EASeR Project:
Recommendations - For Different Levels Of Rescue Mission And Actors

Project description.

EASeR project targets a specific aspect of search and rescue (SAR) assessment called "barrier effect" during emergency interventions in response to natural catastrophes, especially earthquakes. The term "barrier effect", used by the Fire Dep. of Pisa (IT), refers to obstacles due to a wide range of environmental factors such as: heavy snow, traffic due to damage to the road system escaping in narrow/limited escape routes, road interruptions, non-coherent management of information flow (dissemination of false/fake information, correct information not taken into consideration, missing basic information). These factors can severely hamper the general assessment in SAR as demonstrated by a direct experience of the USAR team of the Fire Dep. of Pisa in both national and international interventions. EASeR intends to provide a practical strategy to carry more efficiently the assessment in SAR with a positive cascade effect on the general performance of all subsequent operations.

The strategy consists in:

i)   analyzing the state of the art;

ii)   providing operational tools as procedures to be validated in IT and Guidelines to be spread at international level;

iii)   identifying new technologies that can be applied innovatively in support of the assessment (software, drones);

iv)   covering through procedures the deployment of helicopters belonging to other corps, whenever possible.

Procedures and innovative technologies are tested in a small-scale exercise where assessment teams from IT, CZ and PL face the "barrier effect". The Fire Dep. of Pisa coordinates the consortium composed by:

i)   FRB MSR (public body, CZ);

ii)   CNBOP-PIB (research institute, PL);

iii)   Timesis (SME, IT).

The involvement of national authorities in civil protection and emergency departments of fire officers makes the project findings sustainable on the longer term (with direct impact in IT, CZ, PL). Additionally, three final conferences targeting end-users aim at amplifying EASeR findings.

Key activities – International Survey

As methodology for the analysis of the state of the art, it was agreed to use a questionnaire (on-line survey) built up to involve international experts, and with their knowledge and experience define even more

precisely "barrier effect" and reveal gaps unseen earlier. This allowed project team to collect data from several countries on the topic of the "barrier effect":

1. United Kingdom
2. Australia
3. Chile
4. Greece,
5. Malta
6. Russia,
7. USA
8. Japan
9. Netherlands
10. Poland
11. Italy
12. Czech Republic

Based on the experience of Italian rescuers and survey outcomes based on surveys delivered by international Search and Rescue society, a discussion on the shape of the SOP's index/content has started.

End products

Project aims to create three end products which will be:

1. Italian Standard Operating Procedures
2. International Standard Operating Procedures – Outline
3. Recommendations - for different levels of rescue mission and actors.

Each of the products is to reach the recipients at various levels of rescue operations management, so that by serving one purpose, they will maximize the effectiveness of carrying out rescue operations by joining forces of all possible actors not only on-site of rescue activities.

Table of Contents

Section 1 – Identification of the Desired Document's Recipients

This section shall describe the potential recipients of this document. During the designing phase, the project team identified six main groups of players involved in the assessment operations, that have critical role for efficiency of the rescue missions. Different players, entities, agencies, government bodies are classified as follows:

1. National Civil Protection authorities at EU and extra EU level
2. National Operations Centre
3. Local authorities (e.g. self-government, municipalities, public administration on different levels)
4. First Responders
5. Assessment teams – all teams that carry out assessment activities in search and rescue (SAR) during emergency interventions in response to natural disasters and that face one or more "barrier effects".
6. Any other entities/teams involved in the assessment.

National Civil Protection Authorities

National civil protection authorities are organized in different forms and methods depending on the country, but usually aim at being the liaison with the National Civil Protection Service, charged with orientation, promotion and coordination of the entire operations system, while in close collaboration with the local authorities. They are also in charge of all activities aimed at forecasting and preventing risks, rescuing and assisting populations affected by disasters, and fighting and overcoming emergencies.

The responsibilities of the national civil protection authorities shall normally include supporting civil protection volunteers and training activities for the various players included in the system, while promoting initiatives for the dissemination of civil protection knowledge and for informing the population.

Moreover, at an international level, these authorities shall promote agreements and technical-scientific programmes to implement risk forecasting and prevention activities, shall organise and take part in exercises involving various countries as well as participate in projects for exchanging and sharing knowledge, experience and methods of intervention. The authorities within the European Union also participate in the European Civil Protection Mechanism, an instrument created to respond effectively and promptly to emergencies occurring inside and outside the Union, by sharing resources of all Member States.

