



**ERREUR ! SIGNET
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EUROPEAN SELF-TRAINING WORKSHOP

SAFETY IN TUNNELS:

EXPERIENCE FEEDBACK

AND

REGULATION PROSPECTION

22nd and 23th of april 2002

LYON

FINAL REPORT

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Introduction

This report groups together all of the contributions presented in Lyon on the 22nd and 23rd of April 2002 during the European self-training workshop safety in tunnels and regulation prospection

This workshop is a European project, co-financed by the Environmental Branch and organised by the French Ministry of the Interior's Defence and Emergency Preparedness Branch.

This workshop was geared around the following three phases:

1. The first phase consisted of presenting the experience feedback from the various managers and civil defence experts,
2. The first day's interventions were rounded off with a nightly field exercise in the tunnel of the ringroad of Lyon
3. The last afternoon was dedicated to the drawing up of recommendations





Openning

by Monsieur GUILLOT

Préfet délégué pour la Sécurité et la Défense de la zone sud est

*Préfecture de la zone de défense Sud Est
69000 LYON
France*



Dear Sir, madam

My first comment is to welcome you to Lyon, city of international conferences.

You represent the 15 countries of the European Union.

Your workshop of auto-training is reunited by the initiative of the European Union and I salute Mr MOLITOR and Mr THAMM, from the <<transport and energy >> Head office.

You are all specialists of the security in tunnels, designers, constructors, managers of the tunnels or senior executives in the rescue services.

So I won't try to give you advice on the subject. But you know that it is the south eastern area (where you are) at Chamonix, in the tunnel of Mont-Blanc, which happened the most fatal disaster in the last few years for France. The more feedback experience we get, the better, in terms of:

- Risk analysis
- Prevention
- Design of the works
- The rescue planning
- The operational means
- The management of this type of crisis

And you know that we are at this stage concerning exploiting a site not only secured but also accepted.

The prefect that I am, responsible for the security in the broad sense, cannot be uninterested by this problem and would like to make some comments:

Your workshop has been put into the agenda due to recent accidents, which, however old the design may be, have had incomparable developments and consequences on the people, the environment and the economy judged generally unacceptable.

The desire, the need of security expressed by our fellow countrymen grows and it maybe the first effect of the European reality: it needs, no matter what country where it is found, no matter what the age, the type of tunnels crossed, to be at the same level of security.

Your reflection has to, not only improve the techniques on the construction of tunnels or the procedure for the rescue operations, you will help us to realise how, with different regulations, with the techniques that evolve with the time, in a varied environment, we will be able to bring a notion of, maybe not identical security but of <<iso security>>, equal security.

In all cases, take in account that your reflections are expected because they are necessary to advance the level of security in the present tunnels and the ones to come, in response to the recent accidents and to exceed our fellow countrymen's expectations.

No doubt the propositions that you are going to formulate will help to progress our problematic.

Once again, welcome and may I address all my encouragements for your studies.



**Message
of
Mr. Michel SAPPIN, prefect,
director of defence and emergency preparedness,
high ranking defence official.**



After the fire incident of the Mont Blanc Tunnel (24th March 1999), the prime Minister asked that all actions were taken to secure the road and rail tunnels.

Under a pilot test by the Minister of Equipment, the Interior Minister and more particularly the DDSC, has been associated to deal with everything which touches the aspect of the security of users and the intervention of the rescue.

It immediately appeared that:

- that no legislative or regulation basis existed,
- that the instructions or memos existent were not opposable to territorial groups,
- that the other transport infrastructures were in the same situation,
- that the inventory of fixtures and the security actions of a number of **tunnels** could not be ignored.

The interior minister defended strongly its large position in the development of a legislative and regulative base of the transport in general.

Furthermore it was decided that, no matter who the executor of the **tunnels** maybe (state or collective), the **tunnels** are to be <<controlled>> throughout their lifetime (conception, once in operation, exploitation) by the **creation of a special police from the prefect** to this effect: consultation of the above project, authorisation of the putting into service and periodical checks of the safety conditions.

In addition a National Committee of evaluation and the security of tunnels made up of experts from the administrations and the private sector was created with a purpose to advise the State authorities that then follow up the tunnel files.

Finally, it was decided that the **owners** would be submissive to the following obligations:

- realisation of a study of danger with an opinion on the security by an independent expert
- development of a Plan of Intervention and of Security (PIS) for the protection of the users.

I.1 – AN IMPORTANT LEGISLATIVE AND REGLEMENTATION BASE IS IN THE PROCESS OF ELABORATION

I.1.1 – **A law of great signification**, has been adopted to apply the principles mentioned above (n° 2002-3 of 3rd January 2002, relating to the security of infrastructures and systems of transport, to the technical investigation after the event, an accident or incident of terrestrial transport or aerial, and to the underground storage of natural gas, hydrocarbon and chemical products):

Thus, the tunnels are supervised by the French law, road tunnels, rail tunnels, the underground, the tramway etc...of the state or the territorial committees.

(Note for information: application of this law equally to the port/harbour **tunnels**, to the **tunnels** of the interior navigation and other transport sub-structures such as platform intermodales, immaterial guidance).

I.1.2 – A project of legislation for the application of the law.

A project of legislation relative to the security of road tunnels is finalised and must be put into place soon. Its purpose is to give to the state a real control on the road tunnels. This applies for the tunnels in service or planned for the future.

This text creates a <<National commission for the evaluation and the security of road tunnels>> made up of representatives administrative, representatives of the territorial committees and experts from the private sector.

It obligates the tunnels over 300m to the following instructions:

-before starting the work, elaboration of a preliminary dossier of security with collaboration on the security by an independent expert. This document is presented to the prefect and submitted by him for the opinion of the national evaluation commission. The start of the work is decided by the notification of the prefect depending on the documents and opinions.

-before the ‘putting into service’, setting up of a dossier which asks the authorisation to ‘put into service’ together with a security dossier to the prefect. Depending on this dossier the prefect gives the authorisation to ‘put into service’ with restrictive measures if thought necessary.



-During the exploitation, every 5 years a security check and a report by an independent expert to be communicated to the prefect.

-in case of important modifications of risks or the conditions of exploitation and at least every 15 years, realisation of an in-depth diagnosis in the same conditions as the 'putting into service'.

Finally, the means for fire fighting and rescue for tunnel only are obligated for all the bi-directional tunnels over 5km or 3km(depending on the nature of traffic) after opinion by the national commission.

I.1.3 – A technical inter-ministerial instruction presenting the system and equipments as well as the exploitation relative to the security of road tunnels (n° 2000-63 of the 25.08.2000). Take note that the elaboration of this document (revision of the historic text of 1981) had started from 1996. On the day of the Mont Blanc tunnel fire, the new regulation was finalised and in the process of being evaluated. It had been re-analysed and intensified in the light of the Mont Blanc and Tauren tunnel fires. This regulatory system has been applied since August 2000 to the state **tunnels** by way of circular. It will be applicable to the territorial committees' **tunnels** as soon as the legislation appears.

1.2 – CERTAIN WEAK POINTS OR NEEDS AWAITING TREATMENT

I.2.1 – The European sharing of knowledge and research

The fires in tunnels recently have provoked a reflection by the fire services in different European Union countries.

The strategic and tactical choices differ from one country to another when facing the difficulties of extinguishing the fire in tunnels.

To promote at a European level, the exchange, the research and the crossed training of all firemen/women can only optimise what already exists, and in consequence, permitting the progression towards a better level of performance in the protection of users and the preservation of the facility.

This could be put down to the systematisation of experience feedback, on the sharing of information and the <<know how>>, on the determination of the research leads (adapted material, robots, an innovative fast acquisition system, reconnaissance, the attack....)

This work of research could be financed by the European Union.

I.2.2 – Equipment

We must wonder about the effectiveness of certain equipments in a purpose of European legibility of the security on the whole of the itineraries.

In the equipment domain, it is necessary to systematically return the warning devices, and the management of the traffic (traffic light, barriers of head access, barriers inside the tunnel...)

In the equipment domain aiming to have an action on the attitude of users, it would be without a doubt productive to promote, at a European level, a study to verify if the normalised signalisation existent is adapted to the particularities of the tunnels in terms of perception and legibility, and if the equipments more active do not permit to obtain a better rescue of users in case of an incident.

Finally, and it is one of the most important lessons to learn, the recent events have proved that very rapidly the volume of smoke given out by a violent fire of HGVs is more than the capabilities of the smoke extraction system meant to allow the evacuation of the public and the 'putting into place' of the rescue teams.

So it is necessary to improve the reflection, not on the symptom, by looking to optimise the extraction systems, but on the cause by limiting the development of the fire from its birth.

One way can be the 'putting into place' of a spray system or saturation in water from the surrounding air (limiting the development of the fire, delaying the outbreak before the arrival of the recue, protection of the users, protection of the facility...) or others to be found.

I.2.3 – The intrinsic security of the vehicles



The evolution of HGVs and their multiplication in the last 30 years have made these vehicles dangerous regarding fire.
HGV : high gross vehicles

Two objectives can be aimed for, on one hand, limiting the number of fires, on the other, limiting the development of the fire.

-limiting the causes of HGV fires can be obtained by the reliability of sensitive equipment (brakes, turbo...) but equally by the putting into place heat detectors, closed circuit system of the electrical supply in the case of a violent shock, adapted extinguishing systems (motor compartment, refrigerating groups...).

-for limiting the development of fires the tracks for progress are numerous, to start by a return of weights and dimensions to the roads on the whole with the lessening to be reconsidered but equally by limiting the amount of petrol transported. We can equally mention the actions in the domain of the behaviour of the fire from the elements of the HGV (body work, seats, dashboard, electrical equipment...), of the protection against the fire of particular equipments. (reservoirs, refrigeration, petrol pipes, tyres...), the behaviour towards the fire of isolating "sandwich" panel of refrigerated trailers and tarpaulin.

In this same domain, like the euro class initiative lead for the construction sector, an interrogation needs to be made into the classification of the resistance of material used in the construction of the vehicles, and their accessories against fire.

I.2.4 – Regulation or recommendations European

Concerning the tunnels, the safety regulations differ depending upon the country. A certain number of work groups have already lead in-depth studies in the domain of the security of tunnels and have already given back their conclusions quite often more or less in the objectives and the principles. The technical choices are sometimes different depending more on the civil engineering than the equipment.

The basic material is now ready for construction of texts communitarian relating to the safety of this kind of **work**. It would be judicious in a way that the commissions of experts represent the rescue services, in another way that the process was used for the road tunnels as well as the rail tunnels.

I.2.5 – The measures of control and penalties more severe

By experience, it has become evident that the users don't respect the highway code concerning speed and the safety distance despite the advertising and awareness campaigns realised after the last tunnel fires (Mont Blanc, Tauren, Saint-Gothard). These two measures are essential in the prevention of accidents. Some systems exist to record and punish the offences and must be put into practice with the up most severity by the police forces.

Also, for the **tunnels** where it is possible, we need to remember the importance of systematic controls of HGVs, and more particularly the ones carrying dangerous merchandise. In this case, the transit with accompaniments has shown its pertinence (control before entering in the tunnel then discipline imposed during the transit).



MINISTÈRE DE L'INTÉRIEUR
DIRECTION DE LA DÉFENSE ET DE LA SÉCURITÉ CIVILE



ISPRA seminar recommandations for tunnel incidents

The new EU TUNNEL DIRECTIVE

by Monsieur THAMM

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Lessons learnt ? The new EU TUNNEL DIRECTIVE

European Policy in the field of Road safety

White paper on European transport policy for 2010 « Time to decide »

Road accidents in EU countries lead to:

40.000 fatalities per year*!

*Remark: 120 fatalities per day, same magnitude as within 50 years of tunnel incidents!

1.700.000 injuries per year!

• 300.000 of which suffer permanent disabilities

direct costs 45 billion €every year!

total costs to society 160 billion €every year!

Safety in Road Tunnels

Dealt within:

- PIARC C5 Committee Road Tunnel Operations
- OECD/PIARC Research Project Dangerous Goods Transports
- EU -Commission: Hearing on 28th of September 1999
- WERD : Western European Road Directors
- Recommendations: Austria, Switzerland, Italy and France
- Different national Workshops and Committees
- Switzerland, France, Norway, Germany, Austria
- EU -Commission: Joint Research Centre Nedies Project 2001
- UNECE ad hoc group of experts on Safety in Road Tunnels: Final Report 10.12.2001
- EU-Commission: DGTREN Draft of a Tunnel Directive, April 2002

Integrated road tunnel safety policy?

Engelbergtunnelfire 17.11.2000

- The driver of a small truck could have reached the open, if he had not been stopped, but escorted out by the police;
- The police stopped the traffic, but forgot to inform the tunnel operation centre;
- One driver took his own fire extinguishers thereby reducing the temperature of the fire, which led to non-functioning of the automatic fire detection within the tunnel. He produced a lot of smoke;
- While he did not take the fire-extinguishers from the emergency points of the tunnel he also did not alarm the tunnel services;
- The cross connections between the two tubes were not closed by fire proofs and smokes proof doors. Thus the smoke went into the unaffected tube;
- finally 9 minutes after the starting of the fire the tunnel services were alarmed via smoke detection measurements from the unaffected tube.
- They sent the fire brigade into the wrong tube. Luckily no casualties!

