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Definition of priority sub-areas to be surveyed

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Executive summary

The general objective of ESTEEM is to enhance and strengthen the links between the Maghreb and EU transport related research systems, focusing on the specific theme of transport safety and security.

The deliverable 1.1 provides an overview of the activities performed during the Task 1.1 of ESTEEM, aiming at identifying and selecting four sub-areas to be investigated during the project.

The strategy adopted for selecting the topics has been divided according to the following steps:

- definition of possible interesting themes;
- definition of criteria for sub-areas selection, representing the importance of the topics;
- application of a multi-criteria method to sort the sub-areas and to identify the most promising ones, according to the criteria;
- validation and revision of the sub-areas priority list, according to the opinion of the main MPCs stakeholders.

For each sub-area selected through this strategy, some key points have also been defined aiming at focusing the successive project surveys on specific interesting aspects.

The four sub-areas and their key points, to be analysed during the successive project activities, are:

- road safety
 - accident data collection & analysis;
 - management aspects;
- human factors in road safety
 - enforcement;
 - education & training;
- information systems for transport safety
 - ITS for road safety;
 - ITS for safety & security of port operations;
- safety aspects for infrastructure design
 - rail crossing safety;
 - vulnerable users;
 - safety audits & inspections;
 - maintenance.

The sub-areas analyses have shown that the transport security issues in the MPCs are not considered relevant compared to the safety aspects, due to a strong difficulty in collecting the necessary data and in contacting the main stakeholders. In summary, the four sub-areas

mainly relate with specific road safety aspects. The other modes (i.e. maritime and rail) are concerned regarding to specific issues.

1 Introduction

This document is prepared for the Directorate-General for Research of the European Commission as deliverable of the project ESTEEM (Enhancing Safety and security aspects in Transport rEsearch in the EuroMediterranean region).

The general objective of ESTEEM is to enhance and strengthen the links between the Maghreb transport related research system and three Mediterranean neighbouring EU countries (namely France, Italy and Spain), focusing on the specific theme of safety and security of transport systems and infrastructures.

In order to do this, it is deemed necessary to implement a strong coordination action among the relevant actors in the two regions, ensuring that their future research policies on transport are defined at regional level and not only at the level of the individual countries.

The specific objective of the project is to bring the partners to share the identification of priority common research themes, responding to identified needs, which should be investigated in future research actions to be carried out at the regional level. Thus, the project will contribute both to the definition of the future research roadmaps for both the FP7 Transport programme and the Mediterranean Partners Countries (MPCs) governments and to the coordination of high quality research and policies on transport in the countries involved in the project in the area of safety.

The strategy implemented to achieve these objectives foresees four main Work Packages, as follow:

1. identification and selection of thematic sub-areas to be investigated (WP1);
2. analysis of the above mentioned sub-areas in the form of structured surveys (WP2);
3. exchange of results and sharing of the knowledge acquired, in the form of workshops and production of roadmaps for future research actions (WP3);
4. creation of a Network among stakeholders and the project participants and a series of Dissemination Activities (WP4).

This deliverable relates with the activities of the Work Package 1.

The Work Package 1 is divided in two tasks which put the basis for the subsequent Work Packages activities.

Especially, Task 1.1 refers to the sub-areas selection (i.e. definition of four topics to be investigated during WP2 and on which the research roadmaps will be based). Task 1.2 refers to survey methodology definition (i.e. definition of the way the WP2 activities will be performed).

This report provides an overview of the activities performed during the Task 1.1 for identifying and selecting the four sub-areas to be investigated during the project.

Especially, Task 1.1 activities were:

- definition of a first list of possible sub-areas to be analysed during the project;
- definition of selection criteria and application of a multi-criteria analysis for finding most promising sub-areas;
- validation of the multi-criteria analysis results by MPCs stakeholders to definitively choice the four sub-areas.

The document is structured according to these activities. Chapter 2 describes the methodology used for the sub-areas selection. Chapter 3 refers to the definition of the list of possible topics among which the four sub-areas has been selected. Chapter 4 describes the multi-criteria analysis performed in order to sort the most interesting topics. Chapter 5 refers to the validation and revision of the sub-areas defined through the multi-criteria analysis and to the final definition of the topics to be investigated during WP2.

2 Methodology for sub-areas selection

The adopted methodology for sub-areas selection starts with propositions from all the partners. A first consultation has been performed during the kick-off meeting, held in Rome in April 2008, through a brainstorming session.

Especially, the local MPCs situation concerning transport issues has been depicted. This allowed to start a brainstorming session which led to propositions of possible sub-areas to be investigated during the project.

During the kick-off meeting, it was also decided to adopt a precise strategy for defining the four most interesting sub-areas (for both MPCs and European Community) on which to focus the project.

The chosen strategy is based on the following steps:

- definition of criteria for sub-areas selection, representing the importance of the topics;
- application of a multi-criteria method to sort the sub-areas and to identify the most promising ones, according to the criteria;
- validation / revision of the sub-areas priority list, according to the opinion of the main MPCs stakeholders.