National Operations Centres

The National Operations Centres shall be those entities coordinating at national level the activities of the National Fire-fighters Corps, organising structures that may vary considerably among countries but which shall all provide for a central coordination and which, in the specific case of the EASeR Project activities, shall

coordinate the activities of the USAR assessment teams by sending the resources needed to deal with complex emergencies. In general, these centres shall have, as a rule, the following tasks:

1.   activating and moving the resources required by the territory, monitoring the resources sent and the development of the situation

2.   informing the top management of the organisation, and the other offices located in the territory, preparing newsletters and updates for institutional communication;

3.   on the basis of the maps drawn up, monitoring the location of resources, planning personnel shifts in the areas of operations, controlling activities that may be of support to rescuers (weather forecasts, control of water levels, etc. ..).

Local authorities (Mayor and Other Local Authorities of Various Levels)

The local authorities or authorities located on the territory, know more than any other the area in which they reside and can therefore give a fundamental contribution to the assessment teams and the resolution of barrier effects. It is paramount that the local authority shall continuously perform its task of collecting necessary information but also managing and processing the useful information in case of disaster, including among others:

- Local Emergency Plans

- territorial shape

- population density and distribution

- road network conditions

- vulnerable buildings.

First Rescuers (more particularly Local Fire-fighter and Local Civil Protection Volunteer Teams)

The phase immediately after the disaster shall be normally characterized by a rescue system developing spontaneously through the action of "unorganized" volunteers who were not trapped and/or blocked and are therefore able to assist others by creating a network of "instinctive self-rescue".

Such categories of rescuers shall be able, as a rule, to easily access the "border line" elements present in the accident area and to proceed to rescuing victims trapped inside collapsed facilities, blocked by non- structural elements (furniture, machinery, partitions, secondary construction elements, etc.).

These individuals, who shall reach first the emergency site, in addition to carrying out the first rescue and search, shall also be able to provide essential information and support to the assessment teams that will intervene shortly after.

The first responders that shall interface with the USAR assessment team can be divided into two main categories: local fire-fighter teams and civil protection volunteers.

USAR Assessment Teams

The USAR teams that can be deployed in both a national and international context, shall assess the disaster area and may encounter barrier effects as well. The USAR Teams shall be of three types as included in the INSARAG guidelines[1]:

- The USAR Light (USAR L) module shall be able to intervene in the immediacy of the disaster and perform search and rescue in the rubble, using means, equipment, procedures and Personal Protective Equipment (PPE) normally belonging to the various national or local fire-fighters.

- The USAR Medium (USAR M) module shall intervene to perform search and rescue in the rubble, also using k-9 units and technologically advanced equipment, operating procedures and specifically dedicated PPE while also being able to perform complex operations for victims' extraction.

- The USAR Heavy (USAR H) module shall perform search and rescue operations in the rubble, using K-9 units and technologically advanced equipment and is composed of human resources, instruments and logistics that ensure operating simultaneously on two separate sites and with extended autonomy from the USAR Medium module.

Other Subjects Performing Assessment Activities

While in the hours and days following a disaster, various types of assessment shall be carried out in the affected area, this document shall describe only the USAR assessment and the barrier effects encountered during its performance.

However, it is useful, in order to interact effectively with all those who operate in a post-emergency context, that everyone shall be informed about the purposes and aims of the USAR assessment for interfacing without hindering each other and, where possible, exchanging information. To this end, this document could be a useful reading for the various players who carry out post-emergency assessment.

Section 2 - Methodology And Tools

This section based on existing assessment methodologies shall focus on the specific methods that can be used during Search and Rescue assessment activities also underlining different actions that need to be taken

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[1] INSARAG is an inter-governmental humanitarian network of disaster managers, government officials, non-governmental organisations (NGOs) and USAR practitioners operating under the umbrella of the UN, and within the realm of its mandate contributes to the implementation of the International Strategy for Disaster Reduction (ISDR). The INSARAG Steering Group unanimously endorsed the new INSARAG Guidelines 2015, and the new Guidelines is put into effect as of February 11, 2015.
The Guidelines consists of three volumes: (Volume I: Policy, Volume II: Preparedness and Response, Manual A: Capacity Building, Manual B: Operations, and Manual C: IEC/Rs Guide, and Volume III: Operational Field Guide).
Bibliographic source: https://www.insarag.org

to ensure effective and timely reconnaissance. Different tools developed to optimize the efficiency of abovementioned actions shall be described and presented to the document's recipients.

Assessment Activity and Teams Carrying Out Search and Rescue Activities In An Urban Environment

The search and rescue of people "trapped" in the rubble as a result of collapses of buildings and / or landslides, and more particularly, the rescue activities characterized by complex scenarios, such as those resulting from seismic events, lead to defining standardized and homogeneous response capabilities on the national territory.