Saukopftunnelfire 24.8.2000

- The driver of a passenger car on fire took his mobile phone and not the push button alarm at an emergency point within the tunnel;
- The police in charge did not verify the call via monitor. They send a police car for verification. Loss of time 5 min;
- The police at the spot stopped the traffic and forgot to alarm the fire brigade in the first place. Loss of time another 10 min;
- Finally 30 min after ignition the fire brigade arrived at the spot. The car was totally burned out, no fire anymore, but 1 km of smoke in the tunnel;
- The fire brigade did not know how to handle the emergency panel for smoke exhaust. The trained people were on holidays;
- One fireman believed using only a push button at any spot in the tunnel would help to remove the smoke. In doing so, the result was contra productive;
- After that they send out catastrophic alarm. Result: 60 fire brigade vehicles were blocking each other in front of the tunnel entrances! Luckily no casualties!

Wrong incident management cases

The summary of this wrong human behaviour:

- It can be dangerous to believe that implementing only expensive tunnel equipment will automatically lead to safer tunnels.
- More information for users as well as common training of fire brigades, police and rescue services is urgently necessary.

Some parts of the puzzle

Gothardtunnel fire Integrated road tunnel safety policy

Gothardtunnel fire Lessons learned

Information on Correct Behaviour in Road Tunnels is vital in cases of fire:

- Listen to traffic radio!
- Don't make unauthorized U-turns
- Leave immediately your vehicle!
- Look for emergency exits signs!

EU road user leaflet -front page

EU road user leaflet -back page

Improving the safety of tunnels



Safety in road tunnels > 500 m on the TERN:

- European directive, which could take the form of a harmonisation of minimum safety standards
- conditions guaranteeing a high level of safety for tunnel users

Directive Road Tunnel Safety

➤ Explanatory Memorandum

- Objectives
- Background
- Justification
- Costs
- Expected Benefits
- Conclusions

➤ 15 Articles

➤ 3 Annexes

Objectives:

- Primary: prevention
- Secondary: reduction of consequences

Articles

- Purpose, Scope, Definitions
- Safety measures
- Administrative provisions
- Periodical inspections
- Quantitative Risk Analysis
- Committee procedure, group of experts
- Final provisions

Annexes

- Measures
- Approval of design, safety documentation, commissioning, modifications and periodical exercises
- Road signing in tunnels

Measures:

- Infrastructure
- Operation
- Vehicles
- Road users

Tunnel Cross Section

Emergency cabin with fire-extinguishers and push button

Traffic Signs and Signals

Lane signals

Traffic surveillance

Emergency points

Emergency points in road tunnels (every 100m to 200m)



Operational teams during the accident in the tunnel of TAUERN

by Monsieur KUBIZA

landesfeuerwehr-inspektor

Général Inspector of the Fire Services in AUSTRIA

*Chairman of the workgroup “security in tunnels” of the
Austrian Federal Fire Brigade Federation*

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AUTRICHE TAUERN

Total damage

- 12 people death (1 Austrian, 6 German, 2 Belgian, 2 Bosniacs, 1 Greek)
- 49 people hurt
- 14 motor lorry burnt
- 26 cars burnt
- 6,2 Mio. €Total damage

Rebuilding

Trucks for fire brigade

- RLF-A 2000 (water tank vehicle) + 9 men with breath apparatus
- 2000-l type (water tank vehicle),
- Pump,
- Hydraulic. salvage equipments
- Electric Generator,
- Light mast,

tactic

Italian experience

by Monsieur ARDITI

responsabile officio stum-sina

Member of the National Safety Board for Prevision and Prevention of main risks

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Fore ward

The safety of the transport is among the main objectives of all Governments that, to this purpose, usually make direct interventions on the networks of transport, promotes actions of information and sensitisation of populations, launch research programmes on criteria of prevention.

The technological factor is decisive for the safety of the transport: the safety increase that the new technologies have induced on the vehicles is self-evident (ABS, inertial valves, etc.).

It is, as much evident, the qualitative difference among old and new roads: some roads of the European network have been upgraded correcting the layouts, adopting safety barriers of new generation, implementing monitoring systems and information systems to the users, etc.

The development of communications and traffic is an evident opportunity for the economic and social development, but it induces us to think about the consequences for the environment and the safety.

The constant increase of the road traffic (actual and future) make more serious and present the specific factors of risk, also because our transport network has not been growth in a way compatible with the model of development adopted.

The main accidents are nevertheless rare, and they are a subset often bounded the presence of dangerous goods or, at least, the presence of heavy goods vehicles.

Possible ACTION line in the European framework

In the following some lines are shortly outlined as a proposal to the attention of colleagues for a possible common action on the European framework.

Information of professional drivers

Considering the correlation among heavy goods vehicles and "main transport risks on road", we can certainly consider as a priority the action of information of professionals drivers. The a.m. information should focus on behaviours to hold in case of emergency.

The recommendations of the group of experts on safety in road tunnels of UN (doc. TRANS/AC.7/9 of December 10th 2001) mention as applicable to the case of tunnels the following OCDE statement: the 95% of the accidents are the consequence of an inadequate behaviour of the drivers.

In the case of the tunnels, the adoption of a correct behaviours (both in the driving and in the emergency handling) certainly induces a reduction of the risks factor and a mitigation of the consequences.

For instance, in the 26 years between 1965 and 1991 twenty events of fire have been registered inside Mont Blanc tunnel, events that have been handled in absolute safety and satisfactory way.

Thirteen of the twenty events¹ did not require any other intervention than the use of the portable extinguishers available into the tunnel.

Seven times on thirteen (about 35% of the registered events) the fire has been extinguished directly by the professional drivers that obviously find themselves on the spot of the event since the beginning, so far having an important chance for a simplified handling of the event.

These easy remarks suggest the kick-off of an *information action* about risks and relevant criteria of intervention, action that could usefully be developed on a European framework and in cooperation with the Associations of truck drivers.

Such an informative action could aim at illustrating those easy measures useful in facing the emergency. the past experience show that, unluckily, it is not to take for granted the adoption of those measures, although they appears self-evident to the experts that observes the dynamics of the phenomena.

Emergency Handling

The past "safety cases" show that some typical aspects, partly already analysed by the international scientific organisms (e.g. OCDE, PIARC, NFPA, UN, etc.).

On the escort of the a.m. studies and the experience of the various European partners some thematic studies could be produced in order to examine and propose the operational and behavioural lines for the emergency handling in the context of the transports, with particular reference to the tunnels.

Object of the a.m. analyses could be:

- The criteria to be adopted for the handling of recurrent events
- The criteria to be adopted for the handling of the traffic on alternative itineraries in case of emergency

¹ Source: F. Cuaz – la sicurezza nelle gallerie stradali – proceedings 1st conference on "Protection from fire in rail and road tunnels" – Roma 1996 – Department of civil protection

CONVERGENCE of national regulation

The white paper of EU about the transport reports the following:

Safety in long tunnels is another vitally important aspect in the development of the trans-European network. A significant number of road or rail cross-border links, either at the project stage or under construction, include major tunnel sections, sometimes exceeding 50 km. These projects, which have already received or will receive Community financial support, include the 8 km long Somport tunnel between France and Spain, the rail/road link between Denmark and Sweden (Øresund), the future Lyon–Turin transalpine rail link, the Brenner project and the Bologna–Florence high-speed line currently being constructed, where 60 of the 90 km will be in tunnels. Existing infrastructure in some parts, both rail and road, also has ageing problems (80 % of rail tunnels were constructed in the 19th century), or has increasing difficulty in coping with the inexorable growth in traffic. Current national legislation varies greatly: some Member States have legislation on safety in tunnels while in others it is rudimentary or even non-existent.

The European Union can help to improve safety both at a technical level and in the way in which tunnels are operated.

Consideration should therefore be given to European regulations, which could take the form of a directive on the harmonisation of minimum safety standards, so as to put in place the conditions guaranteeing a high level of safety for the users of road and rail tunnels, particularly those forming part of the trans-European transport network.

Moreover, the Commission will be very vigilant with regard to the safety measures planned for infrastructure works which include sections in tunnels and which receive Community funding, particularly under the budget for the trans-European network.

Taking into account the heterogeneous nature of the regulation adopted by the various countries members, it seems important to promote a progressive convergence of the adopted criteria. To achieve this result, an assessment of state of the art in order to fit the best solutions is needed to both guarantee the safety of the transit and to deploy the opportune norms for planning, operation and emergency handling.

The adoption of common solutions for the existing tunnels cannot put aside a responsible taking in account of the existing, stating from those European countries that have a more consistent park of tunnels.

evolution of the safety in the tunnel lifetime

There is an essential continuity between the several aspects of the broad activity to build up a road tunnel, which may be subdivided into: studies, site investigation, physical planning, conceptual design, detailed design, and construction. The overall scheme should provide for close inter-relations between the several aspects, often of an iterative nature.

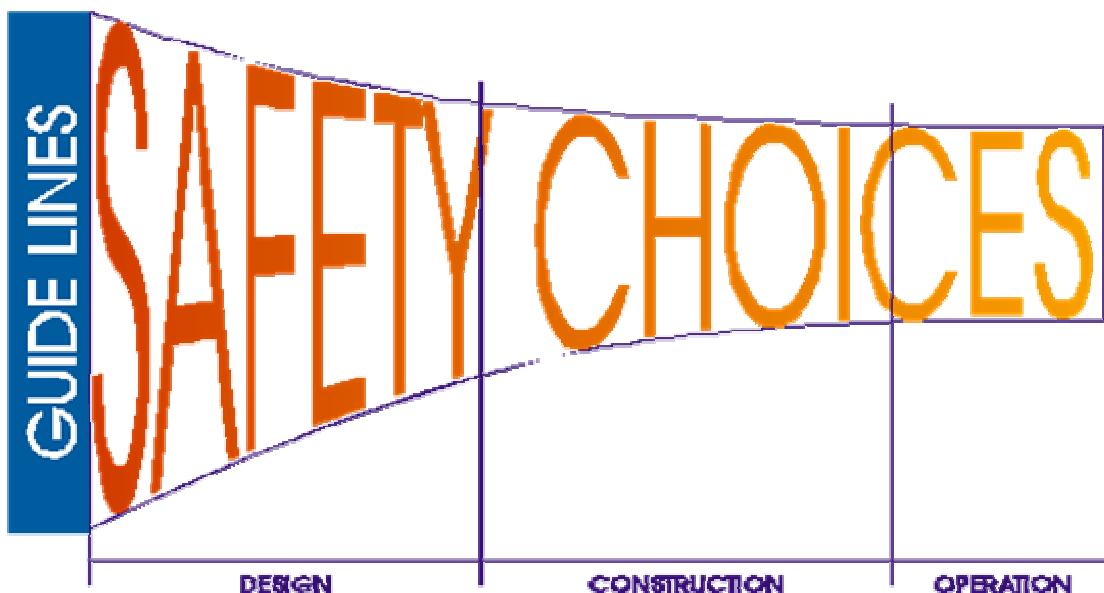
Subdivision and independent advance of the activities during the design is generally prevented in order to avoid cost increase and risk of expensive surprises during construction. Previsions are generally made for periodical review to justify proceeding with the next stage of the preparatory work.

The same criteria should be adopted all through the development of the project and construction in order to check it from the operation, maintenance and safety point of view.

Project optimisation entails in facts consideration of all factors affecting performance (including safety) and cost, including consideration such as the environment assessments and the evaluation of contractual relationships between the several parties.

It is self-evident that the safety of a tunnel is mainly stated in the first phases of the conceptual design (e.g. when stating the construction of a single or double tube tunnel).

The choices for the safety that could be taken are lesser and lesser while advancing the phases of design, construction and operation (see following scheme).

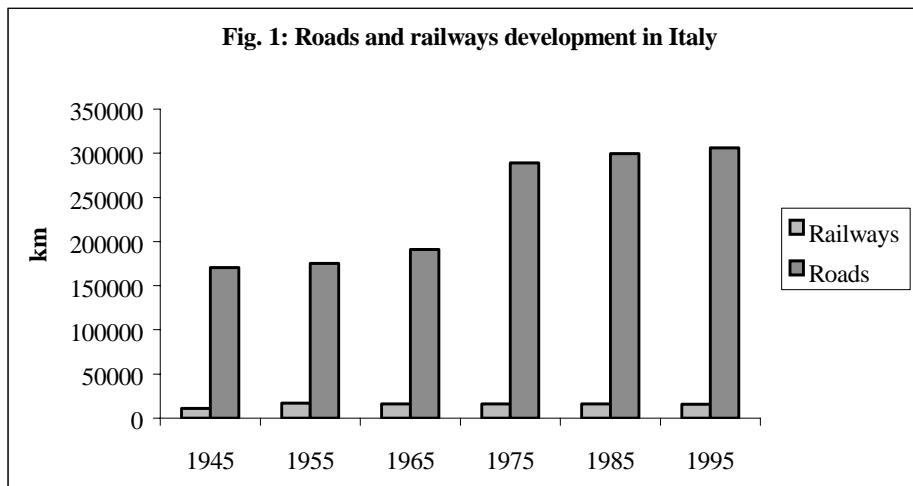


On the other hand, the level of standards set for a road tunnel are not immutable. In the course of time, changes in traffic demands, general improvements in road standards, broader social and economic factors may call for upgrading of the initial standards of service.

