability with other systems, data accuracy, customer-care, availability of the signal, extendibility to other freight types (not ADR) and continuity of the signal belong to this class.
- Nice to have features are exportability to other modes of transport, service accessibility via a dedicated system at users' premises, additional services possibly customised to specific needs, the possibility for the solution to be compliant with HW and HW+SW constraints of the user.

Smaller companies (< 100 employees) also due to their more focused kind of business, tend to demonstrate less interest than the average in the extendibility to other freight types (not ADR), while they tend to favour more a solution that guarantees exportability to different modes of transport.

Medium-sized companies (<1000 employees) are also the only non-Italian ones that have responded to this part of the questionnaire. For them the price is a nice to have feature (as compared to a required feature for the other clusters).

Finally, Trenitalia, the only big-sized (> 1000 employees) respondent to the questionnaire, considered respectively as required features and important features service accessibility via a dedicated system at user's premises and exportability to different modes of transport, both considered on average by the user group only as nice to have. On the contrary, easiness of use, continuity of the signal and data accuracy are for them only nice to have.

With regards to modes of transport, the train specialists (i.e., those carrying more than 90% of their goods via train) require more than the other a solution that guarantees exportability also to other transport modes.

3.4.5 Summary

A brief overview of the requirement analysis per user profile is provided in the table below.

		Authorities	Infrastructure manager/ operators	Good owners	Transport operators
Required	Data security (authentication, authorization, integrity, privacy, other)				
	Service liability				
	Data accuracy				
	Availability of the signal				
Important	Interoperability with other systems				
	Service guarantee				
	Continuity of the signal				
	Service accessibility via a Web Interface				
	Price				
	Additional services possibly customised on customer's needs (i.e. mapping, freight identification, reporting)				
	Extendibility to other freight types (non ADR)				
	Easy of use (SW and HW)				
Nice to have	Exportability to different modes of transport				
	Service accessibility via a dedicated system at customer's premises				
	HW and SW constraints (for example specific requirements on the interfaces, redundancy, proprietary software, etc.)				
	HW constraints (for example specific requirements on the installation, certification, etc.)				
	Service (i.e., ability to provide high levels of on-going customer service)				
	Other				

Required features

Important features

Nice to have features

Table 3 Analysis of user requirements per user profile

4 Service requirements and EGNOS/Galileo added values

4.1 Outputs, methods and tools

Some questions of the survey specifically address EGNOS/Galileo in comparison with the present GPS, and oriented to evaluate:

- EGNOS/Galileo added value and advantages, as perceived/expected by the users belonging to the different profiles
- The opportunities they see for EGNOS today and as a precursor of Galileo
- The user interest towards EGNOS and its willingness to invest in a new technology/enhance present solutions based on GPS
- Their view concerning the barriers hindering the operative adoption of EGNOS and recommendations for possible facilitators
- Any constraints posed by the necessity to extend in the future the use of EGNOS/Galileo also to other freight types and modes of transport.

Based on the analysis of the answers, it has been possible to have an understanding of the above aspects for each user profile.

Moreover, on the basis of the users needs before defined, requirements of services to be provided by SCUTUM are specified for each user profile,.

4.2 EGNOS/Galileo added values

4.2.1 Authorities

There is a common perspective concerning the introduction of satellite navigation for the transport of dangerous goods: adoption shall be done by the commercial actors involved in the transport of dangerous goods (i.e. transport operators/fleet owners/hauliers).

The common position of all respondent authorities is that:

- A suitable regulatory process can facilitate and economical incentives are likely to encourage introduction
- Safety and security enhancement is the main driver and reason for improving current regulatory framework
- The regulation process shall be initiated at European level, coordinated and supported at national level.

Specifically, concerning EGNOS, all the interviewed authorities declared their interest toward EGNOS and willingness to support its adoption. Main reasons are:

- Tactical and strategic benefits
- Operational improvements (especially to support police/fireman search & rescue operations)
- Increase of safety/security levels.