In scenarios following catastrophic events, the "Golden Day" concept becomes essential, as the main purpose of rescue in such contexts should be to deliver victims to advanced medical care within the first 24 hours of the event, taking into account that after such time the survival rate of victims is extremely low.

The coordination methodology is key to clearly identify the activities normally required during a disaster involving Modules performing search and rescue in the urban environment (USAR modules or teams).

Univocally identifying all possible operational levels allows the coordination facilities to correctly plan, assign tasks and specific USAR operations required. Some information management tools (templates, formats, reports, marking system) shall be used to facilitate coordinating and planning USAR activities.

Operational Assessment Levels (ASR)

The ASR five operational levels can define the phases of USAR activities:

- ASR1 Level: Wide Area Assessment

- ASR2 Level: Sector Assessment

- ASR3 Level: Rapid Search and Rescue

- ASR4 Level: Complete Search and Rescue

- ASR5 Level: Search and Recovery Total Coverage.

The ASR-1 and ASR-2 phases include the performance of assessment activities; although such activities shall be carried out mainly during the early hours, they cannot be considered as completed until the entire area has been covered.

The ASR-1 phase include the preliminary investigation of the affected or assigned area, aiming at:

- determining the extent and severity of the accident

- identifying the extent, location and type of damage

- estimating urgent resource needs

- developing a sectorisation plan

- prioritising

- identifying general risks, infrastructural problems and possible location of the base of operations.

This activity shall be carried out through a quick initial visual check of the damaged or assigned area.

Usually the ASR-1 phase shall be conducted by local authorities, National Operations Centres and, if not yet completed, the USAR assessment team.

The ASR-2 phase shall include identifying specific sites where there is a chance to find survivors in the sector for prioritisation and action plan making.

The assessment should be quick yet methodical with the aim of timely assessing the entire sector and collecting essential information about the identified operational site. Information from local rescuers and the population shall often be valuable and should be constantly collected during the assessment.

SAR operations shall not usually be performed during this phase unless there is an unexpected chance to save lives. In this case, it is necessary to decide whether the USAR assessment team shall stay to initiate the rescue or shall continue its assessment activity. The decision shall depend on the situation and the instructions that the team was given, including without limitation:

-requests to send additional teams to perform rescue operations

-the assessment team stays, but must make sure that assessment shall be completed by others

-adopting a strategy to send a complete team capable of both ASR-2 and ASR-3.

ASR-2 shall be normally conducted by local authorities, the USAR M, H assessment team and a unit of the USAR L MODULES.

The ASR-3 phase normally applies in the early stages of a large-scale event when there is an imbalance between the number of teams required and the number of teams available.

Teams shall be assigned to one (USAR L) or more work sites (USAR M).

These search and rescue operations should, as a rule, be completed quickly to maximise the chances of saving lives (it should not require more than one shift per site).

If during this phase a victim trapped deeply in the rubble is detected or confirmed, the team (USAR M/H) can perform the activities includes in the ASR-4 phase. If the operating team is USAR L, it shall require the intervention of a USAR M/H team.

During the ASR-4 phase, rescue operations are carried out for heavily trapped or buried survivors under the rubble who have not been reached during the previously completed operations.

In this phase, extended work (more than one shift) shall be required and operations shall require a wide range of USAR skills and resources.

As a rule, the ASR-4 phase shall be conducted by USAR M and USAR H teams.

The ASR-5 phase is when deceased victims shall be recovered.

It shall be usually performed after the rescue phase was completed.

The ASR-5 phase shall be performed by the local VVF, USAR L, M and H teams.

Section 3 - Issues identified

This section will describe main "barrier effects" that hinder the emergency interventions in response to natural catastrophes, especially earthquakes. Ten main issues have been identified by the project team. Each of the mentioned barrier effects will be described including examples to show the negative influence to the overall effort of emergency services involved in search and rescue operations. Above mentioned issues are gathered in subsections as follows:

> 3.1 Access to worksites
>
> 3.2 Performance, knowledge, skills & training of the assessment teams
>
> 3.3 Interaction with the affected population
>
> 3.4 Time pressure
>
> 3.5 Communications & IT
>
> 3.6 Incident management and management of all the emergency
>
> 3.7 New technologies dependency and support
>
> 3.8 Media management
>
> 3.9 Use of aircrafts / helicopters and generally air, land and water vehicles
>
> 3.10 Activities outsourcing.

3.1 Access to worksites

This barrier effect is represented by difficulties to access worksites due to:

- evacuation of the residents from the affected area

- damaged infrastructures

- high environmental risk

- severe weather condition

- evacuees' lack of awareness about how to behave

- assessment team's lack of knowledge about the area

- safety and security issues.