The set of criteria to be used for the sub-areas selection was both quantitative (in term of impacts related to the development of a specific topic) and qualitative. The criteria were defined by an expert group composed by members of the project consortium.

The criteria were used as basis for a multi-criteria analysis of the sub-areas proposed, aiming at defining a first priority list of sub-areas. This first sorting of the sub-areas has been performed through the contribution of all the consortium partners, who defined the weight to be given to each selection criterion and the performances associated to each couple of sub-area and criterion.

Especially, the expert judgments on weights and performances were provided by each partner separately. Then, these judgments have been revised and refined during the WP1 meeting, held in Paris in June 2008.

The multi-criteria analysis of the possible sub-areas has then been performed basing on the results obtained in Paris and the priority list has been obtained.

Besides these tasks, a strong necessity to define the four sub-areas to be investigated according to a precise interest of the Mediterranean Partner Countries (MPCs) appeared. In other terms, the selection of the sub-areas to be analysed during WP2 had to be led by the local MPCs needs.

An informal consultation process with local MPCs stakeholders (mainly decision makers) has then been performed by local partners (SIDES, EMI and BATNA University). This activity was basically an acknowledgement of the local programs and plans on safety and security (forecasted or considered interesting). Thus, the MPCs partners informally contacted some local stakeholders in order to verify what topics, among those selected, are considered interesting for them and what development are forecasted.

The priority list of sub-areas, previously defined, was then revised according to suggestions and comments of the local stakeholders.

The last part of the Task 1.1 concerned the final decision on the four sub-areas to be analysed and the precise definition of objectives and key points of each topic.

3 List of possible sub-areas

The set of possible sub-areas to be investigated has been defined through the contribution of all the partners. Everyone gave its point-of-view on the main issues and needs, related with transport safety and security, that could be analysed during the project.

The sub-areas definition has been performed according to different analysis levels. Main distinctions concern territorial level (urban or extra-urban), transport modes (road, rail, etc.) and time scale for implementation (short, mid or long term).

One of the main aspects considered was the balance between the correct approach and the need to provide results as specific and concrete as possible.

The strategy for sub-areas definition starts from the brainstorming session held in Rome during the kick-off meeting, in which each MPC partner depicted the current situation of transport in their country.

The Algerian partner proposed to focus the analysis on road traffic accidents (data collection and statistics) and on public transports inefficiencies, as in Algeria too many private operators work in competition and the services provided are not organised.

The Tunisian partner confirmed the relevance of road accidents rates also in Tunisia and proposed to investigate the following themes: urban transport quality planning and management, infrastructures quality, monitoring on the impact of the new regulation on driving license.

The partner from Morocco underlined the similarities between the three countries on road accidents rates. In Morocco, public transport is better organised and over-delivered but there is a growing uncontrolled competition between private operators. The sub-areas proposed were maritime transport, with focus on logistic; rail transports, with focus on infrastructures management and safety at rail road crossing; road transport, with focus on safety and security in urban transport and planning.

These considerations clearly stated the importance of road safety in MPCs, being probably the central problem of the three Maghrebian countries.

It was interesting to verify some similarities with the European situation of transport, especially the relevance of the road safety issues.

After the kick-off meeting, each partners provided a more specific list of interesting sub-areas to be analysed.

Table 3.1 shows the list of possible sub-areas obtained from the partners contribution. The areas have been separated in five topics: road, rail, maritime, infrastructure and others (i.e. relating with multimodal transport aspects, good transportation, transport modelling, human factors, etc.).

Table 3.1 - Possible sub-areas and analysis levels

Code	Sub-areas	Modes	Territorial	Time scale
RD01	Data collection and analysis for road safety enhancement (including vulnerable users)	Road	Urban - Extra-urban	Short-term
RD02	Methodologies and tools for road safety	Road	Urban - Extra-urban	Mid-term
RD03	Safety, security and environmental aspects of international road freight transport	Road	Extra-urban	Mid-term
RD04	Fostering the use of adequate traffic control and guidance systems	Road	Urban - Extra-urban	Mid-term
RD05	Fostering the implementation of ITS systems for road safety enhancement	Road	Urban - Extra-urban	Long-term
RW01	Infrastructures management and safety at rail road crossing	Rail	Extra-urban	Short term
RW02	Systems for control and regulation of rail road circulation	Rail	Extra-urban	Mid-term
RW03	Systems and rules for passengers safety and security	Rail	Urban - Extra-urban	Mid-term
RW04	Railway tunnels safety and security	Rail	Extra-urban	Mid-term
MR01	Methodologies and tools for safety, efficiency and environmental protection in ports operations	Maritime	Urban	Short-term
MR02	Procedures and practices for conducting maritime accident investigations	Maritime	Extra-urban	Mid-term
MR03	Technologies for tracing and tracking vessel traffic	Maritime	Extra-urban	Long-term
IF01	Incorporation of safety, security and environmental aspects in the transport infrastructure design	Infrastructure	Urban - Extra-urban	Short-term
IF02	Transport information and management systems for safety, security and environmental aspects	Infrastructure	Urban	Mid-term
IF03	Road tunnels safety and security	Infrastructure	Extra-urban	Mid-term
IF04	Fostering the use of advanced infrastructure equipments and signalling	Infrastructure	Urban - Extra-urban	Long-term
IT01	Modelling and simulation for safety and security performance of transport systems	Others	Urban - Extra-urban	Short-term
IT02	Safety and security aspects for hazardous goods transportation	Others	Urban - Extra-urban	Short-term
IT03	Systems and tools for supporting decisions during emergency situations	Others	Urban	Mid-term
IT04	Modelling the human system interface to investigate how to increase human awareness	Others	Urban	Mid-term