During the operation there is an important phase of optimisation that has to determine how the initial design should be influenced to allow for such changes to be incorporated subsequently, with little interference with the use of the facility. There may be considerable scope for difference between the possible options.

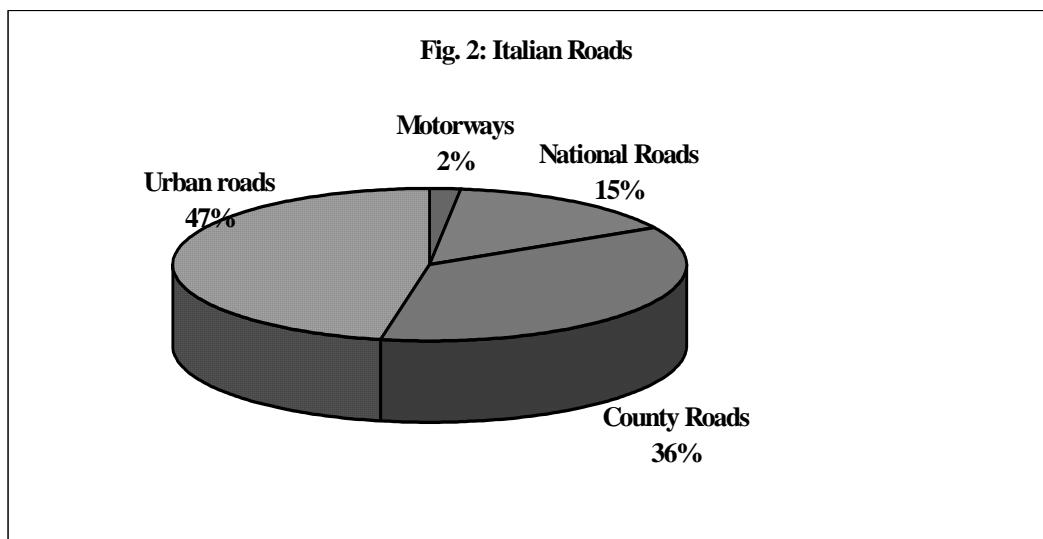
ROADS AND TUNNELS IN ITALY: QUANTITATIVE ANALYSIS

In fig. 1 are the extensions of the national railway and road networks (beginning from 1945). We can point out that the rail is grown of 45% in the period from 1945 to 1955, while in the following years it has some decrease; the increase of roads has been constant and equal, in 50 years, to around 80%.



Currently, the roads average density reported to the national territorial surface is: 100 km / 100 km²; for the railroads: 5 km / 100 km².

Motorways (fig. 2) represent just a small percentage of the total road network (2%, around 6000 km).



The motorways network is grown only of 10%, in the last 20 years; in the same reference period, the traffic on the motorways (estimated in reason of about the 25% of the overall national traffic on road of all levels), is grown from the 22.8 million of vehicles for km/year in 1975 to the 63.2 million for km / year of 1997 (177% increase); in 1998 an average of 51 million light vehicles and 15 million heavy vehicles travelled for each km of motorway. The heavy good traffic recorded a 206% increase (from 4.7 million vehicles\km of 1975 to 14.4 million in 1997).

So, you can affirm that in Italy, in the last 20 years, the increase of the mobility demand on road (and, particularly, motorways) has no comparison with a correspondent increase of the offer.

The need to update the road network meets difficulty because of the particular morphology of the national territory that often, to be crossed, require works in underground spaces or in elevation. Particularly, the development of the road tunnels in Italy doesn't find any comparison with other European countries: the Italian tunnel network is the double of the related values of main countries networks as reported in the Tab. 1, and it is the second network in the

world, after Japan. At the same time, the development of the subway network is certainly limited (just London offers a network of about 200 km against the 60 km of the overall Italian network – with about 50% in Milan).

Tab. 1: TUNNELS in Europe - lengths in km

	Railroads	Roads	Subways	TOTAL
Italy	1200	1160	60	2420
Austria	105	210	15	330
Switzerland		360	140	500
Germany	380	70	550	1000
France	650	180	270	1100
Great Britain	220	30	200	450
Norway	260	370	20	650
Spain	750	100	200	1050

The road tunnels (motorways and national roads, competence ANAS - National Road Board) are over 2300, for a development of 1160 km (Tab. 2).

Tab. 2: Road and Motorways tunnels in Italy

	Number of Tunnels	Total length (km)	TOTAL
Motorways	1248	740	2333
National Roads	1085	420	1160

261 tunnels (11% of the total) for an overall length of 487 km (42% of the length) are over 1000 m (Tab. 3). The number of tunnels on the motorway network is comparable with the number of tunnel in the national and county road network (respectively 1.248 and 1.085 tunnels); significantly different is instead the length (740 km of motorway tunnels; 420 for the secondary roads): from this fact we can draw that the motorway tunnels (build from the years '60, therefore exploiting more modern design and construction criterions) are generally longer than those on other national roads (with generally more ancient structures).

Tab. 3: Road Tunnel within length > 1000 m in Italy

TUNNELS > 1000 m

	Number of Tunnels	Total length (km)	TOTAL
Motorways	186	358	261
National Roads	75	129	487

In the Tab. 4 are shown the tunnels with length superior to 3000 m; 5 of them, belonging to national roads, have a single tube with two-way traffic.

Tab.4: Road tunnels with length 3000 m.

	Hole nr.	Strada tunnel Length (m)	Total length (km)
A32 (Torino-Bardonecchia) Frejus	1		13000
A5 (Torino-Aosta-M. Bianco) Monte Bianco	1		11600
A24 (Roma-Torano-Teramo) Gran Sasso	1		10200
Gran San Bernardo	1		6000
A32 (Torino-Bardonecchia) Cels	1		5250
A25 (Torano-Pescara) S. Domenico	2		4550
A24 (Roma-Torano-Teramo) S. Rocco	2		4181
A32 (Torino-Bardonecchia) Prapontin	2		4000
S.S. n. 52 (Carnica) Comelico	2		4000
S.S. n. 251 Fara	1		3953
S.S. n. 240 Agnese	1		3600
S.S. n. 229 Omegna	1		3461
S.S. n. 3(Flaminia) Furlo	1		3411
A20 (Messina-Villafranca-Furiano) Petraro	2		3345
A5 (Torino-Aosta-M. Bianco) Villeneuve	2		3230
A20 (Messina-Villafranca-Furiano) Capo Calavà	2		3160
S.S. n. 47 San Vito	1		3047

Tab. 5 offer a detail about tunnel situation on national roads and motorways network.

- The 83% of these tunnels has systems of artificial illumination.
- Ventilation system it is generally natural: for the motorways,
- 30% of tunnels - almost totally with length superior to 1000 m - it has artificial ventilation;
- for the nationals roads, this percentage goes down to 20% (reported percentage always to the total development in length).



MINISTÈRE DE L'INTÉRIEUR
DIRECTION DE LA DÉFENSE ET DE LA SÉCURITÉ CIVILES



PLANNING FOR THE RESCUE AND COOPERATION BETWEEN PUBLIC SERVICES AND THE TUNNEL MANAGER FOR ROADS TUNNELS OPERATIONS

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1 French Tunnels

Legislation 88-622 of 06 may 1998 (with the application of the law n° 87-565) relating to the emergency plans-art.12:

"The PSS were established to confront technological risks that were not made the object of a PPI or a risk due to an accident or a sinister of such nature to bring concern to the life or to the integrity of people to property or to the environment."

For each type of particular risk, the PPS is prepared by the prefect in liaison with the services and the organisations who have the means that could be involved."

In accordance with this article, the prefects have been requested to realise the PSS of tunnels with a length>1 km, and of those with a lower length according to the characteristics of the tunnel
(nature and importance of the traffic, dangerous merchandise, geometry of civil engineering...)

1.2 Cross-border tunnels

For the cross-border tunnels, the governments decided to realise the bi-national safety plans. These bi-national plans are realised by the local authorities of each state and approved by the inter-governmental commissions after the opinion of the security committees.

1.3 Development of plans

The manager must imperatively be associated to the development of the PSS or BINAT.

1.4 Exercises

These plans must be validated with periodical exercises involving the owner and the public services.

.2 Principles

2.1 Tunnels in which the manager has not provided for any security service

It is the case of most of the structures.

As for the rest of the road network, the relief is ensured by the territorial public services.

Uniqueness of command: DOS, the prefect
COS, the firemen

2.2 Security service dedicated to the work available in the tunnels

Sainte-Marie aux Mines, Fréjus, Mont-Blanc, and for the future Somport and A86 small sized vehicles. By the legislation that is being prepared, obligation for all the bi-directional over 5 km (or 3 km in the opinion of the national evaluation commission according to the particular risks of the tunnel.

In such a situation, 3 stages depending on the increasing seriousness of the event.

-minor accident: responsibility of the manager with his means

-accident more important but not relevant to a PSS or a BINAT: responsibility of the manager with limited reinforcements of the exterior services (ex: road accident requiring a public sector VSAB) necessity for the tunnel manager to appoint a responsible executive, director for the internal operations (not official appellation).

-accident of a more significant scale: responsibility of the DOS starting with the increase of resources involved in the PC of PSS or the BINAT plan and the triggering of the plan

2.3 Cross-border tunnels

DOS: two cases exist

- joint DOS through consultation between the authorities no matter where the accident took place
- DOS to the representative of the territory where the accident occurred.

COS : ensured by the fireman from the territory scene of the accident, except in the case where, depending upon the development of the intervention, the command can be practically ensured only by the relief from the other State (the smoke direction forbidding any approach from one side)

For the coordination of the operations between PC which allows it (infra PC), means of communication recommended in addition to the more traditional means: video-conference.

2.4 PIS and PSS

The managers must realise a plan of intervention and security (PIS)

This document describes how the manager accepts no responsibility in matter of the users security during their normal routines as well as during a situation of an accident.

For the planning of interventions and the management of the crisis, a part of this document must be devoted to the interface PIS/PSS highlighting more particularly certain points.

- The alert: always double the transmission of the alert by two different ways and independent.
- Formalize the content of alert and information messages.
- To designate the persons, on behalf of the manager, in charge of the interface with the outside interveners (correspondent of the DOS correspondent of the COS)
- Modes for the transfer of command between the tunnel manager and the DOS/COS.
- The tunnel manager means are put at the DOS/COS disposal (and under their command)
- Means usable by the outside services (communications, ventilation/smoke extraction, extinguishments, etc...)

This document must be established under the responsibility of the owner but imperatively in cooperation with the prefecture (SIDPC and rescue services)

3 interventions in tunnels

3.1 road accident – intervention and usual means

3.2 FIRE: due to the confined environment, increase of the effects of heat, radiation, concentration of the smoke and significant risks of fire propagation to other vehicles (that potentiates more the above effects)

The tunnels of little importance must have made the step towards planning and benefit from a plan ETARE (establishment directory), with first level (heavy), second level, and other reinforcements.

For any fire start in a tunnel: leave systematically with the perspective of a serious fire and apply the “old” principle of anticipation

- send straight away a first level with “heavy” means of extinguishments, reinforced at a minimum with command reinforcements /transmission, rescue means to the victims with insulating breathing devices and bottles.
- Put into action immediately of the second level (without waiting for information from the terrain) and send with this second level already ready, on receipt of the request message from the first level leader
- Penetration into the tunnels by the two heads combining their means towards the place of fire. In the usual case of tunnels with access shafts (urban work) send the means also through the shafts.
- Priority to attack the fire: don’t leave the fire developing, that could seriously jeopardize the assistance to the victims (and of course, the fire fighters’ security)
- If the attack is made impossible by surrounding conditions (impossible to approach) put the priority on rescuing what is still possible. For cross-border tunnels like Frejus and Mont-Blanc, the private firemen of the owner had a priority mission at the fire; the evacuation of users is to be assured by other teams.
- The access by the evacuation galleries are used to go and find the users who took refuge in the shelters. The users are then accompanied to the outside (shelter-gallery-shelter-tunnel (not dangerous zone)-exterior or shelter-gallery-exterior.
- The access by the evacuation galleries to attack the fire is nothing but a last resort to “see what still can be saved” when nothing can be done from the main road



The operation must be run with the utmost caution because we don't know the surrounding conditions inside the work, once we've opened the door of the shelter.

.4 Frequently asked questions

4.1 Specialised fire engines

The engines against fire incidents in tunnels must have the adapted characteristics for confined environment. This step was plotted for the Mont Blanc, The Frejus, and in progress for the Somport.

It also exists for other tunnels, in other countries (Elbe/Germany/Saint-Gothard/Switzerland for example)

It is strongly recommended that the fire engines from the rescue centres send as a minimum the first level tunnel intervention, received certain adapted measures in addition of the reinforced ability of extinguishments.