3.2 Performance, knowledge, skills & training of the assessment teams

All the items linked to the staff of the assessment team, like:

- issues needing improvement through training (necessary experience, cultural issues, lack of general guidelines on how to manage appropriate area assessment during national/international emergencies, buildings' marking, etc..)

- team's ideal skills (related to its composition and dimension and how to connect it with emergency dimension)

- training in field orientation in different weather conditions and assessment work by day and night

- working with specific GIS tools to quickly find the references in a fairly unknown affected area

- capacities and skills to analyse and process Sat photos, Geographical Information Data, UAV Mapping

- abilities and skills to represent the current situation in maps (Standard Symbology) and ability to share key information in formal and informal meetings).

3.3 Interaction with the affected population

Possible difficulties can be:

- language barrier

- people interviewed in the affected area or in its close proximity are directly or indirectly affected by the consequences of the incident

- level of preparation of the affected population

- gathering of relevant information.

3.4 Time pressure

Possible difficulties may be:

- high expectations of the affected population

- special requests from affected population

- high pressure from supervisors on "finding someone"

- difficulties to manage the peak of demands to the assessment teams (at all levels and hierarchical order).

3.5 Communications & IT

Possible difficulties may be:

- non-coherent management of information flow

- lack of reliable communication means and user friendly platforms

- damaged or congested communication infrastructures

- overloaded communication channels due to the high number of services working on site without using dedicated channels on different levels of intervention

- lack of common language between all the players.

3.6 Incident management and whole emergency management

Possible items that are included into this issue:

- experience and training needed for the Incident Managers

- necessity to have specific SOP on management

- information on how to assess the need for international help

- need to raise the awareness of local authorities/first responders

- need to clarify competences and management organizations of all the entities involved in an emergency and how to manage crisis coordination

- clear identification of competences for on-site commander to require personal and material assistance.

3.7 New technologies dependency and support

All possible aspects linked to a beneficial use of new technologies like drones and mapping:

- lack of new technologies

- lack of detailed satellite maps of the area

- availability of updated maps and distribution of common maps for all players (When, How, Verification…)

- data quality (verification, last update,…)

- availability of new technologies that cannot be used

- extended waiting time for satellite maps or available, yet unreachable satellite maps

- lack of interoperable software tools.

3.8 Media management

Possible difficulties can be:

- different sources of information, releasing contradictory situation overview

- problems with collection of media information and monitoring (very chaotic and useless media information)

- release of deliberately false information

- need for SOP for cooperation with the media in case of incident

- social media monitoring.

3.9 Use of aircrafts / helicopters and generally air, land and water vehicles

Items needed to be clarified for a relevant and adequate use of vehicles, most of all aircraft and helicopters as follows:

- procedures for USAR assessment teams and helicopters teams

- detailed training and knowledge of helicopters' use and their potential.

3.10 Activities outsourcing

This issue is linked to all possible activities, modalities and difficulties that can be encountered in using an outsourcing tool or resource during assessment.

Section 4 – Recommendations

This section shall describe actions, good practices, suggestions and examples of effective solutions to increase the effectiveness of response, avoid duplicating efforts, and promoting adequate resilience of regions and population in case of major emergencies.

4.1 Access To Worksites

As to the barrier effect called "access to work sites", the players that follow may play an important role in addressing and resolving it.

The national operations centres can collect and constantly update both ordinary and complex historical data in case of emergency, in order to build and progressively update the database with the history of the activities carried out, the resources employed and handled, the criticalities faced and the chronological order and of the related documents drawn up or filed. Such data collection can be further refined thanks to sensitive parameters, i.e. relating to strategically relevant or critical elements, which is important to know in order to quickly face a disaster with the necessary operating resources, as well as the appropriate procedures for workers safety, in order to prevent probable barrier effects or mitigate environmental risks. On the basis of such data, it is possible to draw up maps correlating the data of the first and second group, according to the objectives pursued each time, such as for example:

- flight obstacle maps for air safety purposes
- asbestos risk maps, in post collapse scenarios, to protect rescuers;
- environmental risk indexes maps, to locate adequate and appropriate resources in the national territory;
- past stability verifications maps, to prepare useful monitoring of rescue daily activities.

In case of a disaster, the national operations centres may carry out analyses aimed at anticipating and limiting possible difficulties of access to the sites. If available, pre- and post-event aerial or other images and satellite data, can be analysed in order to immediately identify the location and extent of the emergency scenario, any critical issues, road network conditions and alternative routes, etc.. At the same time, using cadastral data, if available, it shall be possible to identify the type of building involved in the disaster, and the resulting possible vulnerability indexes.