For the majority of respondent authorities, perceived advantage is that EGNOS could support the implementation of an authority database/central repository populated with the real-time data coming from the transport operator systems, to be used for institutional purposes (for example in case of statistics, search & rescue operations, law enforcement, safety measure establishment). Such as authority database/central repository is implemented at national level, and exchange of information between national databases is necessary especially for cross-border coordination.

The answers concerning the barriers for EGNOS introduction are very heterogeneous, probably depending on the specific country, and in the case of the two Italian authorities from the differences between local and national frameworks (regulation, responsibility, operations). Difficulties for EGNOS introduction are seen in: transport operators reluctance due to various reasons (e.g., hostility in being controlled, costs, driver privacy, lack of interoperability of the commercial solutions negatively impacting on the possibility to implement the national database/central repository, existing solutions do not enable to use EGNOS especially due to receivers' limitation).

Again, a regulatory process is expected to facilitate EGNOS penetration.

4.2.2 Infrastructure managers/operators

The position of the infrastructure managers/operators concerning the use of satellite navigation systems for the transport of dangerous goods is that:

- Similarly to the authorities, the adoption shall be done by the transport operators/fleet owners/hauliers. Moreover, infrastructure operators as well can be motivated to use satellite navigation for their specific needs (e.g., monitoring traffic of dangerous goods), the main reasons being the enhancement of safety level and the establishment of a common operational framework. One of them (SANEF) also mentions the need to have a centralised system implemented at national level (similarly to the database/central repository concept mentioned by the authorities).
- A combined European and national regulatory process is envisaged as facilitator for the adoption.

In relation to EGNOS, the respondents, both for motorway and rail operators, have commonly expressed interests on EGNOS, mainly for safety reasons, even if the real advantages are still not clear. There is also interest towards the EGNOS CS capabilities to

enhance availability of EGNOS corrections in difficult environments. However, also due to the lack of a clear understanding of the advantages brought by EGNOS, the common position is that use of EGNOS is justified only if compulsory due to laws or regulations (for example ITS Action Plan Directive is mentioned).

4.2.3 Goods owners

The 3 respondents represent oil and chemical companies, from Italy and Austria. All of them make use of GPS-GPRS solutions:

- For various purposes, such as real-time tracking & tracing, remote control & monitoring, safety and statistics, customer contract fulfilment
- Except for ENI, that uses a personalised turn-key solution, both Federchimica and OMV use off-the-shelf solution and services provided by a commercial Service Provider
- All of them have a clear understanding of EGNOS benefits with respect to present GPS mainly due to its robustness and capability to provide guarantee position. They are clearly interested in using EGNOS (ENI already uses it) and EGNOS CS capabilities to enhance availability of EGNOS corrections in difficult environments, but they are not ready to pay for GNSS/EGNOS services.

4.2.4 Transport operators

Despite respondent transport operators differ in terms of size, country, type of activity (both road and rail operators have been interviewed) and present use of satellite navigation solutions (some of them already use satellite technologies for tracking & tracing/monitoring, other not), the majority of them addressed:

- cost as the main barrier in the adoption of satellite navigation systems for the transport of dangerous goods
- enhancement of safety, operational procedures and efficiency, therefore increasing of service levels provided to the customers, as the key advantages
- the compulsory use of tracking & tracing solution due to European and national laws as the main reason for adoption.

With regards to EGNOS, advantage with respect to present GPS solutions is seen in the capability to cope with legal and responsibility obligations, especially over a logistic chain (where various operators are involved from the shipper to the consignees) and for cross-border traffic. However, cost is perceived as the main barrier and a European/national regulatory process combined with a national incentive programme is recommended to facilitate EGNOS introduction.

4.3 Services requirements

On the basis of the user requirements before defined, for each user profile, requirements of services to be provided by the SCUTUM system (in order to match users needs) have been specified and detailed here after.

4.3.1 Position information service

This service consists in the provision of EGNOS position data (i.e. EGNOS SBAS corrections are applied), including latitude/longitude/time and relevant HPL[16] to be used as a guarantee on the position data.