During the meeting in Paris (June 2008), some changes on the possible sub-areas were proposed. Especially, the sub-areas IT01 and IT04 (highlighted blue in Table 3.1) were changed. Besides, two further sub-areas (IT05 and IT06) were added. These sub-areas are:

- IT01: modelling, simulation and planning for safety and security performance of transport systems;
- IT04: modelling and educating the users on how to increase their awareness;
- IT05: safety and security of vulnerable users;
- IT06: human factors in safety of terrestrial transportation system;

4 Multi-criteria analysis of sub-areas

The number of possible topics to be analysed was large and it was difficult to define four sub-areas on which to focus the attention. For this reason, it was decided to adopt a methodology for defining the most promising sub-areas.

Due to the complexity and the heterogeneity of the selected topics and their impacts on environmental, social and economical aspects, the multi-criteria analysis appeared to be the more appropriate method for formalising the sub-areas selection.

The multi-criteria analysis allowed to:

- synthesize opinions expressed by different subjects;
- determine a priority scale;
- analyze situations in conflict;
- formulate recommendations and operational suggestions.

The multi-criteria analysis aimed at defining a first priority list of sub-areas, basing on their expected impacts.

In order to perform the analysis, a set of selection criteria was defined. Successively, a weight was assigned to each criterion, aiming at quantifying its importance. Next step consisted in assigning to each pair criterion / sub-area a performance. Basing on values assigned both to performances and weights, the priority list was created through the weighted sum method”.

4.1 Definition of selection criteria

The definition of the selection criteria was performed in two steps. First each partner provided a set of possible criteria. According to the contributions provided, a list of selection criteria was depicted. Table 4.1 summarises the criteria used for sub-areas selection.

Table 4.1 – Selection criteria

Code	Criterion
C01	Organisational impacts (changes in organisation of users)
C02	Policy impacts (changes on political MPC's programs and plans)
C03	Impacts on energy and environment
C04	Economical impacts (economic revenue – benefit and cost of the actions)
C05	Societal (social sensitivity - included effects on accidents)
C06	Common transnational approach (between MPCs and between EU and MPCs)
C07	Stakeholders (public authorities, private companies, etc.) involvement / interest
C08	Relevance and feasibility (for MPCs)

The criteria were qualitative and referred to the possible impacts that the development of safety and security related to a sub-area could produce.

The following criteria were also considered relevant for the subsequent roadmap activity:

- Organisational impacts: it refers to the possible changes of users behaviour in consequence of the development of certain organisational assets (e.g. less dangerous driving behaviours in consequence of the development of a strong legislation for accident reduction).
- Policy impacts: it refers to changes of programs and policies (e.g. in which way the spread or the development of a certain subject leads administrations to plan and programme according to it).
- Impacts on energy and environment: it refers to positive or negative effects that the development of a certain topic produces in terms of energy consumption and environmental impacts.
- Economical impacts (economic revenue – benefit and cost of the actions): it refers to economical effects, even if not directly visible, linked to the development of a certain topic (e.g. in road accidents, if the topic leads to reduce the number of accidents, an economical saving is obtained, as human life has a monetary cost). The economical impact can be expressed as the balance between benefits and costs linked to the development of a certain topic.
- Societal impacts (social sensitivity - included effects on accidents): it refers to the effects on the community (e.g. concerning road accidents, the reduction of the number of deaths and injuries on roads).

4.2 Choice of performances and weights

A consultation process was performed during the meeting in Paris aiming at defining the performances for each pair criterion / sub-area and for each weight.

Table 4.2 shows the performances assigned to each pair of sub-area and criteria, while Table 4.3 shows the weights assigned to each criterion.