Local authorities, on the other hand, with regard to any difficulties that an assessment team might encounter in reaching the emergency site, could provide useful information to address and, possibly, overcome them, about locations for landing aircraft near the areas affected by the disaster and the road network of access routes to the emergency site. Local authorities should therefore:

- map and periodically update the possible landing pitches or areas in their territory
- constantly update the various road plans and possible access routes to the areas of their territory.

The first responders are from the area and know the road network and any criticalities resulting from the disaster. They can therefore suggest the most appropriate roads and means of transportation to reach the disaster sites.

The USAR assessment teams, on the other hand, can deal with this barrier effect through personal equipment and techniques facilitating access to work sites by correctly selecting individual workers' personal equipment in order to guarantee acceptable conditions of hygiene and personal comfort and short term minimum self-sufficiency up to setting up the Base Camp, as well as dividing the loads for any air transport thus reducing weights and volumes of stowable material and activation times. In case of disaster, and upon knowing the site to be assessed, the USAR Team Management shall ask for information regarding access (local road network) to the sectors or sites assigned. Such information shall be useful for selecting the most appropriate and fast means of transportation to reach the assigned sector/site.

4.2 Performance, Knowledge, Skills & Training Of The Assessment Teams

As to the composition of the assessment team, the team staff training and the skills the team members must have in order to perform the USAR assessment at best and deal with the barrier effects, it is useful to suggest as follows:

- Module Leader (Management)

- Liaison Officer (Management)

- Staff Officer (Staff Management)

- Structural Assessment Officer (Reconnaissance and Assessment)

- Haz-mat assessment officer (Reconnaissance and Assessment)

At least one of the staff members shall be experienced in cartography, IT and communications and shall be familiar with IT platforms in use at national and INSARAG levels.

The Team's activities and corresponding skills shall be as follows:

1) facilitating the set-up of the coordination structure of the USAR modules (UCC) in line with the resources deployed on site for initial planning of search and rescue activities

2) dividing the assigned area into sectors if not previously identified (ASR1)

3) defining the operating priorities within the assigned sectors (ASR 2), i.e. identifying the sites where there may be survivors

4) drafting the necessary maps for both the assessment and later rescue teams

5) providing instructions to the various module means, as to the ordinary road network within the area of interest.

The professional figures performing the functions referred to in item 3, in the USAR M team, shall be as follows:

Officer In Charge Of The Expeditious Assessment And Safety Of Structures

During the reconnaissance/assessment for the purpose of identifying operational priorities, such an officer shall carry out the following tasks:

- getting information on and assessing the sites from a static point of view, identifying any precautions and expeditious securing operations

- proceeding to an initial voice and visual search (call-out) to detect survivors

- establishing priorities in search and rescue operations, on the basis of the ascertained or presumed presence of survivors

- providing for marking the site, according to the provisions of the INSARAG guidelines

Haz-mat Assessment Officer

During the reconnaissance/assessment for identifying operational priorities, such an officer shall carry out the following tasks:

- getting information about the presence of hazardous substances and plants, identifying any precautions and operations of securing the shipment

- collaborating in an early voice and visual search (call-out) to detect survivors

- collaborating in an expeditious triage aimed at ascertaining the presence of hazardous substances and systems

- suggesting the use of "specific" PPE as well as any additional safety measures as to the presence of hazardous substances.

A proper execution of these operations (ASR2) shall allow for a rapid organization of rescue activities through effective planning and proper management of resources.

The **Management and Staff functional unit** shall include the following professionals:

Team Leader

He or she shall coordinate the activities of the assessment and planning unit team in synergy with the other locally activated Fire-fighters' coordination facilities.

Liaison Officer

Such an officer shall liaise with the members of the Civil Protection system on site (representatives of the local Civil Protection system, Healthcare Rescue, Police Forces, etc.) and

- shall get information about the state of the sites before the disaster and the presumed number of victims involved

- shall keep in touch with the communication bodies in the vicinity of the operational area, keeping the Module Manager (Team Leader) informed in accordance with the Department's institutional communication policies.

Staff Officers

They cooperate with the other members of the Reconnaissance and Assessment Team in developing the initial planning phase, more specifically:

- setting up the USAR Coordination Structure (UCC);

- dividing the assigned disaster area into sectors, if not previously done

- processing data received from the USAR assessment teams on site, through a specific software also used for Planning

- drafting the necessary maps for the assessment teams and for the subsequent rescue teams

- entering all data/information (information from local people, local rescue system, assessment teams, etc.). related to the defined sectors in specific digital forms.