4.3.2 Remote localization service

This service consists of providing the position information available via a Human Machine Interface (HMI) through displays on geographic digital maps. The HPL is displayed as a circle around the point related to the latitude/longitude.

4.3.3 Tracking & tracing service

This service consists of reporting all position information and relevant HPL, related to a certain time window, on a digital maps accessible via a HMI.

4.3.4 Goods status monitoring service

This service provides the continuous monitoring of the parameters of the goods (depending on the type. For example: temperature, pressure, etc.).

4.3.5 Tampering monitoring service

This service enables the real-time information of the possible tampering of the goods repository during the transportation.

4.3.6 Identification service

A service enables the identification of the goods and/or transporting vehicle.

4.3.7 Transport supervision & monitoring service

This service is the combination of various services:

- Remote localization

[16] Horizontal Protection Level

- Tracking & tracing
- Goods status monitoring
- Tampering monitoring
- Identification.

It performs the functions of monitoring goods status, through the up-to-the-minute summary of the transported goods. The following information are made available via a HMI through displays on geographic digital maps:

- The co-ordinates of sensitive areas
- Declaration of the chosen transport trajectory
- Travel info on areas to avoid
- Data about the transported goods:

  goods identity, quantity and destination of the transported goods

  safety limits for good status parameters (for example pressure, temperature)

  goods present status

  trajectory alerts

  panic alerts

  position & velocity

Goods real-time data are available on periodic bases or on request.

4.3.8 Geofencing service

Geofencing is the ability to impose topological restrictions on geometric features. By means of this function, the system is capable to recognise and alert if the on-board equipment route deviates from the pre-defined path.

4.3.9 Alarming service

This service raises automatic alarms in case of anomalies. For examples, automatic alarms are generated in case of route diversion and prohibit zones crossing events (the exact route should be planned and authorised by civil protection before the transportation).

Messages containing parameters exceeding pre-defined threshold values are outlined and separately classified as alarm.

Various types of alarm are defined, for example low (warning) and high (alarm).

Alarms shall be raised also in case of status parameters exceeding thresholds.

4.3.10 Reporting service

This service provides the generation of activity reports. It has also the capabilities to perform simple statistics reports (in a graphical representation) on the generated traffic.

4.3.11 Information service

This service provides information at fixed times/intervals or on specific need/request. It includes reports on other traffic, transit authorisation, ports/terminals/nodes information.

4.3.12 Logging and archiving

This service enables to log all events and to archive them for successive reporting and statistics. Archived data are: positions and HPLs, events, alarms, external accesses. Archived data over a prefixed period is also possible. It is possible to retrieve archived data for reporting, statistics, troubleshooting and traceability of the occurred events.

Data link: the service requires two way data link.

Service environment: services need to be guaranteed in each environment transport of dangerous goods could take place: urban, sub-urban, rural (including mountain zones of the road network - such as tunnels, viaducts, etc.). This has to be taken into account for the selection of the communication network(s).

Service coverage: service coverage needs to be guaranteed across all Europe extension. Thus for the communication, roaming capability should be provided to the users in the border zones.

Position precision: very precise position is required only in case of specific operations (such as loading and uploading of goods)

Service availability: the required availability for the dangerous goods transport is very high (around 99.0 %). For other types of transport, the service availability requirement can be relaxed.

Service reliability: for the dangerous goods transport, service cope with following reliability performances:

- Information transmission (incoming/outcoming) is guaranteed in at least 9999 communication
- Response time up to 1 min, in workload conditions. This is the elapsed time from the beginning of an information transmission. Latency is comprised as it includes the information transmission time and all the required processing time (positioning services, acknowledgement if requests, etc)
- Acknowledgement mechanism needs to be ensured if necessary.

Service access: the access to the service is provided to the four user profiles, according to their specific requirements:

- From public entities/institutions. In this case an interfaces towards public entities/institutions for information exchange is provided for their various purposes (for example for safety, statistics, traffic management, emergency and rescue actions, enforcement, etc.).
- From commercial entities, normally via web mechanisms, through standard protocols for data exchange and through HMI for service usage.