Table 4.2 – Performances of pairs criterion / sub-area

	C01	C02	C03	C04	C05	C06	C07	C08
RD01	2	8	3	4	2	10	8	9
RD02	2	7	2	4	2	7	8	8
RD03	5	5	7	5	6	9	6	4
RD04	7	9	7	9	9	9	9	6
RD05	8	9	6	10	9	9	9	6
RW01	7	6	4	4	9	4	7	6
RW02	8	7	5	8	6	7	6	7
RW03	9	9	1	4	9	7	8	8
RW04	2	7	2	6	6	7	6	7
MR01	7	7	8	7	6	9	8	6
MR02	4	8	6	4	7	8	8	5
MR03	4	8	6	5	6	9	6	7
IF01	8	8	8	9	9	8	9	6
IF02	7	9	9	8	9	9	9	7
IF03	3	6	4	5	9	7	7	6
IF04	7	7	5	9	8	9	8	5
IT01	2	7	5	7	6	9	6	8
IT02	7	7	9	7	9	9	8	7
IT03	9	9	4	5	10	9	10	5
IT04	7	7	5	6	8	7	7	6
IT05	9	9	1	9	9	9	8	10
IT06	8	9	5	6	9	8	9	9

The performance of a couple sub-area / criterion provides a judgement on the impact of the topic on the criterion. The higher the performance is, the higher the sub-area contributes to reach the impact stated by the criterion.

The performances of each couple sub-area / criterion were defined through a consultation process between the partners of ESTEEM. The performances vary between one and ten, where one indicates the sub-area has no impact on a criterion and ten indicates the sub-area has a very strong impact on a criterion.

For instance, looking at the sub-area “RD01” (data collection and analysis for road safety enhancement), the impact on the criterion “C01” (changes in organisation of users) is low, indicating that this sub-area does not contribute significantly in changing the users organisation.

Instead, the impact on the criterion “C06” (common transnational approach) is very high (equal to 10), indicating that the data collection and analysis for road safety enhancement is a common issues in both Europe and Maghreb.

Table 4.3 – Weights for selection criteria

Code	Criterion	Weights
C01	Organisational impacts (changes in organisation of users)	8
C02	Policy impacts (changes on political MPC’s programs and plans)	6
C03	Impacts on energy and environment	5
C04	Economical impacts (economic revenue – benefit and cost of the actions)	7
C05	Societal (social sensitivity - included effects on accidents)	9
C06	Common transnational approach (between MPC and between EU and MPC)	5
C07	Stakeholders (public authorities, private companies, etc.) involvement / interest	7
C08	Relevance and feasibility (for MPCs)	10

The weights indicate the importance of the selection criteria. The higher is the weight, the higher is the criterion importance.

The weights of each criterion were defined through a consultation process between the partners of ESTEEM. The weights vary between one and ten.

For instance, the criteria “C03” and “C06” (respectively, “impacts on energy and environment” and “common transnational approach”) have the lowest weight (equal to five), indicating that these criteria are less important than the others.

The criterion “C08” (relevance and feasibility) has the highest weight (equal to ten), indicating that the relevance and feasibility of a sub-area has a strong importance.

In general, other important criteria are “C01” and “C05” (respectively, “organisational impacts” and “societal impacts”).

4.3 Analysis and results

The multi-criteria method used to sort the sub-areas was the “Weighted Sum Method”, which identifies, as best solution, the alternative having the maximum linear utility.

The linear utility is given by weighted sum of the performances. Thus, the method consisted in multiplying the weights, assigned to each criterion, per the performances of each pair criterion / sub-area. The result reflects the importance of the selection criteria and sub-areas performances.

The weighted sum for the alternative j is obtained through the following formula:

$$G_j = \sum_{i=1}^N w_i \cdot p_{ji} ,$$

where:

- G_j is the total weighted performance for the alternative j ;
- N is the number of criteria;
- w_i is the weight associated to the criterion i ;

- p_{ji} is the performance associated to couple alternative j and weight i .

For instance, for the first sub-area “RD01”, the total weighted performance is equal to 321, as shown in Table 4.4.

Table 4.4 – Example of analysis for the sub-area “RD01”

RD01	C01	C02	C03	C04	C05	C06	C07	C08	Total
Performance	2	8	3	4	2	10	8	9	
Weight	8	6	5	7	9	5	7	10	
Weighted performance	16	48	15	28	18	50	56	90	321

The best alternative is the one maximising the linear utility. Then, the alternatives (sub-areas) have been sorted in decreasing order.

Table 4.5 shows the results of the multi-criteria analysis; it summarizes the results for all sub-areas and ranks results by decreasing order of total weighted performance (column “All”) while the other columns group the same results by mode.

Table 4.5 - Result of multi-criteria analysis

Rank	Road	Rail	Maritime	Infrastructure	Others	All	Code
1					476	476	IT05
2				470		470	IF02
3	467					467	RD05
4					459	459	IT06
5				459		459	IF01
6	457					457	RD04
7					444	444	IT02
8					436	436	IT03
9		411				411	RW03
10				409		409	IF04
11			402			402	MR01
12		388				388	RW02
13					381	381	IT04
14			356			356	MR03
15					353	353	IT01
16		350				350	RW01
17			347			347	MR02
18				340		340	IF03
19	321					321	RD01

20	321					321	RD03
21		311				311	RW04
22	285					285	RD02

The most important sub-area appeared to be IT05 “Safety and security of vulnerable users”.