- reserve of clean air for the vehicle (for men, and if possible, for engine)

- extra bottles of ARI

- thermal camera

- exterior temperature sensor (don't engage in a very hostile environment because we feel safe)

- spraying of the cabins of vehicles

- front shield (push a light vehicle to obstruct the way)

4.2 Breathing equipment open circuit (ARICO)/closed circuit (ARICF): choice?

From a general opinion, the ARICF present a lot more constraint (training the staff, work on intervention, cost maintenance...) than the ARICO. In addition, the modern ARICO have now excellent autonomy (60 to 90 mns) and a better ergonomics, easier to use than before. In consequence, the changing of the intervention team is more dictated by the tiredness of men in hostile environment than by the autonomy of the breathing equipment. For these reasons, the firemen have generally opted for the ARICO even for tunnel fires. The ARICF remain crisis specialists for the cases very particular and provide the GRIMP (group of recognition and intervention in perilous environment) who can also be included in the second level.

4.3 Mobile ventilators with high flow and spraying water: effectiveness? Usefulness?

This equipment does not allow, in almost all circumstances, to fight against a natural flow or the ventilation of air established in the tunnel. On the other hand, it can permit the reinforcement of the current of air established to favour the attack from the side under the wind. The effect is to push away the smoke partially and to cool down the atmosphere, this which notably limits the risk of flash over. We can then consider this like a mean to press on with the attack on the fire and protecting the intervenient. There is another advantage related to restrict (in certain measure) the damage to the work. The fire services that have such equipment can favourably be included in the first level of intervention. In the case contrary, they must be part of the second level. However you must note that their manoeuvre is not always easy.

PLANNING FOR THE RESCUE AND COOPERATION BETWEEN PUBLIC SERVICES AND THE TUNNEL MANAGER FOR ROADS TUNNELS OPERATIONS

An example : the french-spanish tunnel of SOMPORT.

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2 lanes
a both-way traffic system
8608 m long (5 759 m in Spain + 2849 m in France)
2000 m minimum radius
gradient 1.65% in France + slope 0.5 % in Spain
4.55m in free height
10.5 m wide ($2*2.3+1+2*0.5+2*0.75$)
constant banking : 2%
reversing semi-transverse ventilation

International treaty (C.T.M) (Spain and France)
Drafts and projects (Spain and France)
Commission for the installations, for the rescue
and evacuation plan (Spain)
Accident of the Mont Blanc
Bi-national group for the security (Spain and France)
Police security subgroup
Y.T.M.D. traffic subgroup
Subgroup of bi-national rescue plan
Diagnosis of the tunnel security
Committee for the security

PRINCIPLES

Security
Unique exploitation
Respect of the sovereignty
Effective coordination
Plan of intervention and security (P.I.S)
Specific rescue plan (S.S.P)

Concerning the manager
Blazes controlled and resolved by the personnel and the means of the tunnel

Level 0 and 1
Blazes controlled and resolved by the personnel and the means of the tunnel





MINISTÈRE DE L'INTERIEUR
DIRECTION DE LA DÉFENSE ET DE LA SÉCURITÉ CIVILE



THE HUMAN FACTOR IN THE SAFETY OPERATION OF SOMPORT TUNNEL

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1.- INTRODUCTION.

The capacity of infrastructures and safety facilities of tunnels are often limited by the human factors. This fact has been proved by the recent accidents. The lack of training in management and in facing emergency situations, as well as the lack of appropriate guidelines for tunnel users, resulted true objections.

On the other hand, it has been also seen that many people could save their lives in other cases. This happens when there is not only a suitable training of the different agents involved in emergencies tunnels (Operation Staff, Fire Brigade and Rescue Service, Medical Services etc.), but also when the correct instructions were given to the tunnels users in advance.

In the St. Gotthard Tunnel Fire, on 2.001 24th. October, the Swiss Authorities remarked that only one of eleven people who died was a swiss citizen, although the majority of drivers who go through this tunnel are swiss. This tunnel is used for about 18,000 vehicles a day. According to the helvetic safety experts, the fact must be because of swiss had been warned and reported about the correct behaviour in case of an emergency. After the Mont Blanc accident, the safety procedures of all tunnels were analysed and as a result, the information about the right behaviour was composed (advices in habitual situations as well as in case of emergency).

These events have showed us the necessity to consider the relation between the human conduct in emergencies and the safety measures in tunnels.

It is very important to increase the level of safety, the training of the prevention and management of risks tunnel operation team. We shouldn't forget that people behaviour to face emergency situations is essential for a successful operation.

A previous information to the tunnel users about the right behaviour will allow a better communication between them and the operation staff. The more appropriate is people attitude in each situation, the more successful the rescue will be.

Emergencies in tunnels, specially fires, have a fast evolution. A satisfactory solution of these emergencies requires a perfect coordination of resources and a fast assessment of the situation, in order to trigger the arrangements in different fields, as the ventilation operation, evacuation of users, rescue of victims, attacks the incident, etc. The tunnel safety installation can only be fully effective if they are combined with an efficient operation staff, emergency service, and the correct behaviour of tunnel users.

The success of this combined work will be only possible if the members of the public emergency services and the operation team are known previously, and they have made exercises and simulations all together, in order to make easier the mutual understanding.

Therefore, before the opening of a new tunnel, there will be required an initial training for the operation team and the public emergency services. Afterwards, the need is a continuous training for everyone.

2.- THE HUMAN FACTOR IN THE SOMPORT TUNNEL OPERATION.

The human factor in the operation of the Somport Tunnel has been taken into account by the Tunnel Construction Commission since the very beginning of system safety planning.

First of all, a Safety Work Group Spanish-French was created in order to set up the Emergency and Aid People Plan.

In the first meeting celebrated in Huesca (Spain), on 1.999, May 28th., it was discussed the necessity of only one operating company to take in charge of all the tunnel. The aim was to make up a coordinate acting by both entrances of the tunnel. French agents agreed with this, remarking the need to find people able to work with both administrations and both languages.

It was also discussed in this meeting the importance of the first response to minimize the potential consequences of incidents, such as the facilities disposed in the entrances of the tunnel. Spanish Delegation exposed that a firemen vehicle and an ambulance have included in its project for spanish portal, but French Delegation adduced that this would precise counting on a permanent service in order to take into account those facilities. There was not an agreement about this point by that time.

In the second meeting of the Work Group celebrated in Oloron Sainte-Marie in 1999, 24th. of June, the necessity of a unique operation staff was accepted. This team should assume the functions of ordinary aid. The importance to define the necessary operation team and its qualification was set up. It was proposed 32 people to give service 24 hours a day during 365 days a year.

The third meeting of the Work Group took place in Huesca, in 1999, 28th. of September. Then, it was exposed the need of training in prevention, safety and management of emergencies of the personnel in charge of the tunnel operation before its putting in service. It was accorded too the necessity of a fireman vehicle and an ambulance in each portal of the tunnel.



This meeting resulted a great advance in the human factor consideration, in the operation of the Somport Tunnel. There were decided the following points:

1. - It will be three agents in each portal of the tunnel at all time, equipped with a firemen truck and an ambulance, in order to make sure the ordinary aid. This implies a total of 30 agents for the safety (3 men-women x 5 turns x two entries). It takes over the service during 24 hours a day.
2. - The training program will set up by Spanish and French experts, with the aim to fulfil the requirements of safety established in both countries. It is necessary to get insured a suitable teaching for the cooperation and coordination, in case of being required the Public Emergency Services of Spain as well as the French ones.
3. - The necessity to insist on the practical aspects of training, with exercises and simulations.
4. - The training coordination by the National School of Civil Defence (Civil Defence General Direction - Ministry of Interior-, Spain.)

3. - THE OPERATION STAFF TRAINING OF THE SOMPORT TUNNEL.

According to the points established by the Hispanic-French Work Group, the following aims for the training program of operation staff were set up:

- The knowledge of the legal frames of Civil Defence in Spain and in France.
- The awareness of the principles of Safety in tunnels established by the Spanish - French legal technical rules.
- The achievement in techniques to analyse the different risks related to the transport through tunnels.
- The achievement in techniques of planning and management emergencies.
- The achievement in techniques of communication with tunnel users.
- The identification of the different emergency services which might be required in tunnel emergency situations, as well as the responsibilities and the procedures of coordination among them.
- The improvement of coordination and cooperation between operation staff and public emergency services.
- The achievement in techniques of intervention against potential tunnel emergencies.
- The achievement techniques of management and direction emergencies.

The following minimum program was fixed, based on the top aims. They were grouped in thematic modules:

- Module 1: Legal aspects of the Civil Defence (7 hours)
- Module 2: Principles of Safety in Tunnels (20 hours)
- Module 3: Analysis and risk assessment (7 hours)
- Module 4: Intervention in emergency Situations: fire extinguishments, Rescue and Aid (162 Hours)
- Module 5: Management and Direction Emergencies (14 Hours)

The needs of the operation staff have been defined, as well as the adequate qualification and training for them. One can find it in the Sheet of Particular Technical Prescriptions of the technical assistance work for the execution of diverse operations of conservation and operation of the Somport Tunnel and its accesses gathers and needs, among other aspects, dated on 4th. of April, 20001.

Particularly, it settles down a minimum team of 50 people, 47 with full dedication and 3 as part time job, for the operation of the Tunnel, with the following profiles:

- 1 part-time (30 %) Director, as chair-man/woman, with degree of Engineer of Ways, Channels and Ports.
- 1 full-time Co-Director, (Head COEX), Public Works Technician or Engineer of Channels and Ports.
- 1 part-time Technician, Engineer or Computing Degree, as software system responsible, connected with the facilities of the tunnel via modem, who takes care of the operation problems with the installed computer central system.
- 5 full-time turn boss, bilingual French-Spanish, to assure the service 24 hours a day. Technician medium. Knowledge and training in computer science and electronics. They mustn't live far 30 km. away from a portal of the tunnel. (1 technician COEX and 4 Group 1).
- 5 full-time Console Operators (bilingual: French-Spanish), to assure the service 24 hours a day. Training of electronic or computer science industrial masters, FP2 or similar. They will have to live less far than 30 km from one of the mouths of the tunnel. (Group I).
- 30 full-time Agents on operation and direct attention to users (bilingual: French-Spanish), assuring the service 24 hours a day (3 x 5 in each mouth). Official of 1^a with membership card of 1^a, membership card



of fireman and enabled to distribute first aid to the people involved in slight accidents. They mustn't live far 30 km. away from a portal of the tunnel. (Group I).

- 1 Electrician with the category of 1^a official for maintenance. (Group I).
- 1 Electronical Technician, category of 1^a Official for maintenance. (Group I).
- 1 Official 1^a bricklayer. (Group I).
- 1 Administrative Head.
- 1 Secretary.
- 2 Guard as sworn.

At least, the Operation Agents and the Head of Turn must have proved formation in security and prevention for the possible incidences that may occur in a tunnel of functional characteristics similar to Somport Tunnel, including techniques of intervention, rescue, and aid, to use in case of emergency.

The console operators must have knowledge in systems of centralized technical management of tunnels.

4. - TRAINING ON PREVENTION AND RISKS MANAGEMENT IN TUNNELS.

The National School of Civil Defence started up a plan of education in Safety prevention in tunnels. This plan includes all the agents implied in the construction, operation, and use of these infrastructures.

As the tunnel was still being built, and there was not decided the Company for its aid operation, it was not possible to begin with the training of operators of Somport Tunnel. So that, the National School of Civil Defence made up this plan in order to promote the Culture of Prevention and Management Risks in the field of the Operation Tunnels.

The first developed educational action within this line of performance was the Course of self-protection: Plans of self-protection in Tunnels. It took place between 13 rd. to 22 th. of February, in the year 2001.

The course had a theoretical part and a practical one.

The practical part was developed in the Manzanera Tunnel, placed in the N-330- Highway, from Alicante to France by Zaragoza, k.p. 597,400. It is a tunnel that was outside of service when the Tunnels of Monrepos were constructed.

Two exercises of emergency simulation were realized:

- 1.- Practical exercises of traffic accident inside the tunnel. There was simulated a collision of vehicles with victims.
- 2.- Fire practical exercises in the tunnel. There was simulated a collision of vehicles which caused the fire.

The experience of this first course has allowed us to detect those aspects of training on which we must insist. Particularly, it was detected that there is a big need to reinforce the education in coordination techniques and interventions among the different groups of performance in emergencies in tunnels.

The fast development of these accidents demands a perfect mutual understanding and synchronization among all the people implied in the tunnel emergencies, if we want an effective reply. This one will be possible only by means of the accomplishment of exercises and manuevers all together.

Considering this experience, a new course has been planned for this year 2002. It meanly refers to aspects of management and coordination for emergency cases in tunnels.

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The analysis of the tunnel risk by the SDIS of the Rhône

by Monsieur le colonel DELAIGUE

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The departmental fire and rescue service of the Rhône (SDIS)

The SDIS of the Rhône is a public organization in charge of:

- The prevention and the development of the risks,
- Preparing the safety measures and organising the rescue resources,
- The protection of life and property, and of the environment
- The emergency assistance to people

Men and women:

5055 agents

1224 professional fire fighters

3476 voluntary fire fighters

286 technical and administrative personnel

69 personnel from the health service

4 territorial operational groups

170 intervention centres

1000 vehicles and trailers

a budget of 112 million € or 71€ per inhabitant

The analysis of the <>tunnel<> risk by the SDIS of the Rhône

A high demographic density: 1,570,000 inhabitants

A contrasting department: city and countryside.