Data security: security mechanisms are required to provide authentication and protection of data/information. Access control is required, for avoiding potential risk of unauthorised access to information and hence minimising the risk of disclosure. Security measures are applied to the service to be protected from malicious attack and to maintain the protection and integrity of the data during use, storage and transmission.

Data privacy: privacy and confidentiality of data and information is required. Services shall ensure the right of users to protect their information.

Exportability to other modes of transport: the possibility of service applicability to a multimodal transport is required.

Extendibility to other types of goods: the possibility to be applied to the transport of different types of goods, with necessary customisation corresponding to the different operational procedures, is required.

5 Products

Specified service requirements have been used for identifying EGNOS possible introductions in the user community, that in turn enable to define products, that SCUTUM can possibly provide to users.

Three possible introductions for EGNOS in the user community have been identified, and they have been also mapped into the four user profiles.

Turn-key solution. This includes a solution (named LCS[17]) that is capable to interface EGNOS/EDAS and provides EGNOS CS services[18]:

- Exploits the integrity information, and calculates the HPL (HPL gives the confidence of the position data and can be used as a mean for its guarantee)
- Provides/applies EGNOS corrections in case the signal is not available due to difficult environments (and thus enhance the availability of EGNOS corrections).

The solution can be plugged into GPS-based systems and through its connection to EGNOS/EDAS provides EGNOS CS (CS-NAV) services. This solution can be customised and adapted according to users' needs.

Two types of **specialised services** can also be offered:

- **EGNOS corrected positions and related HPL**. This corresponds to the Position information service mentioned above. It is provided to the users' application platforms, enabling users to upgrade their systems from GPS to EGNOS.
- **EGNOS CS-based tracking & tracing service**. This service includes all the above specified services, and is provided by a Web access by a Service provider.

The above two types of services are offered through a connection to a Service Provider and can be tailored to specific users' needs and personalised into bundled services/VAS[19].

In the next table the three EGNOS introductions are mapped into the four user profiles. For infrastructure managers/operators, goods owners, transport operators, the product selection depends on the specific needs, normally linked to the size and business of the company.

The three possible introductions of EGNOS products enable the definition of products/products lines that SCUTUM can possibly provide ("tailorable" means that they can be customized upon specific needs).

[17] LoCation Server (source: MENTORE)

[18] CS-NAV services (source MENTORE)

[19] Value Added Services

	Authorities	Infrastructure managers/operators	Goods owners	Transport operators
LCS turn-key solution		**X** tailorable	**X** tailorable	**X** tailorable
EGNOS positions/HPL services	**X**	**X** tailorable	**X** tailorable	**X** tailorable
EGNOS CS-based tracking & tracing services			**X** tailorable	**X** tailorable

Table 4 EGNOS introductions vs user profiles

6 Conclusions and guidelines for next phase

The work on user and service requirements, has been carried out by means of a survey.

Capitalizing on the experience and knowledge of the users participating to the project, the survey goal has been to gather a complete view of the user communities, so that to elaborate inputs for the next phase of the project enabling to implement a system, products/services and a proposal for a standard that have a large consensus.

SCUTUM is focused on the use of EGNOS CS[20] and on its capability to provide a more robust and guaranteed positioning

The survey outcomes allowed identifying opportunities for EGNOS CS, to define products and services, and collect information for elaborating the strategy for the relevant introduction in the market.