The three others sub-areas selected through the multi-criteria analysis were:

- IF02: Transport information and management systems for safety, security and environmental aspects;
- RD05: Fostering the implementation of ITS systems for road safety enhancement;
- IT06: Human factors in safety of terrestrial transportation system.

Results of multi-criteria analysis show that three macro-areas can be considered more important than others. In fact, the modes “Others”, “Infrastructure” and “Road” are in the first eight positions of the rank. Besides, within these positions, the mode “Others” appears four times.

A sub-area belonging to the rail mode appears, the first time, at the ninth position, while the maritime mode appears, the first time, at the eleventh position.

Besides these considerations, the multi-criteria analysis results suggested possible combination of some sub-areas, allowing covering a wider range of areas.

An area referring to **human factors**, including *human factors in safety of terrestrial transportation system* could be composed by sub-areas IT05, IT06 and RW03.

A second area could refer to the **information systems** (e.g. Intelligent Transport Systems, Information Communication Technologies) and could include the sub-areas IF02, RD04 and RD05. Also in this case, this area would cover all the surface transport modes.

If we consider these aggregations, the best four sub-areas became:

- Human factors (including RW03, IT04, IT05, IT06);
- Information systems (including RD04, RD05, MR03, IF02, IF04);
- Safety, security and environmental aspects for infrastructure design (IF01);
- Safety and security aspects for hazardous goods transportation (IT02).

Sub-areas excluded by the analysis were: RD01, RD02, RD03, RW01, RW02, RW04, MR01, MR02, IT01, IT03 and IF03.

It should also be noted as the area “road safety”, excluded by the analysis, was defined as fundamental by the MPCs Partners, during the brainstorming session held during the kick-off meeting. This is one of the reasons why the validation of the selected sub-areas with local MPCs stakeholders was considered fundamental for the final sub-areas selection.

5 Validation of selected sub-areas

The sorting obtained through the multi-criteria analysis has been used principally to obtain indications on the characteristics of the topics which could be analysed (their importance and their expected effects).

Anyway, the sorting is based only on the criteria chosen and on the judgement of the Consortium Partners. Then, the method does not consider all the possible factors and it's not based on universal judgement.

Due to the objectives of the project, it is also necessary to ensure that the topics analysed reflect specific needs of the MPCs stakeholders. As the main output of the project is the creation of future research roadmaps on transport safety and security, they have to be agreed with the local stakeholders.

In order to validate (or eventually change) the sub-areas selected and the aggregations proposed, a consultation process with some relevant stakeholders has been performed by MPCs. Especially, some decision makers have been interviewed in Tunisia, Algeria and Morocco in order to validate and define precisely the four sub-areas to be investigated during the project

The stakeholders were asked to give their opinion (in term of relevance, feasibility, etc.) on the sub-areas selected and on the possible aggregations of sub-areas, as well as on possible other topics to be considered.

The following paragraphs synthesize the results of consultations performed by MPCs.

5.1 MPCs stakeholders consultation

5.1.1 Algeria

The partner from Algeria (UNIBATNA) identified various stakeholders interested with the transport safety and security topics. Especially, the stakeholders consulted for validating the sub-areas priority list are indicated in Table 5.1.

Table 5.1 – Algerian stakeholders consulted for sub-areas priority list validation

Stakeholder	Description	Person
DTUCR Direction du Transport Urbain et de Circulation Routière	Central Directorate at the Ministry of Transport, Algiers In charge of leading the transport policy in its field of competence	Central Director
DTT Direction des Transports terrestres	Central Directorate at the Ministry of Transport, Algiers In charge of the transport policy in both rail/road	Central Director
BETUR Bureau d'étude des Transports Urbains et Routiers	Office under the Ministry of Transport The BETUR is the larger study office of Algeria in the field	Director
Direction des transports de la wilaya de Batna	Department responsible for representing the state and ensuring the implementation of the regulations on transport at the territory of the Wilaya	Director
ENATT Ecole Nationale des Transports Terrestres	National School located in the town of Batna The only school specialized in land transportation in Algeria (it provides various formations in the area)	Director

Gendarmerie Nationale	Public authority responsible for road safety in intercity road transport	Officer in charge of road safety and data collection
Centre Hospitalier Universitaire	SAMU Service (Emergency Medical Assistance) It is responsible for the removal of road accident victims	Chief Medical Officer

The priority list of sub-areas was presented to each stakeholder. They were consulted in order to know if they agreed with the four selected sub-areas. Furthermore, they were asked to give their general opinion on the topics.