Training and preparation of the USAR staff who may be part of the USAR Assessment and Reconnaissance Team, that can be extended to all types of USAR Module (Light, Medium, Heavy), should include the following:
- organization and participation in national and international exercises (full scale exercises)
- organization of and participation in national and international field exercises for USAR assessment
- simulated USAR assessment exercises (table top exercises);
- UCC training (an important coordination tool that becomes more efficient if the teams in the area of intervention are formed in a homogeneous and adequate way)
- interacting with the involved population, usefully drafting guidelines as a reference document after training
- interacting with local authorities and first responders, in order to understand what information to gather and how to do it.

4.3 Interaction With The Affected Population

The following players can play an important role in dealing with the barrier effect "interaction with the affected population" and in resolving it where possible:

the national operations centres, if difficulties in interacting with the population are limiting the work of the assessment team, can consider possible support actions such as sending other assessment teams or first responders to relieve the assessment team.

In drawing up their Emergency Plan, local authorities must analyse in detail the weaknesses of their territory, identifying more particularly wait and hospitalization areas. Such Local Emergency Plans must then be disseminated throughout the territory so that the population shall know and implement them as much as possible. Subsequently, when rescuers are mobilized, the local authorities affected by an emergency should ensure, as far as possible, that their populations are guided to behave in accordance with the provisions of the local Emergency Plans, activating, in turn, the bodies that shall carry out the various activities provided for in such Plans. If the local authority involved in the emergency is able to guide the affected population in accordance with the provisions of its Local Emergency Plan, the USAR assessment team should find it in the appointed areas, thus reaching more easily the areas to be assessed.

The first responders, instead, can act as an intermediary between the population and the USAR assessment team to help finding useful information from the population. They can also provide information on the inhabitants of the affected area and share the early information collected.

The USAR assessment teams consider the interaction with the affected population as one of the most delicate aspects that a rescuer has to deal with during an emergency. Some of the possible non-technical barrier effects, resulting from a USAR team's assessment, were identified as all those emotional, psychological, behavioral and social reactions by the population surviving the disaster and present in the peritraumatic context. Anger of the relatives or acquaintances of the victims, especially in disasters caused by 'human beings or known in advance, creates a barrier effect as it can intensely be directed towards the rescuers. Anger also occurs when a person perceives that either himself or herself or some of his or her loved ones are suffering injustice, for example, he or she may find it difficult to understand and accept that the assessment team cannot immediately start to help, rather it must proceed further with its assessment work.

In addition, any language barriers given by the culture and dysfunctional communication with the players on site can cause additional stress, with possible misunderstandings, complications and operational delays.

In the Preparedness phase for every possible emergency and in order to be able to deal with it effectively, primary prevention work shall therefore be done by informing and training on such issues, so as to make the rescuers not only responsive but also aware and proactive regarding other people's stress conditions as well as their own.

During the impact phase (Operations), the rescuers of the assessment team shall be able to understand, control and guide the acute and intense, potentially destructive, emotional reactions, during an evolving crisis, trying to manage them in the best possible way according to the various critical situations they encounter. It is evident in the light of the above, that it is important to consider as main barrier effects, in addition to the technical ones, also issues arising from the human factor, namely management of feelings and actions of all the players involved in critical events, their behaviors and the psychosocial and inter-relational aspects binding them.

4.4 Time Pressure

The need for rapid assessment by the team is closely related to the certainty, on the part of the team itself and the operating teams, that as time goes by, it shall become increasingly difficult to perform rescue operations to save lives.

The national operations centres can assess the scenario in the short term and consequently the resources to be moved and where, through the following activities:

- drafting maps to give general information about the resources to be moved
- processing data and satellite images to assess the scenario in detail, thus allowing to optimize or integrate the resources sent immediately, verify intact and fast roads, as well as any environmental risks, etc..
- immediately collecting and processing data about the resources moved, the activities carried out, the areas of intervention, so as to provide immediately a common basis for monitoring the actions and planning the next steps.

First responders, if not properly trained and informed, can themselves represent a barrier by putting additional pressure on the team. If, on the contrary, they know the useful information to be provided to the assessment team, the first-responder teams, as they are locals, can provide a truly effective support.

USAR assessment teams, in addition to being trained appropriately for interaction with the affected population and time pressure, can more effectively manage time through the First Rapid ASR2, as it allows the assessment team to be directed in a surgical manner, without risking losing valuable time inspecting areas that could potentially be "clean". Making the assessment team travel shorter distances at this stage is important to avoid all the other identified barrier effects encountered while assessing the assigned area.