The survey has confirmed key SCUTUM principles:

1. Safety and compliance to regulation are to be considered as a first-rate priority. What is involved is, in particular, the establishment of adequate provision of accessibility, integrity and reliability, which is important in the carriage of valuable and dangerous goods. A guaranteed position to increase safety is a requirement commonly cited by respondents.
2. There is a general interest towards EGNOS capability to provide guaranteed position. The common suggestion is to promote a legislative effort at EU level, supported also by specific national actions, the aim being:
   - The definition of requirements laid on data format exchange. Such regulation should ensure interoperability and prevent the development of non-compatible technological solutions in particular Member States
   - The establishment of a common operational and liability framework, especially when different operators/users and cross-border traffic management are involved. In line with this, SCUTUM establishes an institutional-technical working group involving users, to demonstrate and validate EGNOS CS-based services and initiates a standardization work by launching a CEN Workshop Agreement.
3. For commercial users, costs are important drivers, and the establishment of appropriate legislations (starting at European level and supported by national efforts) is perceived as a key facilitator for EGNOS technology wide adoption.

[20] Based on EGNOS/EDAS (EGNOS Data Access Service)

7 Annex 1 – Questionnaire on user needs

QUESTIONNAIRE on user needs

SCUTUM (SeCUring the EU GNSS adopTion in the dangeroUs Material transport) is a European Research & Development project, aimed at a wide adoption of Satellite Navigation EGNOS/Galileo based technology and services for the safe hazardous goods transport management.

In order to obtain the knowledge of the transport of dangerous goods user community, SCUTUM is presently performing a survey by means of this questionnaire.

The questionnaire is addressed to users and aims at gathering information concerning their needs, operations and applications related to the monitoring of dangerous transports and use of positioning technologies.

The completion of the whole questionnaire will take a maximum of about 10 minutes. Of course, all the information will be handled anonymously; Data will not be disclosed to any other party.

You can find more details on SCUTUM www.scutumgnss.eu, EGNOS and Galileo at the bottom of this questionnaire.

We kindly ask for your participation in our survey.

Thank you very much!

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1. Entity profile

1. Contact details (name, surname, position, email, telephone)

_____

2. Full name of the company, short name (acronym), country:

_____

3. Type of company:

Authority	Infrastructure manager/operator[1]	Goods owner[2]	Transport operator	Other
☐	☐	☐	☐	☐

If Authority, ☐ National ☐ Local ☐ Other, please specify_____

If Infrastructure manager / operator, please specify _____

If Goods owner, please specify _____

If Transport operator, please specify _____

4. Size of the company (# employees) _____

2. Application scenario

1. How many vehicles do you use to transport dangerous good? _____
2. What kind of dangerous goods do you transport? (split by % of ADR classes)?

_____

3. Which mode of transport (split by % of modes)?_____
4. How many units (vehicles, container, swapbodies, tanks, etc) of dangerous goods do you handle?_____
5. In which countries?

☐ in EU, please specify _____

☐ in extra EU, please specify _____

6. Which is the regulatory/ legal framework of your operations?

☐ Local, please specify _____

[1] Including facility managers, such as terminal and port operators
[2] Including cargo owners

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☐ National, please specify _____

☐ European, please specify _____

☐ International, please specify _____

7. Are there any specific issues in addition to the legal/ regulatory aspects (e.g., technical, organizational) that your organization has to consider concerning the monitoring of dangerous goods? _____

8. Does your entity need to monitor dangerous goods transport?

   ☐ yes ☐ no

9. If yes, please specify the reason (e.g. safety, efficiency, regulation, liability, etc.)

   _____

10. If yes, which type of monitoring and for which purposes? please specify (e.g., data for statistics purposes, real-time tracking & tracing, real-time control, management/planning, quality contract, etc.) _____

11. Presently, does your entity monitor dangerous goods transport (i.e. use technology and tools for monitoring)?

    ☐ yes ☐ no

In case a solution/system is used, please answers to questions from 12 to 29, in case a solution/system is not used, please go to question 30

12. If yes, how many vehicles/units are monitored per year? _____

13. And how (please describe tools and procedures used)?

    _____

14. Presently, do you track & trace dangerous goods (i.e. use technology and tools for tracking & tracing)?

    ☐ yes ☐ no

15. If yes, what kind of tracking & tracing services do you use? (e.g. GPS and GPRS, RFID, others) _____

16. What are the costs of your solution?

    ☐ Equipment cost _____

    ☐ Installation cost _____

    ☐ Customisations cost (if any)_____

    ☐ Services (yearly or monthly cost)_____

    ☐ Maintenance cost (if any)_____

17. Why did you select this solution?

    Please specify selection criteria _____

18. How do you access to the monitoring/tracking & tracing functions:

    ☐ You use a solution/system implying the provision of monitoring/tracking & tracing functions via a service provider?