The operational activity during the year 2001 88,354 interventions

<The <>tunnel<> risks in the Rhône>

Railway tunnels (mono tubes) Total amount: 43

14 tunnels are higher than 400 m

5 tunnels are considered at <>major risks<> out of the 31 recorded at the national level

Their length varies from 1,200m to 4,200m

>Metro tunnels (mono tubes)

Total amount: 44 (inter-stations)

35 tunnel length is greater than 400m

Maximum length of an inter-station 1,700m

Urban Road tunnels total amount: 9

4 tunnels between 400m and 600m: unidirectional monotubes

3 tunnels between 1000m and 1800m: bitubes

1 tunnel of 1800m: bi-directional monotube

1 tunnel of 3800m: bitube

Consultation of the SDIS of the Rhône

From the project to the exploitation stage

The means

The plans

The dispatch of rescue teams and the tactic of intervention

Tactic of intervention

The organisation of the rescue operations must be structured on plans defined previously.

It depends on the pre-established scenarios (see diagram)

It must enable the right coordination between the intervention teams.

Close relation between the persons in charge from the services involved: the manager, the police, the fire fighters, DDE (Coraly): on the field and at the manager CP for the level 2 events.



MINISTÈRE DE L'INTÉRIEUR
DIRECTION DE LA DÉFENSE ET DE LA SÉCURITÉ CIVILE



Planification du risque : le plan de secours du tunnel du Mont Blanc

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Summary of the presentation

Difficulties met during the fire of the 24th March 1999

Regulations applicable for the road tunnels

Description of the **tunnels**

The mixed group of the TMB

The concepts of intervention to TMB

- Treatment of the sinister

- Management of the users

Organisation of the command and connection of the safety/rescue plans

Difficulties met during the intervention of 24th March 1999

Rapid spread of the fire before the arrival of the Safety/rescue

Incompetent of this Kinetic by the Intervenient

No information about the real situation

Very hostile environment (smoke, heat, visibility) Ventilation uncontrollable

Difficulties of coordination between the two heads of the **tunnels**

Feeling of impotence despite the important means put into place

Regulations applicable for road tunnels

Prior procedures

Opening

Follow up of exploitation

Definitions

Low traffic: the traffic predictable in both directions 10 years after the opening is<to 2000 vehicles/day and<to 400 at the rush hour (the PL are counted for 5 VL)

Urban tunnels: Risk of frequent congestion or city of over 20000 inhabitants and:

- Traffic by direction > 1000 vehicles/hour (for 10 years) or
- Risk of extending the queue or
- Existence of interchange

General conception

2 tubes unidirectional if over 4000 PL / day in total of the 2 directions

Emergency exits if:

- Urban is more than 300m
- Non-urban, more than 500m

Principle measures

Exits

- 400 m in non-urban
- 200 m in urban
- Less if there is a risk of traffic congestion and more than 3 ways

Solutions:

- Direct communication with the exterior
- Inter-tube communication (without obligation)
- Gallery of security (if technically justified)
- Shelters linked to the exterior by a shaft

Main measures (continuation)

Safety niche: 200m

Fire kennels: 200m (except non-urban of less than 500m)

Radio-communication of the rescue: If more than 500m in urban and 800m in non-urban

Inter-tube communication or areas to turn around for the rescue vehicles every 800 m if more than 1000 m
 Security service at each head if more than 5km, not when low traffic and no direct communication with the exterior



Smoke extraction

300 m if urban

500 m if non-urban and not when low traffic (800 m possible under control)

1000 m if low traffic

HOW?

Longitudinal

Transversal

Semi-transversal

Mixed

Particular cases

Tunnels for reduced speed vehicles (2 m, 2 m70 or 3 m50)

The geometry of the work

1. The tunnel has a road of 7 m large, bordered with two pavements each 80 cm
2. The geometry of the tunnels
3. The tunnel consists of:
4. An axial band of 3 m x 4.80 high
5. 2 lateral bands of 2 m x 4.50 high
6. 11600m, bi-directional, width 8m60, open in 1965. The tunnel is formed like a circumflexed accent.
7. 36 garages disposed in staggered rows
8. 116 safety niches in staggered rows every 100m

9. Ventilation

10. Smoke extraction

Presentation of the GMTMB

* Convention of mutual assistance between SDIS74 and RAVA: creation of the Mixed Group of the Tunnel of Mont Blanc

- Convention between SDIS74, RAVA and GEIE: integration of the rescue public services in the operation of rescue of the Mont Blanc Tunnel, 23 June 2001

Convention of mutual aid between the 2 services SDIS-RAVA

1 – The will of RAVA and SDIS to set up an organisation of mutual aid based on the principle of solidarity and reciprocity.

- -From the initial stage, exchange about training and exercises.
- -Put into disposition free of charge the operational means in case of a disaster or a sinister.

2 – Specific development of the Mont Blanc co-operation with the creation of a structure named Mixed Group of the Mont Blanc Tunnel.

Third part convention

SDIS-RAVA-GEIE-TMB

Object: Convention relating to the organisation of the first rescue intervention services and the fight against the fire in the tunnel of Mont Blanc.

Genesis of this convention

1 - Renovation and modernisation program (CIG) anticipate 3 positions immediate intervention

2 – Creation of a unique owner GEIE TMB after the agreements of the two states

3 – The owners wish that only the first mission intervention is confided in the firemen of SDIS74 and to the RAVA

4 – The 2 public services wish to bring a mutual answer to the cover of a shared risk

GMTMB Objective

Objectives fixed for GMTMB:

- To assure the first aid rescue with 10 firemen H24 shared out on 3 rescue positions (EII)

- Organisation of missions based on the Internal Plan for Intervention and Security (PIIS)
- Help with the prevention and the evaluation of risks relating to the exploitation (formulation of propositions and recommendations)
- The convention specifies the nature of the services confided to the interveners and the modes of funding. The convention provides the development of a co-ordination plan that determines:
- Situation and coactivity predictable and risks it represents.
- Means and measures used to anticipate danger and limit damages.

Composition GMTMB

Composition GMTMB:

- SDIS74, Fire service of Haute-Savoie department
- VVF, Vigili del Fuoco of the Autonomy Region in Val d'Aoste (RAVA)

Side of SDIS74:

- 23 Professional Firemen appointed to GMTMB
- 80 other Firemen SPP and SPV from the rescue centers of the Vallée de l'Arve

Side of RAVA:

- 12 Professional Firemen appointed in priority to GMTMB
- 100 other Firemen of the RAVA

A – Treatment of the sinister

Priority is given to the rapidity of the intervention and to the fight against the fire

- Site is defended by 3 positions of intervention (1 in the middle of the tunnel)
- Each position is armed with 3 firemen and 2 specialised vehicles

B – Management of the users of TMB

THE PRINCIPLE

Security Actions

The principle of the security actions is essentially based on the auto-rescue of users:

- Radio messages
- PMV
- Red Lights
- Barriers
- Signalling, etc....

As a Supplement, human means are pre-dispatched on each T+0 Platform : One platform chef, safety assistant and traffic security team members.

Security Actions

Supplementary human means available per platform of T + 20mn/

- Firemen of Chamonix (France)
- Firemen of Courmayeur (Italy)
- Workforce GEIE contactable

According to the operational priorities, the following missions would be given to them

- to reinforce the action of the team in charge and the safety of the users
- to rejoin the users taking refuge in the most exposed shelters
- to reinforce the treatment mission of a sinister

Security Actions

Extra human means available each platform to T + 40mn

- Reinforcement of firemen from Haute-Savoie
- Reinforcement of firemen from Aoste
- GEIE constraint personnel



Missions

- To ensure the safety actions to all the users
- To Join by the shafts, the shelters holding users that may be in need of help, or if they are particularly exposed
- To prepare the evacuation

Evacuation of users

2 types of evacuation

Evacuation of users

It is realised by:

- The evacuation agents of GEIE (EST et AS)
- GEIE agents called for reinforcement
- The rescue/emergency public services

ORGANISATION OF THE COMMAND AND ARTICULATION OF THE RESCUE PLAN

(PIIS and PSB)

The right way to manage an intervention is based on 2 notions

Generalities

Articulation of the binomial DOS/COS

The rescue plans of the Mont Blanc Tunnel

Mont Blanc tunnel case

1. Unique intervention with the means peculiar to the company as part of the PIIS
2. The intervention with the means peculiar to the company as part of the PIIS, reinforced by the public safety means
3. The intervention with the means peculiar to the GEIE of the public safety as part of the PSB.



MINISTÈRE DE L'INTÉRIEUR
DIRECTION DE LA DÉFENSE ET DE LA SÉCURITÉ CIVILE



The crisis communication

by Monsieur le Colonel BOUTTE

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The crisis communication

Notion of Crisis:

Certain operational situations present a complexity, which generates uncertainties for the decision makers and the population.

The habitual emergency procedure are put into practice in accordance with the emergency plans. The necessity to produce the knowledge to reduce uncertainties, bring the management to call in experts from the outside, while the emergency is very present and the medias, the political leaders, and the pressure groups express, pass-on, and amplify the worries of the population.

The emergency, uncertainties, worries of the population, the appearance of numerous actors have a decisive influence on the decision.

Badly managed, this pressure can modify the climate of the decision committee, which risks to develop a certain number of phenomena (withdrawal of the individuals, closing down of the committee, conflicts between powers, fear and appearance of the irrational)

These phenomena hamper the decision committee in performing work of simplification, which is necessary to understand, in the emergency, a complex situation.

The acceleration of time, the increasing complexity, the multiplicity of the actors and the ineffectiveness of the usual procedures can cause the work of simplification necessary in this type of decision to fail.

The decision committee finds itself in <>crisis<>, which is considered as a breakdown in the decisional process.

This definition takes us to tackle the crisis in a perspective of the action, in other words during the management of the operations.

This approach permits, during the management of an emergency, to evaluate the risk for the decision committee to swipe or swing in the crisis and take the measures to avoid the crisis.

The management of operations and the avoiding of the crisis:

The management of an operational situation includes:

- ⇒the settlement of the emergency
- ⇒reducing the uncertainties of the event and its effects and on the reaction of the population
- ⇒the answers to give to the worried population
- ⇒the management of new actors

The strategic principles to be put into practice which equally permit to reduce the pressures exerted on the decision committee, to avoid a swing of this towards the crisis, by the losing control on the decision.

In the same time, the leading of the decision committee must be realised to identify and manage the various phenomena likely to disrupt the climate of the decision committee.

The communication:

The communication is an important factor in the management of a complex operational situation.

It must be realised according to 2 main lines:

- ⇒Internal communications: between the different services, the interveners, the members of the decision committee and the occasional actors.
- ⇒The external communication: towards the population directly or via the media.



These two lines are inseparable in the measure where an inefficient management of the internal communication leads to clashes in the matter of external communication.

The communication (internal and external) must take into account each phase concerning the management of the operational situation. Control of the emergency, reduction of the uncertainties, answers to the worries of the population, management of the new actors.

It must be managed with three objectives:

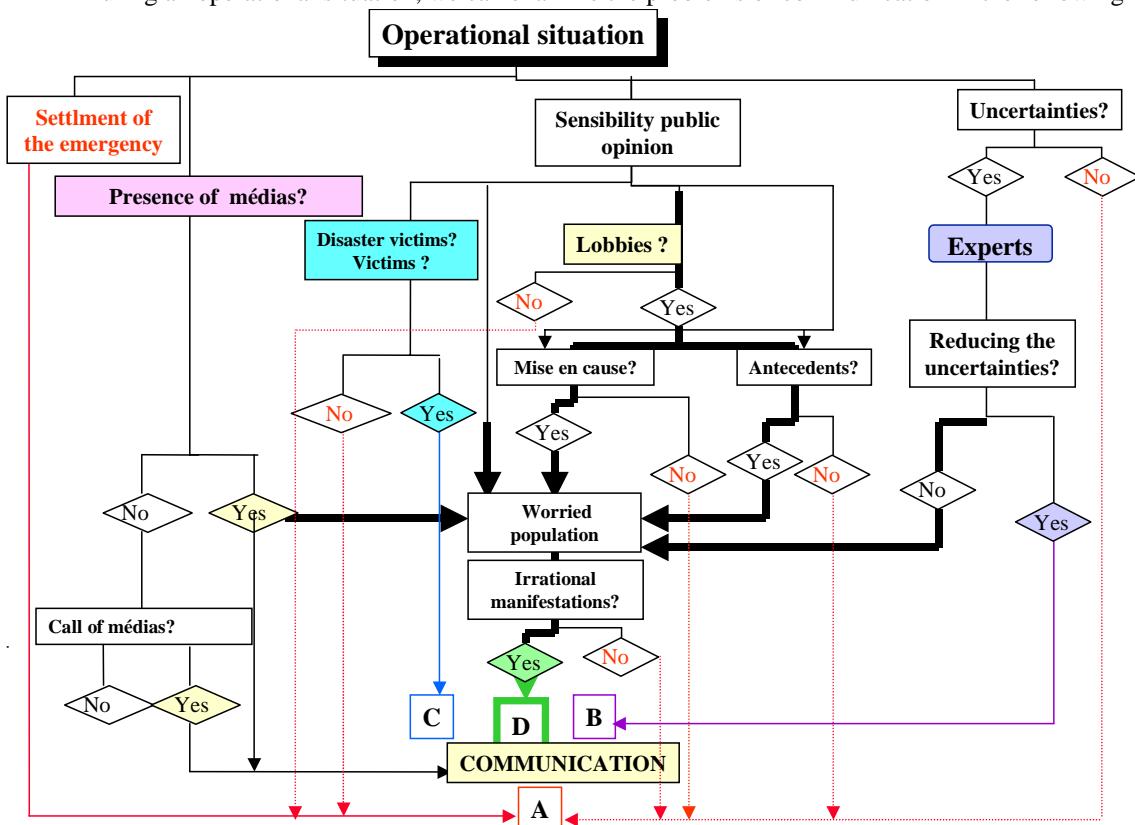
- ◆ to inform the population so as to answer to their worries
- ◆ respond to the expectations of the media
- ◆ To <>reduce<> the pressure on the decision committee to give them <>freedom to act<> to treat the event and its consequences.