4.5 Communications & IT

The flow and the channels of communications can be an important barrier effect in case of complex emergencies and the subjects interfacing within an emergency can contribute as follows:

The national operations centres can standardize information flows and dissemination at all central and local organizational levels, as well as staff training on information use. In fact, by collecting information from the commands of the affected areas on what needs to be found and distributed to the teams that are about to go to the emergency sites, they can usefully contribute to the resolution of barrier effects resulting from information flows and information technology. The national operations centres can in fact assess whether communication support shall be needed by the teams and what type they need (radio communications, field portal systems and IT personnel) which shall therefore be available while using such technologies.

Local authorities should identify ways and means to communicate with the population, while assessing:

- whether to use an alert system in case of disaster, identifying how to register to it and how to disseminate information to the population

- whether to define the information tools to reach the different population groups, by identifying the various possible means, bearing in mind that it is necessary to reach people who can use different means of

information and think about how to cover as many inhabitants as possible (homepage of local authority websites, newspapers, radio and television, etc. ..)

- when it is necessary to pre-alert the population and how, for example in case of weather alert and taking into account the distribution of the potentially affected population within the territory.

Local authorities should also assess the possible weaknesses of their communication networks and decide whether and how to strengthen them by saving data in a different storage.

In relation to the hours following a disaster, local authorities should, if possible, assess the stability and/or damage to their communications network and, taking them into account, identify how to communicate to provide information to the affected population and the various parties involved in the rescue.

The first responders, if able to keep on finding correct and timely information about the incident can be a real added value for the assessment team, as they are able to provide detailed and certain information.

The assessment team shall update the means of communication provided, so as to ensure information flow even in difficult conditions such as:

- damaged and/or congested communication infrastructure

- excessively busy communication channels

- lack of reliable means of communication.

During preparedness, it shall be important to care for and maintain all the equipment, while in the mobilization phase it shall be important to verify proper operation of all electronic tools and to require information about the condition of the infrastructure and communications networks in the affected area and with their coverage so as to plan the operations to ensure communications with the USAR assessment team.

4.6 Incident and Whole Emergency Management

This possible barrier effect shall involve the whole management of the emergency and is therefore essential for the best possible result in terms of search and rescue of any victim.

The parties who can usefully contribute to deal with any barrier effects arising from incorrect incident or whole emergency management, shall be the following:

The national operations centres should identify in a standardised way their organizational responsibilities and roles in case of emergency and the local and regional players they shall interface with, monitoring and

assisting, where necessary, the various persons that manage the emergency so that activation and mobilization shall be effective and timely.

The decision-making and communication flow between the national operations centres and those responsible at various levels for the emergency shall be supplemented by information on the teams being deployed, in particular on the assessment teams which are closely linked to the assessment of the emergency scale and extent. The interaction and passage of decisions must be clear and updated in order to allow for the correct flow of information.

Local authorities, in the event that a disaster of such a size that it requires the support of parties outside the local area, shall be familiar with and know how to fit properly into the information and management flow of those who manage the various levels of emergency. It is therefore extremely useful that the local structures and the parties that are part of them shall be properly trained and aware of the information flows that shall come from the local authority and go back to it.

First responders shall be able to understand and know, the role and tasks of the assessment team as well as of the various parties that have responsibilities in managing the disaster.

The USAR assessment teams, in order to contribute usefully to deal with the barrier effects arising from incorrect incident or whole emergency management shall cooperate and, where necessary, set up the USAR Coordination Centre (UCC). The main task of the UCC shall be to channel all information from the affected territory.

In this way, an overall view of the assigned area shall be used to coordinate rescue operations in a rational manner and optimise resource management. More particularly, the UCC shall:

- communicate each new site identified by the assessment teams to the LEMA (Local Emergency Management Authority)

- communicate to LEMA any new Sub-site established by Usar-M teams

- manage all Usar-M teams present in the area falling under its responsibility

- cooperate with LEMA in managing the USAR Light modules

- inform the various LEMA in those cases where data collected from the area show significant imbalances of resources or teams in the areas falling under their responsibility in order to rationalize resources

- in accordance with LEMA, assign Usar-M teams to sites consistently with the Team's capabilities

- manage all the information coming from the area.

4.7 New Technologies Dependency and Support

New technologies can constitute a barrier effect if in excessive large numbers and with different modes of operations which do not communicate with each other or are not useful within their limited time use. During preparedness, the technologies to be used, when and what type of support they need shall be decided.

The USAR assessment teams shall use such technologies which include various possibilities such as SAPR (drones) and data management systems which are useful for USAR team's work.