    ☐ You use a system installed in your office

    ☐ Other, please specify _____

19. Have you customised your solution/system according to your needs or are you using an off-the-shelf solution? _____

20. If yes, please specify the customisation_____

21. What kind of technology does your system use? [e.g. GPRS, SatCom, RFID, ...]
    _____

22. Are you satisfied with your solution/system?

    _____

23. Is there any need that your solution/system does not fulfil?

    _____

24. Which improvements would you suggest? _____

25. Would you be interested to EGNOS performances for your monitoring/tracking & tracing functions?

    ☐ yes ☐ no

    Please specify reasons for yes/no_____

26. EGNOS corrections can be provided also in case of difficult terrains (such as urban areas, mountain areas, with sky/satellite limited visibility and thus EGNOS could be degraded) through a software that enables to distribute EGNOS corrections and thus enhances the robustness of the EGNOS service.

    In case you are interested to EGNOS performances for your monitoring/tracking & tracing functions, would you be interested to be connected to an external service provider for receiving EGNOS corrections in case of difficult terrains or you prefer to have such as SW running in your solution/system?

    ☐ yes ☐ no

    Please specify reasons for yes/no_____

27. Is there any circumstance/situation/legislation that would encourage you to consider investing into an EGNOS-based a satellite navigation solution/system?_____

28. And at which level?

☐ Local, please specify _____

☐ National, please specify _____

☐ European, please specify _____

☐ International, please specify _____

29. What could be the potential benefits expected by using the EGNOS system?

☐ Tactical and strategic _____

☐ Operational _____

☐ Reduction of transport and forwarding expenses _____

☐ Customer service impact _____

In case a solution/system is not used, please answers to questions from 30 to 35

In case a solution/system is used, please go to the next section (user needs and expectations)

30. Is your organization planning to use a satellite navigation solution/system for monitoring/tracking & tracing dangerous goods?

☐ yes ☐ no

Please specify reasons for yes/no_____

31. If yes, would you be interested to consider a solution based on EGNOS?

☐ yes ☐ no

Please specify reasons for yes/no_____

32. EGNOS corrections can be provided also in case of difficult terrains (such as urban areas, mountain areas, with sky/satellite limited visibility and thus EGNOS could be degraded) through a software that enables to distribute EGNOS corrections and thus enhances the robustness of the EGNOS service.

In case you would be interested to EGNOS performances for your monitoring/tracking & tracing functions, would you be interested to be connected to an external service provider for receiving EGNOS corrections in case of difficult terrains or you prefer to have such as SW running in your solution/system?

☐ yes ☐ no

Please specify reasons for yes/no_____

33. Is there any circumstance/situation/legislation that would encourage you to consider investing into an EGNOS-based a satellite navigation solution/system?_____

34. And at which level?

☐ Local, please specify _____

☐ National, please specify _____

☐ European, please specify _____

☐ International, please specify _____

35. What could be the potential benefits expected by using the EGNOS system?

☐ Tactical and strategic _____

☐ Operational _____

☐ Reduction of transport and forwarding expenses _____

☐ Customer service impact _____

☐ Reduction of communication costs _____

☐ Increase of safety/ security levels

☐ Other _____

3. User needs and expectations

1. How would you rank the following purchasing criteria in terms of their importance for you? (rank from 1 to 10 from less to more important)

Criterion [if possible by segment]	Importance
Data accuracy	
Data security (authentication, authorization, integrity, privacy, other)	
Availability of the signal	
Continuity of the signal	
Interoperability with other systems	
Easy of use (SW and HW)	
Service (i.e., ability to provide high levels of on-going customer service)	
Service accessibility via a Web Interface	
Service accessibility via a dedicated system in your premises	
Additional services possibly customised on your needs (i.e. mapping, freight identification, reporting)	
HW and SW constraints (for example specific requirements on the interfaces, redundancy, proprietary software, etc.)	
HW constraints (for example specific requirements on the installation, certification, etc.)	
Service guarantee	
Exportability to different modes of transport	
Extendibility to other freight types (non ADR)	
Service liability	

Price	
Other	

2. What do you consider as the main drivers to facilitate the use of solutions/systems for monitoring/tracking & tracing dangerous goods?