The communication committee must make sure to become one of the best sources of information. This implies:

- ⇒ Speed
- ⇒ Reliability
- ⇒ Clarity
- ⇒ Frequency
- ⇒ Regularity
- ⇒ Circulation

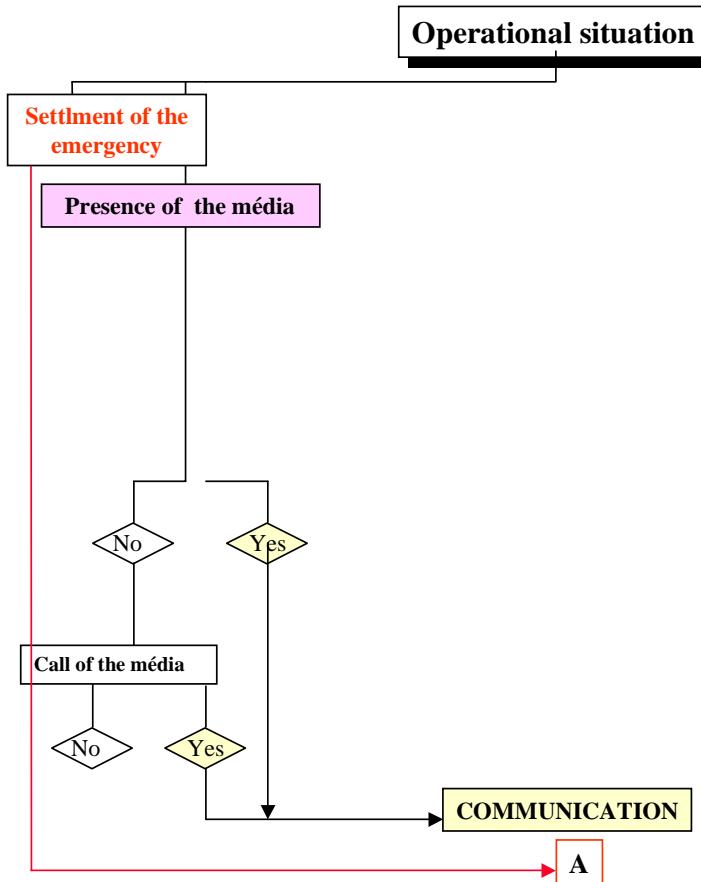
The preparation of press releases and press conferences must take into account the information on the situation as well as the communication already realised. For this purpose the decision committee will follow the AFP and the different medias to define the “tone” of the current media coverage.

During an operational situation, we can examine the problems of communication in the following way:



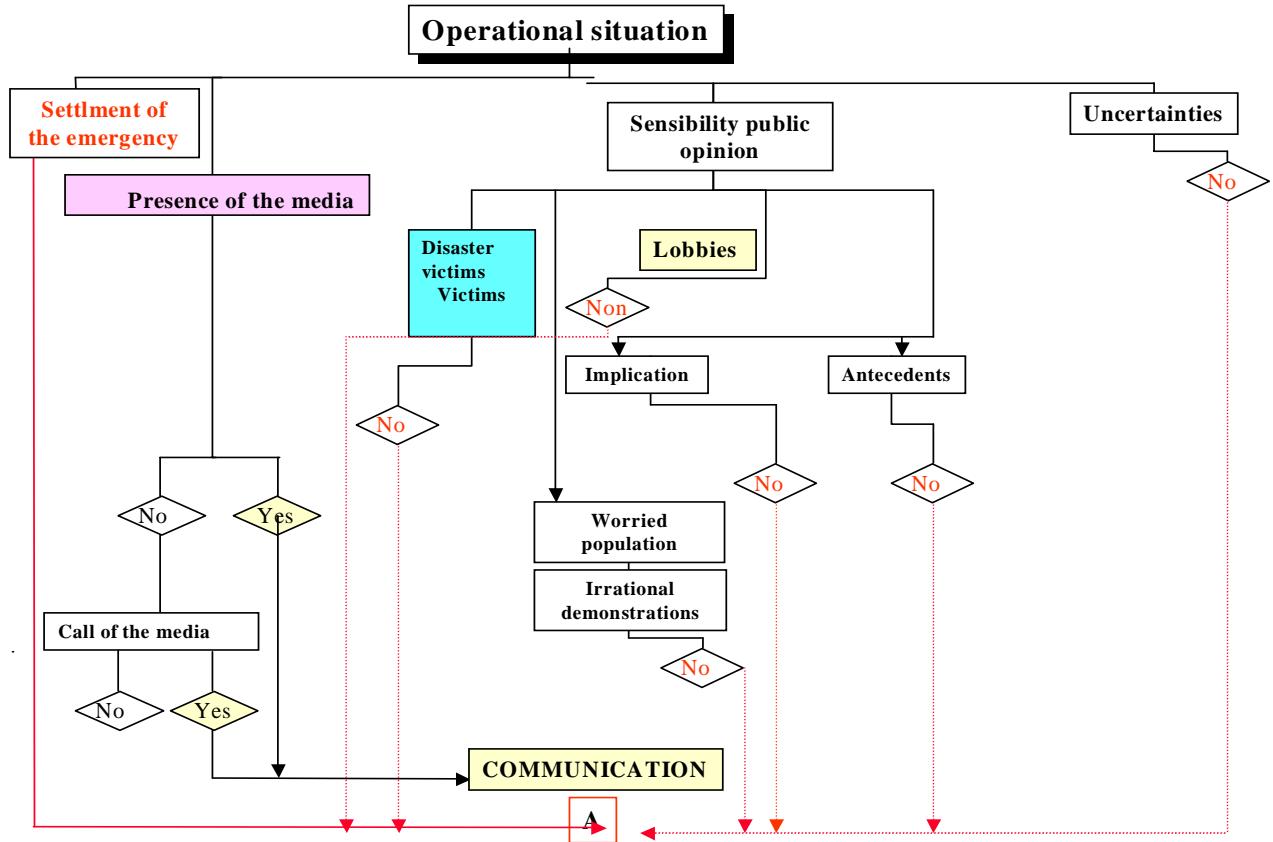
We are going to breakdown together this diagram of communication.

1°) The control of the emergency



In a situation, which qualifies as being simple we will follow a communication type A.

Some factors must be taken into account to avoid the slip towards the crisis. These correspond to the following questions :



The type <<A>> communication responds to the following characteristics:

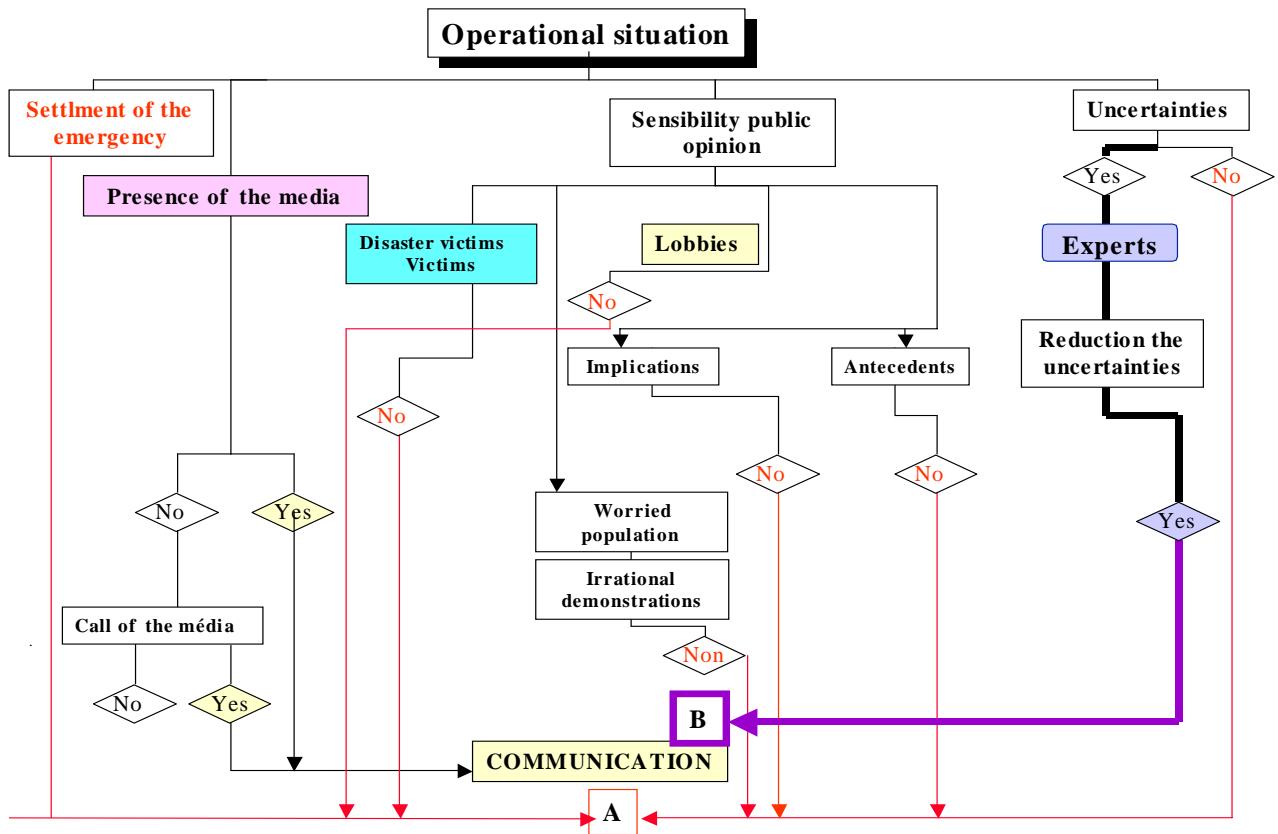
Type of communication	Nature of the communication	Communication officer	How to avoid the crisis
A.	Technical information	DOS COS Operational technician	Vigilance
	Emergency regulations <ul style="list-style-type: none"> • Facts, • Means provided • consequences • conditions for return normal 		Appearance of : <ol style="list-style-type: none"> 1. Groupe de mises en cause 2. origin of the event, 3. failure or non existing of prevention measures 4. shortcoming of first aid services <ul style="list-style-type: none"> • Coordinating between operational technicians communication. • Insuring that there is no measures contract between oral information and existing fact found out by the medias in the field.

DOS: Rescue Operation Director (for Strategy)

COS: Rescue Operation Commander (For Tactical)

2°) The reducing of uncertainties.