The DTUCR Central Director considers that the central themes selected are important and he validated the list. On the theme "IT06", however, he proposed to retain only road safety not land transport, because, according to him, in the rail mode the problem rather is controlled. The real problem in terms of human factor is, according to him, in the road.

For the DTT Central Director of Land Transport, the four sub-areas selected are appropriate and he validated entirely the selection.

The Director of BETUR states that the most important theme is the "RD01" (data collection and analysis to improve road safety). He considers that the themes "RD05" and "IF02" come together in the end. Furthermore, he considers that the coordination between the various stakeholders is a problem that deserves to be raised. This problem does not appear clearly in the proposed themes. He then proposed the following topics:

- "IT06" (human factors in road safety);
- "IF02" (transport information and management systems for safety, security and environmental aspects, adding the coordination problem between stakeholders);
- "IT05" (safety and security of vulnerable users);
- "RD01" (data collection and analysis for road safety enhancement).

The DTW Director accepted the proposed list but would like to add themes "IT01" (incorporation of safety, security and environmental aspects in the transport infrastructure design) and "RD02" (methodologies and tools for road safety). It is necessary, according to him, to develop methods and tools for enhancing road safety.

The Director of ENATT validated the proposed list but indicated that the theme "RD01" (data collection and analysis for road safety enhancement) is most important, according to him (in order to better identify the problems, there is a need of data for analysis).

The manager of the Gendarmerie Nationale did not validate the list. He considers that the list does not cover a key element in his view: "RD01". In addition, he insisted on the problem of coordination of stakeholders' actions.

Basing on the pre-operation consultation, the proposed list was generally validated. However, some elements and interesting remarks can be emphasized.

First, each stakeholder tends to look at some topics more than others, according to their specific interest. The stakeholders take into account their needs and the shortcomings they suffer.

On another level, most of the stakeholders insisted on the sub-area "RD01" (data collection and analysis to improve road safety). It is generally seen as fundamental.

Finally, the problem of coordination of actions between the various bodies working on road safety was also raised and should be handled within a topic.

5.1.2 Tunisia

The informal consultations with Tunisian stakeholders allowed to revise the selection criteria and to sub-areas obtained. In general, the stakeholders judged the sub-area list complete.

Furthermore, the topics appeared to be pertinent. The four most promising sub-areas correspond essentially to the actual main issues of the stakeholders involved with the transport safety domain. Despite these considerations, the road safety topic appeared to be of great importance. Further consultations are still under way.

5.1.3 Morocco

The partner from Morocco (EMI) identified a large range of stakeholders on transport safety and security (e.g. ministries, government agencies, offices, ports, town halls and Wilayas, police, firemen, universities, associations, confederations, trade unions, insurers, banks, carriers of persons and goods, final users, etc.).

At this stage of the project, and for the purpose of validating (or changing) the sub-areas identified by the ESTEEM project team, the consultations were limited to the following organizations:

1. Ministry of Equipments and Transport: DSS (Division of Strategic Studies).
2. Ministry of Equipments and Transport: CNPAC (national committee for the prevention of traffic accidents).
3. ONCF (national office of railroads): IGS (general inspection of safety).
4. ANRT (national agency of regulation of telecommunications).
5. CAMM, committee of marine insurers of Morocco.

Indeed, the Ministry for the Equipment and Transport plays a fundamental role in the elaboration of strategies for transport in Morocco, whereas its department CNPAC exploits an active role in road safety on the whole Moroccan territory (urban and extra-urban roads). ONCF is the only reference with regards to rail transport in Morocco. Also, it was chosen to retain the ANRT taking into account its transversal activity which touches all transport modes and its implication in the implementation of new technologies of information in road, rail and marine transport. Finally, the CAMM was retained as it gathers insurers of transport and particularly maritime transport but which has a real appreciation of risk incurred as regards with transport safety and security.

It must be pointed out that EMI may represent the “universities stakeholder” since the team is very active in the field concerned by this project and has a permanent contact with most stakeholders since more than a decade. Hence, EMI has an accurate appreciation of the situation in that field in Morocco.

The objectives of the ESTEEM project and the adopted methodology were presented to the stakeholders. They were informed of the list of selected sub-areas, selection criteria and their weights, the performances result, the classification of the sub-areas and finally the proposals for aggregating the selected sub-areas.

The DSS considers that the sub-area “road safety” is a priority for Morocco because of the huge number of road accidents. They also consider that the **road safety** sub-area **can include both the human aspect as well as the hazardous goods** one.

The complementarities and mutual influences of the sub-areas can suggest that research on the other sub-areas will generate certainly a positive repercussion for the improvement of the situation with regard to the road safety. It is also necessary to underline the engagement of the Division of strategic Studies to facilitate the collection of information and the co-operation of its various actors to help the Consortium in conducting this project.

For the CNPAC, road safety, human factors and information systems sub-areas are without doubt priority axes. The other sub-areas would be considered as they can contribute to supplement the first.