   _____

3. And at which level?

   ☐ Local, please specify _____

   ☐ National, please specify _____

   ☐ European, please specify _____

   ☐ International, please specify _____

4. According to your opinion/experience, who should be obliged to use solutions/systems for monitoring/tracking & tracing dangerous goods?

   _____

5. According to your opinion/experience, who should be obliged to specifically use EGNOS?

   _____

6. According to your opinion/experience, is there any circumstance/situation/legislation that would encourage using solutions/systems for monitoring/tracking & tracing dangerous goods? _____

7. If yes, at which level?

   ☐ Local, please specify _____

   ☐ National, please specify _____

   ☐ European, please specify _____

   ☐ International, please specify _____

8. According to your opinion/experience, is there any circumstance/situation/legislation that establishes "neutral" management (such as authority, regional government, etc...) of centralized data collection and services for monitoring/tracking & tracing of dangerous goods? _____

9. According to your opinion/experience, is there any circumstance/situation/legislation that would specifically encourage using EGNOS?_____

10. If yes, at which level?

    ☐ Local, please specify _____

    ☐ National, please specify _____

    ☐ European, please specify _____

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☐ International, please specify _____

11. According to your opinion/experience, what do you consider as the main barriers that would hinder using solutions/systems for monitoring/tracking & tracing of dangerous goods? _____

12. According to your opinion/experience, what do you consider as the main barriers that would specifically hinder using EGNOS?_____

13. In case of use of EGNOS services, you are more interested in

☐ Monthly/yearly all-inclusive fee (€ per month/ per year) _____

☐ One off payment (€) _____

☐ Initial payment (€) _____ + Monthly/yearly fee (€ per month/ per year) _____

☐ Pay per use (€ please specify pricing scheme) _____

☐ Other _____

4. Market trends

1. How has the market for dangerous goods transport developed in the last 3 years?

   Please specify the country(ies) _____

   split by ADR class _____ Split by mode of transport _____

2. How do you expect volume demand of dangerous goods transport to develop till 2019?

   Split by ADR class _____ Split by mode of transport _____

5. Other issues

Is there any special issue you would like to highlight that has not been addressed in the previous questions? _____

THANK YOU FOR PARTICIPATING IN THIS SURVEY!

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GALILEO and EGNOS

The European programme of navigation satellite system (GNSS - Global Navigation Satellite System) is currently developing the Galileo programme, a global navigation and positioning satellite for civil purposes.
Galileo's commercial scenario is strictly linked to the development of services. The most significant commercial application fields are:

- Support to vehicles and persons mobility, both for consumer and for professional use (e.g. tracking of people with disabilities, prisoners, etc.).
- Support to transport applications, both for civil aviation and for the intelligent transport systems (ITS)
- High precision applications (e.g. geodesy, agriculture, monitoring of infrastructure and territory) and scientific and spatial.

Since the early 1990s, prior to completion and operation of the GPS system, Europe has begun activities in the field of satellite navigation with the study, design and implementation of EGNOS (European Geostationary Overlay Service). EGNOS is an "improvement" (augmentation) system of the GPS service using geostationary satellites to distribute, on a European area, the GPS integrated signal which improves the accuracy and ensures the Integrity of the GPS satellite constellation.

For this reason, i.e. because of its inherent integrity, the EGNOS signal allows "Safety of Life" applications. Conceived and designed for the needs of Civil Aviation, EGNOS is also suitable to anticipate Galileo with respect to regulated applications previously mentioned.