Reduce the uncertainties implies producing the knowledge which requires calling in the experts.
The situation presents like the following:



The communication type <> will be as the following:

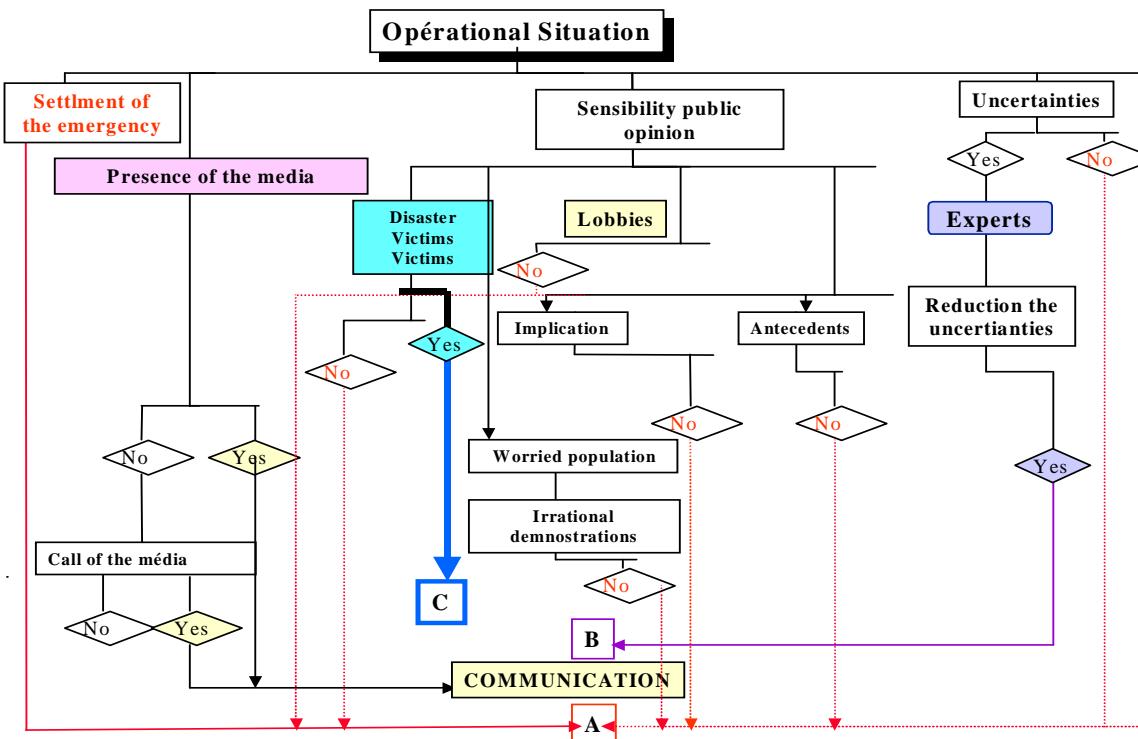
Type of communication	Nature of the communication	Communication officer	How to avoid the crisis
B.	Scientific information <ul style="list-style-type: none"> • Scientific information collection • Analysis • Results 	Experts	<ul style="list-style-type: none"> • Defining the limits of the expert's responsibility • Coordinate expert intervention and the technical and scientific information.

3°)The treatment of the uncertainties of the population.

The uncertainties of the population can be generated or amplified:

- By the importance of the amount of victims or disaster victims
- By a context of particular sensitivity of the public opinion influenced by some factors for example, the impossibility to reduce the uncertainties of the event, its effects, if they are immediate or postponed.

In the **first case**, the schema will be as follows:

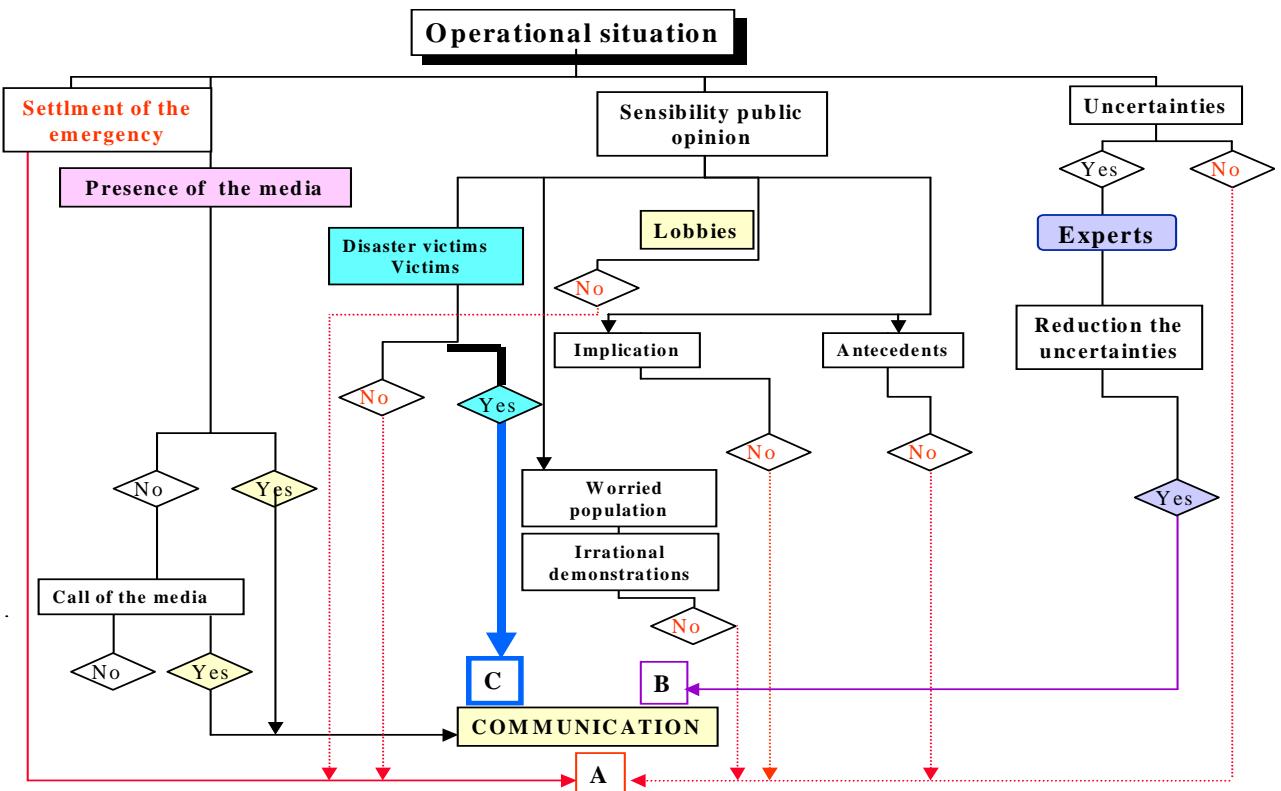


We apply a communication type <<C>>

Type of communication	Form of the communication	Communication officer	How to avoid the crisis
C.	information	Experts Authorities CUMP (1)	
	<u>Social victims</u> <ul style="list-style-type: none"> • number, • state (death), • nationality, • place of the admittance hospital. <u>Family's victims</u> <ul style="list-style-type: none"> • Psychological care • Evacuation, • Housing, catering, • Security payment. 		Information about victims, ⇒coherence between the communication and the green N° ⇒Provide the information to the disaster victims in the duration (post crisis) ⇒Coordinate: 1. Scientifical information, 2. technical information 3. social information

(1) CUMP: Medico Psychological Emergency Unit

The second case corresponds to the following diagram



The communication, which is adapted, is that of type <<D>>:

Type of communication	Form of the communication	Communication officer	How to avoid the crisis
D.	Political information		
	<ul style="list-style-type: none"> • Answers to anxiety of the population • Bring back an irrational perception towards the rational one before providing explanations (significance of symbolism) 	Authority	<ul style="list-style-type: none"> • Make sure that the communication is not shifted compared to the state of mind of the population • Centralize the communication of the various services concerned • Not reject or ignore the request of information from the lobbies
	<ul style="list-style-type: none"> • Plan the communication • Hierarchical organization • Management of space • Management in time 		<ul style="list-style-type: none"> • Organize the communication of the representative of the state with that of the owner and/or the Mayor • Set up a read strategy of communication



Return to normality and psychological and practical support to the victims and their families

by Monsieur MALENE

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Return to normality and psychological and practical support to the victims and their families

After a disaster which has caused the death of an important number of persons or serious injuries or psychological trauma we should wonder: "what about return to normal life?

What is to be understood? The mourning? The compensation?

In other words, a mental work of thought and feelings that will last during some times –for each of the victims, their families (and for all the group they are)

Individual destiny or collective destiny, because of the involvement, which brings all the persons together around the same event of the reality? To dissociate from the psychological reality that it causes and which is traumatic.

This question of reality, of its psychological status is in the heart of the psychoanalytic clinic.

By individual trauma and group trauma, we understand an injury with forced entry, it is characterized by an excess of emotions, getting over the tolerance of the subject and its capacity to control and work out psychologically on this emotion.

We cannot think anymore, neither imagine, prisoner and assailed by a disaster.

The trauma comes out of the meeting between the subject and the exterior world; his inner world, made of his reason, his intelligence, his knowledge, as well as his feelings, his imagination, his dreams, is shattered.

In the violence, he is not able to think anymore. The limits between deep inside of himself and the external world are broken.

So how to restore the gap between the psychic of the subject-victim and the external world?

,,.....,We could understand that the purpose of the rescue and fire services consist when facing a sinister like the Mont Blanc tunnel or the avalanche of the Mont-Roc, in surrounding the sites, isolating it, put it as a safety zone to, in the geographical, material practical, social and the public health physical or psychical, start the work of rescue – this will consist in repairing, mending to fill this breach, this murderous and deadly gaping openness and to reconstruct the alive basis of an individual and of a practical and human group.

It would be the same for the traumatised person,

In other words, mending the forced entry of this psyche.

The first stage of the stages necessary and essential of this work concerning the victims and the families, and which the events lead us to take into consideration very soon, is the problem of identification of the victims.

Factual necessity in fact, the rescue services from the first moment of a sinister are call out by the close ones and the family of the alleged victims They look for an answer, if it is one of theirs.

The search of an information and the anxiety of these persons are major – they call and ask for the names, if it is needed they try to get where the tragedy took place – to find out. It is why it seems necessary that the first interlocutor is the services of the state, prefecture and judicial police – their request is imperatively the one of factor of the reality, in other orders the name of their relatives, possible victim, the health condition, alive or dead... to know what's happening – It is happening that, to their request by telephone, we answer them by request concerning information about the relative they look for, because ourselves we have got a lack of knowledge, to identify this victims. The roles would then be reversed.

The telephone service must be ready as soon as possible to centralise the requests from the families, to explain to these interlocutors why we ask them information about the person they are looking for. Once this is done take sure to keep notes of their addresses to reassure them that we will call them imperatively. Either to give them some news, either to ask them some more information. The insurance to keep the relationship through the telephone is essential to help victims and their families.

In second time, it could be necessary to take into account their anxiety, facing the unknown, to propose them another service, of psychological help, by phone, if they wish in those terms: "We understand well how you're feeling in this difficult situation, we can pass you someone with whom you could talk about how you're feeling".



This possibility of a displacement from realizing the real event to the psychological difficulties it causes, must be proposed to people to help them and ensure them about our reliability. This operation should be put in place very soon, in a dimension of safety and rescue when facing a sinister.

The reality of the trauma event stays – it stays psychologically, and to start a bereavement work in his thought and his emotion, can only start if the work of identification is done and credible – then the imaginary of the family and his close ones, can take the direction of life that carries on - we can not erase.

“The “return to the normality” is not a return to the previous state of mind – “Nothing happened... is out of place».

Facing this event and its violence, as the evil of a fire in a tunnel can be, victims and families will have to start continuity in this trauma discontinuity. The psychological support will have to enable people telling about what happened.

Telling the story of what happened is the first stage essential and necessary for any psychological bereavement work possible: “what happened? How did it happen?» gives the basis for the psyche to organise itself in the “head” of the victim.

That is why any debriefing type organisation has to be above all a possibility of “free speech” that tells about what happened and so gives a direction for mental reorganisation and not emotional evacuation at any price. Some relief will be brought to the tension of anxiety because there are words to be thought of, to represent again psychologically, and not staying as a state of emotional invasion – Telling the story will help releasing the emotion and the excitation of the trauma and will introduce the time of the slowness.

The emergency systems psychological support to the victims will be systems of alleviation, of withdrawal, of “let go” behaviour.

During the war of Lebanon, a psychoanalyst said that her patients of a big distress, were not talking about the war, but about themselves. We must forget to be able to remember. The psyche processes are symbolization process – we put into words, thought, mental representation, what we feel by psyche connection, this trauma connection. To imagine suppose...to come back on the psycho event and do with it something for ourselves, in our lives... a come back from the presence. That is what we call the “bereavement work”, and the rescue security system must allow starting the movement of the psychological process from the victim and the families.

*After the identification of the victims and the first possibilities to implementing an appropriate framework in the methods of the rescue services,
(framework apart from any possible discussion, logistics for alleviation and support).
The repairing can start in its dimension individually or within a group.*

It is necessary for this first stage to be respected, and for example the presence from the first days beside the victims and the families of the representatives of association of legal aid is questionable, as much as it is important afterwards.

The repairing is a secondary stage, a secondary process that the rescue and safety services such as the State, must favoured. It strengthens the accompaniment and the propping up of the bereavement, from the individual lost. It ensures through a process of collective identification, for each of the victims, because they recognize themselves as having a suffering, to reaching a better symbolization of this suffering, a mental perception of it. We can then talk about repairing and “return to the normality” within associations, groups, with the advent of ceremonies and association meetings, by exchanges, which reinforce the capacities of each victim to put in liaison and on continuity psyche within his life and for a certain number of years, what happened.

The collective bereavement (group bereavement) became the environment to favour the individual bereavement and ensures the repairing by the person – those rites of accompaniment and of a passage into the future (meal, ceremony etc), by the reconnaissance collective social and cultural, ensure the movement of a life that carries on.

“What can we do for this not to happen again? comes to reinforce for each of them, this possibility of “how can we live with the absence still hurting of the lost loved one”? So from that active and traumatic absence we go towards an interiority presence of this other who gets into the history of everyone life’s victim of a lost.

If the victims and families are on the suffering, I would like now to say a word about rescuers and others members of the safety services of the states who have to face sorrow and difficulties. For this we must set the scene. A road tunnel, this could represent more than one crossing. Before the sinister, this crossing was made waiting to see another landscape, another sky. Today “the sooner crossed, the better” the anxiety would be the one of the dark and the imprisonment and the fire would be hell and destruction.