The ONCF adhered to the proposed sub-areas. However, they insisted on the fact that the proposed sub-areas do not tackle all the questions which concerns them. ONCF, and CNPAC as well, consider that the equipments and infrastructures maintenance (or lack of maintenance) is a major agent in transportation safety, and that the sub-area related with **infrastructure design could be extended to include the maintenance aspect**.

The ONCF raised also the fact that the productivity is a daily concern and recalled that one of their major challenges is to ensure the safety while respecting the objectives of productivity; this is probably more a constraint than an objective.

For the direction of the ANRT, the information systems sub-area is their daily concern and they are very interested by research in this field. They work particularly on the implementation of solution of navigation by satellite for marine and road transport modes.

The CAMM is very active and aware of the development of solutions in marine transports and logistics. They consider that the four sub-areas identified by the ESTEEM project team as a priority for research, perfectly meeting the needs of Morocco with regards to transport safety and security; namely:

- the safety of the ports and the ships: bad maintenance of the ships, arbitrary classification of the ships, bad management of the zones and harbor installations, bad means of transport and of handling of the containers;
- human factors: errors of crew and dockers, riots, popular movements, strikes and other similar facts, acts of sabotage or of terrorism;
- safety and security of transport of dangerous goods in Morocco;
- communication and information systems in transport and logistics.

It was released from the discussions with a sample of the stakeholders that the sub-areas identified are mostly priority in the Moroccan strategy. They moreover emphasized the importance of the maintenance of the equipment and of the infrastructures in safety and security of transport.

A road-safety sub-area is without doubt a priority need for Morocco. Therefore, the following four sub-areas would perfectly meet priority concerns with Moroccan strategy on transport safety:

- Human factors in safety of terrestrial transport systems.
- Information systems.
- Safety, security and environmental aspects for infrastructure design including maintenance.
- Road safety including vulnerable users and hazardous goods transportation.

5.2 Revision of sub-areas

Following the first selection of possible topics to be investigated and the proposed aggregation, as well as the informal consultation process, four sub-areas have been retained for future investigations.

Globally, the topics selected through the multi-criteria analysis have been validated, even if road safety is considered more relevant than other sub-areas in all the Maghrebian countries. The importance of this topic was already stressed during the kick-off meeting.

Possible sub-areas meeting all the stakeholders' opinion and consistent with the "desk analysis" are:

- **Sub-area 1: Road safety** (with attention to data collection and analysis, methodologies and tools for road safety and safety and security aspects for hazardous goods transportation).
- **Sub-area 2: Human factors** in safety of terrestrial (rail, road and maritime) transport systems (with attention to systems and tools for supporting decisions during emergency situations, modelling and educating the users on how to increase their awareness).
- **Sub-area 3: Information systems** (with attention to traffic control and guidance systems, implementation of ITS for road safety enhancement, technologies for tracing and tracking vessel traffic, transport information and management systems for safety, security and environmental aspects, use of advanced infrastructure equipments and signalling and to the problem of coordination between various stakeholders).
- **Sub-area 4: Safety, security and environmental aspects for infrastructure design** (with attention also to infrastructures maintenance and safety of vulnerable users).

Objectives and transport modes interested by the topics were also defined for each sub-area, as listed below.

Sub-area 1: Road safety

- Objectives
 - To evaluate the current status of development of road safety
 - To evaluate how to improve safety aspects (e.g. in term of data collection and analysis, methodologies and tools for road safety, safety and security aspects for hazardous goods transportation, etc.)
- Modes
 - Road

Sub-area 2: Human factors in safety of terrestrial transport systems

- Objectives
 - To evaluate how human decisions and behaviors can be improved to obtain an higher safety standard of terrestrial transport systems (i.e. users education or training)
 - To evaluate how to improve the users safety and security (i.e. protection of vulnerable users)
 - To evaluate how to support decisions during emergency situations
- Modes
 - Road (especially drivers safety)
 - Maritime operations (involving professionals)
 - Rail (involving professionals)

Sub-area 3: Information systems

- Objectives
 - To evaluate the current status of development of ITS in Europe and MPCs
 - To evaluate possible development of ITS aimed at improving safety and security of transport systems (e.g. in term of road safety enhancement, traffic control, transport information and management systems, infrastructure equipment)
- Modes
 - Road
 - Maritime operations
 - Rail safety

Sub-area 4: Safety, security and environmental aspects for infrastructure design

- Objectives
 - To evaluate how infrastructure design can be improved in order to increase safety and security aspects (e.g. in term of traffic control, safety audits, road and rail tunnels, infrastructure equipments)
- Modes
 - Road
 - Rail

5.3 Final sub-areas and key points

Some further comments on the selected sub-areas were provided by the partners, helping to refine the sub-areas definition.

In particular, specific fields of work were selected among all possibilities within the selected sub-areas. In general, it appeared necessary to keep a minimum scope in order to work consistently, trying to be as specific as possible in the analysis and increasing the level of detail as far as possible.