EGNOS is a European SABS system (Satellite Based Augmentation System). Compared to the current GPS system, EGNOS provides greater accuracy and reliability for commercial and professional applications for the supply of value added services. The latter will not be limited to the cars navigators or mobile phones, but will extend to a wide range of services, many of which relate to the world of transport.

The accuracy provided by EGNOS receiver about 2 m, substantially better than the one provided by the GPS. EGNOS also generates a range of services for commercial purposes which require the guarantee of the information on the positions, mainly for professional use and regulated applications such as monitoring the transport of dangerous goods and nuclear safe tracking for the transport of containers and cargo, tolling system.

SCUTUM (www.scutumgnss.eu)

SCUTUM (SeCUring the EU GNSS adopTion in the dangeroUs Material transport) is a European Research & Development project, aimed at a wide adoption of Satellite Navigation EGNOS/Galileo based technology and services for the safe hazardous goods transport management.

Because of its enhanced stability and accuracy, ENI, a leading Italian oil company, operating at international level, is presently using EGNOS to monitor its fleet (more than one thousand of vehicles) transporting hydrocarbon in Italy.

Based on the ENI experience in Italy, SCUTUM implements a best practise programme performing EGNOS large-scale trials in Europe. The ENI/ Italian system will be extended on

a cross-border basis towards a wider adoption of EGNOS in neighbouring countries Austria and France for further extension to other Member States and other freight types.

The authorities involved in the trials (Italy's and France's Ministry of Transport) will validate benefits and value of EGNOS providing guaranteed tracking & tracing services supporting enhanced safety.

SCUTUM is conceived to be in line with the European policies and Action Plans in support of the telematics applied to the freight transport and the use of EGNOS/Galileo, such as the Proposal for a Directive for the implementation of the ITS Action Plan, and the Freight Logistics Action Plan and related eFreight principles.

8 ANNEX 2 - USERS PARTICIPATING TO THE SURVEY ON USER NEEDS

	User Name	User Profile	Remark	Country
1	CORTE	Authority	Representing national bodies from various European countries having a responsibility and interest in the field of road transport	EU association
2	Campania Region (Agenzia per la sicurezza stradale)	Authority	Local Authority (Ente Autonomo Volturno srl)	Italy
3	Ministry of Transport, Czech Republic	Authority		Czech Republic
4	MIT	Authority		Italy
5	MEEDDM	Authority		France
6	OMV	Goods Owner		Austria
7	ENI	Goods Owner		Italy
8	Federchimica	Goods Owner	Association of chemical producers	Italy
9	Autostrade per l'Italia	Infrastructure manager/operator	Motorway Operator	Italy
10	Satap	Infrastructure manager/operator	Motorway Operator	Italy
11	Autovie Venete	Infrastructure manager/operator	Motorway Operator	Italy
12	SANEF	Infrastructure manager/operator	Motorway Operator	France
13	IPBO (GSI)	Infrastructure manager/operator	Facility Manager	Italy

14	GMC LOGISTICS	Transport Operator	Intermodal Operator	Italy
15	MIT Nucleare	Transport Operator	Forwarder	Italy
16	Fai Service	Transport Operator	Association of 7000 freight transport companies: 57% having a fleet of 1-5 vehicles, 34% having a fleet of 6-20 vehicles, 9% having a fleet of 20 vehicles	Italy
17	Scancargo	Transport Operator	Logistic Service Provider	Luxemburg
18	WALLENBORN	Transport Operator	Logistic Service Provider	Luxemburg
19	ISC	Transport Operator	Railway Undertaking, Combined Transport Operator	Italy
20	Trenitalia	Transport Operator	Railway Undertaking	Italy
21	C.T.E./SINTER	Transport Operator		Italy
22	HUPAC	Transport Operator	Intermodal Rail Operator	Switzerland
23	Italcontainer	Transport Operator	Intermodal Rail Operator	Italy
24	IRU	Transport Operator	Representing the association of road transport operators/users	World association

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