In the tragic scene, the rescuer acts to reach the victim. The question for him would be, how to keep the strength of his action and of his expertise, trying to see, to understand, to find his breath inside the tunnel. For that, markers are essential to him, in this area where time of action goes faster and risks to ruin him. It seems then imperative that his rescue action remain in connection with the external world by a permanent link just as an Arian string that keeps him alive; he must stay alive and must not lose himself, to be able to save other’s lives, and the accentuate time guarantees it. – The risk of an accident as well as to get lost is real at every moment – life depends on the others’ ones and on their capacity to come and get you, for the victims but for the rescuers in danger as well who risk to become victim themselves, if the link with the outside would come to break.

Outside, it is time for waiting and the tension of having the power necessitates being able to control it and the apprehension we can feel.

We could think that it is by the knowledge and the insurance of his expertise as well as the knowledge of the work that the experienced rescuer will be able to manage with this waiting and act when it is time.

The necessity of being able to find in his thought where is the intervention scene, with the prior knowledge of the work would then be necessary to his skills and to his capacity to stay available for the action, and not being full of a too big emotion.

We could also add in this same psyche process, the interest for the rescuer waiting, to regularly get news about what are happening, the failure as well as the successful one – This to be able to represent the scene.

The anxiety is there, it keeps the strength but not the anguish – Anguish is the revolt of powerless when not able to understand and what is happening.

Also, it seems that may be, an useful prevention for the users would be to inform them as well as possible, knowledge of the work and rescue system, if may be....

The time of intervention is a precious time which takes place progressively and ensures to know what’s happening, if the information has been given properly – it permits for the rescuer waiting to keep his strength and not to be assailed by the feeling towards this sinister – Nothing is worst than what we imagine!

How can we find the words when everything pushes you to silence of a tragedy, which is happening in front of you? The rescuers, who discover the scale of a sinister, need to keep their strength as much as to lose one’s grip “after the trauma of the event they were affected by.

The necessity to propose on the site, a system of psychological help seems to be necessary – to help then to find the right distance between the familiarization of their risky jobs and the capacity to keep their feelings, is necessary for their professional and private lives.

In the sinister of the Mont Blanc tunnel, we came to find out during the operational, that the health service in place, made to receive victims, was without victims. When to our door, the rescuer waiting and also coming back from an intervention, were asking for our help. That is why, the capacity for a health service and rescue service to help to adapt to such a request and actually we found out that to work with the rescuer, by rites technical caring (brief medical exam) (to take blood pressure) clinical questions about their health) would reensure them also would deeply



mentally help the integrity of their body threatened and appease their emotional tension of benches helplessness and guilty.

"He is there....., officer, doctor, nurse, psychologist, and he takes care of me, and qualifies the work I have just done and the suffering I just felt, with his attention, his ability, his words and his bottle of water". What? Away from the rescuers, by the outflanking technological of the sinister, he's given back to him and explained. The rescuer who becomes someone to rescue because he suffers of his helplessness and his guilt. A power of himself in his powerless would then be restored, to be available again, to a capacity to obey if he's called again. Strange destiny is the one of a rescuer, which would join the one of the victim – the one and the other might have suffered from the harmful consequences for their psyche, effects from a major trauma, as can be the one from a sinister in a road tunnel.

The return to the normality is not a return to the prior state for the victims and their families. After the identification of the victims the rest is to start a bereavement work and the repairing of the practical and the psychological damage.

For this reason, the security services of the state, rescue and fire, will have to favourite as much as possible these processes, allowing the creation of practical and psychological conditions of a real "transitional space". An "in-between" of this way of the life, that helps for the victims, the families and the rescuers sometimes to "get out the tunnel" to rebuilt a capacity of thinking, in other word, giving a meaning in the life history of each of us.

Thank you





MINISTÈRE DE L'INTÉRIEUR
DIRECTION DE LA DÉFENSE ET DE LA SÉCURITÉ CIVILE



RECOMMENDATIONS

At the end of the workshop discussions, the participants recommended the following provisions relating to the infrastructures, education and operational planning.

MEASURES RELATING TO THE INFRASTRUCTURES

1. Harmonisation of the distances to Pedestrian refuges.

It was pointed out that the distances between the emergency exits are still very dissimilar:

- 500 m for the European Commission,
- 400 m in a rural tunnel
- 250 m in Austria
- 200 m in urban tunnels in France

Work should be carried out to encourage the harmonisation of these distances in existing tunnels.

2. Harmonisation of signposting

- **To harmonise the various signposts**
- **To place the emphasis on pictograms that are common to the Highway Codes in all European countries, in order that understanding is not subject to an ability to use all languages.**
- A 1 metre wide white stripe in the middle would enable free circulation in the event of a vehicle breakdown. The paint used would be rugged to prevent any circulation on this stripe.

EDUCATIONAL MEASURES

3. Raising user awareness to the emergency self-help measures

- They can intervene rapidly after the event.
- In some cases they act fairly irrationally, and do not see themselves as being actors in events, as they are still in a state of shock following the accident.
- Setting up an information campaign on a European scale to present good practices, and the actions that can save lives. (In Spain this training is incorporated into the driving test).
- A traveller leaving from Finland and going to Spain should have the opportunity to have a road signs manual.
- These comments suggest the launch of an “INFORMATION CAMPAIGN” on both the risks and criteria for intervention, a campaign that could well be developed within a European framework, and in co-operation with the driver-trucker associations.

4. Constant training of operators and safety interveners

- To implement the ISPRA recommendations, including the raising of operator awareness and coordination between the various operators (police, fire brigade, ambulances) especially within the framework of training
- The need for continual operator training throughout the lifetime of the tunnel.
- To facilitate interaction between the various administrative offices (Ministries of the Interior, Roads and Transport) involved in the life of the tunnel, by means of a Technical Committee.

OPERATIONAL PLANNING MEASURES

5. Drawing up a global strategy plan (Communication included)

- Within the framework of cross-border tunnels, there should be a common plan for the countries concerned, with a common strategy extending to communication in times of crisis.
- This document should cover:
 1. The organisational structure enabling the direction and coordination of all the Public Authorities in both countries in the event of an emergency.
 2. The mechanisms for providing resources and intervention procedures in the event of an emergency.
 3. The immediate and efficient intervention of the emergency services.
 4. The safe and controlled evacuation of all tunnel users.
 5. The database pertaining to the resources and procedures that can be used.
 6. For this reason, in developing a bi-national plan, we have defined 4 levels of alert, in accordance with the severity of the situation within the tunnel:
 7. Levels 0 and 1 for situations controlled and resolved by the tunnel personnel and resources.
 8. Levels 2 and 3 for situations requiring the intervention of the emergency services outside the tunnel.

Level 2 only requires the coordination of a few emergency services; level 3 requires coordination of all the emergency services and the triggering of multinational emergency service direction.

In the Multinational Plan, a bilingual manual should be drawn up by the services in order to encourage improved understanding and integration of the safety recommendations, including reflex sheets describing what each service should do (fire brigade, police, health workers, equipment units, psychological support, etc.)

6. Indexing the miscellaneous operational tactics in accordance with the phases of development of the incidents



- **We accept that there are different techniques, and that none is superior to the others - even though dissimilar, all can be used at different times.**
- Within the framework of cross-border tunnels, it is not necessary to have new or innovative equipment, as, in reality, joint work would not be possible.
- In the Multinational Plan, a bilingual manual should be drawn up by the services in order to encourage improved understanding and integration of the safety recommendations, including reflex sheets describing what each service should do (fire brigade, police, health workers, equipment units, psychological support, etc.)

7. Drawing up a European methodology for assessing an in-tunnel exercise with an assessment grid for the observers.

- With the participation of an independent, European scale third party, a type of exercise assessment should be thought up and tested through the organisation of an exercise.
- Following this, this reflection could lead to the publication of a “Recommendations for Running Exercises” guide.

8. Means of implementing exercises that implement the global strategy plan

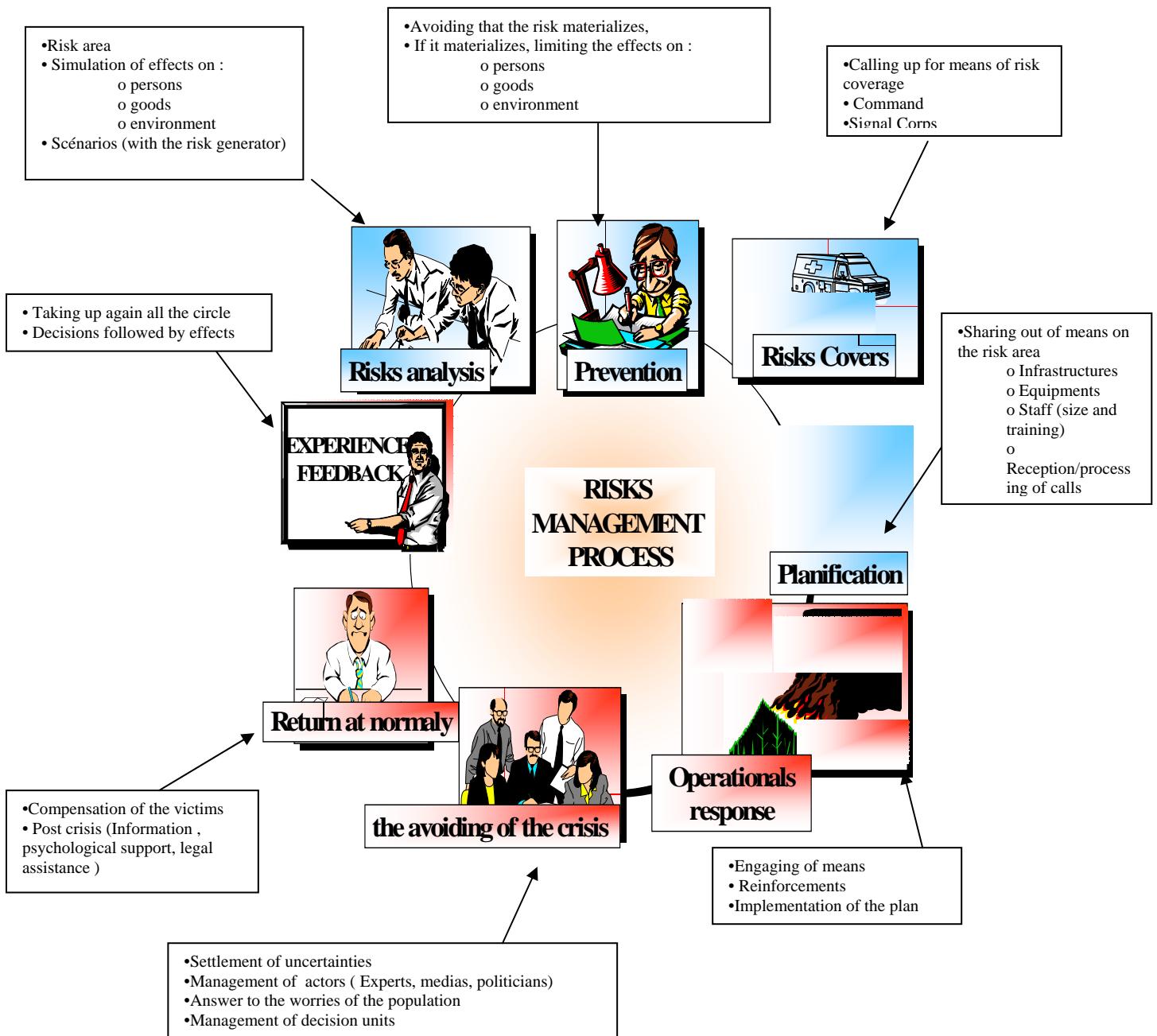
- A major need has been recorded for the reinforcing of training in coordination techniques for the intervention of the various emergency service teams in tunnels.
 - **Practical exercises for road accidents within tunnels:** Simulations should be scheduled with crashed cars and victims.
 - **Practical fire fighting exercises in tunnels:** Simulations should be scheduled with crashes involving the burning of the crashed cars.

9. A data base should be created of feedback on road tunnel exercises

- More exercises need to be organised (live wires) that could supply the database.
- Harmonisation of information and approaches / questionnaires to supply the database.

10. Census of publications and articles bearing on road tunnel exercises that could, following translation, be available to the Member States.

Organisation of a research programme: communications and publications (translations required)



IV - LA LISTE ET LES COORDONNEES DES PARTICIPANTS.				
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France	Directeur	SARDIN	CETU	
France	colonel	BOUTTE	Préfecture de la zone de défense Sud Est -Chef d'Etat-Major de sécurité civile	
France	Colonel	DELAIGUE	Directeur Départemental des Services d'Incendie et de Secours du Rhône	04 72 84 37 18 info@sdis69.fr 04 72 61 72 60
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France	Lieutenant	CHOMETTE	Service départemental d'incendie et de secours du Rhône	
France	Expert – Psychologue auprès de l' Etat-Major de sécurité civile de la zone de défense Sud Est	MALENE	Préfecture de la zone de défense Sud Est –Etat-Major de sécurité civile	
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