The main suggestions were:

- to reduce the transport modes to be analysed and to concentrate the attention on road transport mode;
- to mention maritime mode in relation to inter-modal chains and port operations (safety procedures to avoid accidents, better management, etc...);
- to account for the human aspects only in road safety, since is the place where drivers are not professionals;
- within the human factor, to concentrate on modelling how the different factors influences accidents in order to know how to deal with such problem from the point of view of the societal aspects or personal aspects;
- in the ITS, to concentrate on road and maritime.

Specific suggestions concerned the sub-area “Human factors”. It was proposed to adopt a multilevel approach, distinguishing between base function skills and cultural variables influencing decision making and behaviours relevant for safety in transportation.

Following these comments, the sub-areas titles have been defined further. The exchange of opinions and consultations among ESTEEM partners resulted in identifying specific key points for each sub-area, on which the surveys will be performed.

Final definitions of sub-areas to be analysed and key points to be treated are listed below.

Sub-area 1: Road safety

- Objectives
 - To evaluate the current status of development of road safety
- Key points
 - Accident data collection and analysis
 - Road safety management process
- Geographical scale: urban / extra-urban

Sub-area 2: Human factors in road safety

- Objectives
 - Understanding of the actual situation in MPCs and definition of possible useful improvements
- Key points
 - Road users education and training
 - Enforcement
- Geographical scale: urban

Sub-area 3: Information systems to improve transport safety and security

- Objectives
 - To evaluate the current status of development of ITS in Europe and MPCs and possible development for improving safety and security of transport systems
- Key points
 - ITS for road safety enhancement (information and management systems)
 - ITS for safety and security of ports operations
- Geographical scale: urban / extra-urban
- Modes: Road / Maritime

Sub-area 4: Safety aspects for infrastructure design

- Objectives
 - To evaluate how infrastructure design can be improved in order to increase safety and security aspects
- Key points
 - Safety audit and safety inspection
 - Rail crossing safety
 - Maintenance (road & rail)
 - Vulnerable users
- Geographical scale: urban / extra-urban
- Modes: Road / Rail

6 Conclusions

This deliverable summarises the activities of the Task 1.1 for the sub-areas selection to be analysed in the project ESTEEM.

Within the Task 1.1, different possible topics, related with transport safety and security, have been considered.

The sub-areas selection appeared to be not easily manageable, as the topics to be treated have to meet the interest of different stakeholders (i.e. having different point of views) and have to be consistent with the effective needs and plans of both the Maghreb Countries and the European Union.

To select the four most interesting topics, on which the successive activities will be based, a structured methodology, allowing to refine the selection through successive steps, was then necessary.

The Task 1.1 process can be synthesised as follow:

- definition of a first list of possible sub-areas to be analysed during the project;
- definition of selection criteria and application of a multi-criteria analysis for finding most promising sub-areas;
- validation of the multi-criteria analysis results by MPCs stakeholders to definitively choose the four sub-areas.

The application of such process brought to selecting the following sub-areas and key points:

- road safety (accident data collection & analysis and management aspects);
- human factors in road safety (enforcement and education & training);
- information systems for transport safety (ITS for road safety and ITS for safety & security of port operations);
- safety aspects for infrastructure design (rail crossing safety, vulnerable users, safety audits & inspections and maintenance).

The sub-areas analysis has shown that the transport security issues in the MPCs are not considered relevant compared to the safety aspects. This is mainly due to a strong difficulty in collecting the necessary data (i.e. usually reserved) and in contacting the main

stakeholders. The security issues are usually treated in a very closed way and interaction with research is difficult.

The multi-criteria analysis made it possible not only to define a priority list of sub-areas but also to find possible aggregations, so that specific aspects were included inside a common sub-area. As main result of the multi-criteria analysis, four macro-areas were defined including specific aspects related with different transport modes, geographical scales and time scales.

It also appeared the necessity to focus the attention, within the four sub-areas, on precise interesting topics, in order to avoid the risk to obtain too generic information from the surveys activities (WP2), not sufficiently detailed for defining correctly the future research roadmaps (WP3). The specific aspects (key points) for each sub-area were defined basing on the results of the multi-criteria analysis and on the consultations with MPCs stakeholders.

Especially, the sub-areas validation activity (local stakeholders' consultation) made it possible to emphasise some lacks produced by the analysis. For instance, the road safety issues, excluded by the desk analysis, were considered fundamental by the local MPCs stakeholders (as well as it happens in Europe). For this reason the four sub-areas were revised in order to also include the road safety aspects.

In summary, the Task 1.1 activities show as the four sub-areas mainly relate with specific road safety aspects (e.g. data collection, management, infrastructure design, vulnerable users, enforcement). The most interesting transport mode appears to be the road one, while other modes (i.e. maritime and rail) are concerned regarding to specific issues (e.g. port operations, ITS, rail crossing safety).