More particularly, it is possible to use high endurance fixed wing drones able to embark multiple payloads (sensors), be conducted in bvlos operations (beyond the pilot's view) and to stream to remote operations rooms. Infrared sensors and streaming images to remote locations extends the use of drones.

For this reason, having a software platform that facilitates the collection and dissemination of such information, can play an essential supporting role in overcoming the barrier effect because it shall acquire data from sites and transmit digital and structured information. Such information stored in a database shall allow to prioritise interventions and to optimise on site resource management. These software platforms should aim at digitally collecting, transmitting, managing and analysing data from disaster scenarios (earthquakes, building collapses, attacks, etc.).

Such platforms are made of three parts:

- data acquisition

- data transmission

- information analysis and management.

4.8 Media Management

When speaking of media management, one thinks about activities related to acquiring every possible data and information related to the emergency, their analysis, the formulation of a communication message on the basis of the critical points identified and the directives received from the top management, the external dissemination of the official content, including any accompanying images.

The national operations centres usually shall provide support taking into account both the information from the sources operating on site, and comparing their data with those available to the national operations centres themselves. Data crossing shall ensure that messages are certain, as always necessary, yet especially during a disaster, contents to both the media and the populations involved shall be clear and safe.

Another fundamental aspect for managing the media and avoiding incorrect or indiscriminately circulated information is monitoring media publications, which is usually done by national operations centres, interacting with and informing the Operations Manager of any criticalities identified. The relationship

between these parties should be continuous and dynamic, as they both have information useful for formulating or reformulating messages. It is through their contact that it shall also be possible to ensure strategic control of interviews with workers on site or remote spokespersons.

In some cases, in fact, especially in the early stages of a disaster, to ensure uniformity it is convenient to use a spokesperson, who shall also relieve those who are working, and whose statements may be valid in court.

Local authorities, on the other hand, should identify which media to use in the event of an emergency and how to manage information coming both from them and social media, deciding in particular not only which social media to monitor but also whether to do so in a one or two-way. Local authorities and rescuers should share information collected through local and social media, after verifying them as they are useful in understanding where it is most urgent to start assessing.

Assessment teams should interface both with national operations centres and with local authorities in order to collect reliable and useful information for their activity. To this end, the identification of a press officer within the USAR team shall be extremely useful.

4.9 Use of Aircrafts / Helicopters And Generally Air, Land And Water Vehicles

If the work sites of both the assessment team and the people who shall then carry out the operations are difficult to reach, it is necessary to understand the most appropriate means of transportation to overcome such a barrier.

The national operations centres, intending to understand the means to be used according to the situation, can draft a series of documents including the characteristics of any means of transportation that can be used in case of complex disasters, on the basis of previous similar experiences. Such documents shall detail the procedures for using special means, such as aircrafts and drones while describing:

- the operating characteristics of each aircraft

- the potential and limits of use

- the loading plans divided by persons and instruments and an early analysis on the most suitable means depending on the activity to be carried out.

Local authorities, regarding the support they can provide as to such barrier effect, should:

- map and periodically update the possible pitches or landing spaces in their area

- constantly update the various road networks plans and possible access routes to their own areas.

Upon identifying the specific transport needs of the assessment team, interaction with local authorities shall allow planning and selecting the most suitable vehicle for transport and subsequent movement from the landing pitch.

With regard to the assessment team, its equipment shall be modular according to the load capacity and the means of transportation considered as most appropriate, selected on the basis of the information found about the scenario's characteristics (ground vehicles, Fire-fighters helicopters, Canadair, outsourced aircraft....).

The choice of mobilization by land shall depend primarily on distance. Except for some borderline situations where climatic factors or the isolation of the location to be reached require the use of other means, vehicles are essential, both for approaching the red zone and assessing it as fast and methodically as possible.

When mobilizing by land, therefore, light vehicles under 35 quintals with four-wheel drive shall be preferable and therefore appropriate for any type of terrain and climate.

It is important in some situations to have even lighter vehicles such as quads which are useful to overcome debris resulting from structural failure and can be used in particularly restricted environments.

The National Operations Centres can plan and arrange moving USAR resources by air, thus allowing for:

- early deployment of resources with consequent reduction of time pressure

- reaching environments that are difficult to access by land due to all those variables limiting access to the epicenter of the disaster as follows, particular weather conditions, impassable communication routes due to damaged infrastructure and surplus of requests for help from the involved populations in the suburbs.

4.10 Activities Outsourcing

In the course of a complex disaster, it may be necessary to resort to facilities and vehicles that are not in the possession of the bodies responsible for rescue activities, both for assessment and operational search and rescue.

In such cases, the national operations centres themselves should identify, through their internal divisions, the needed means and equipment and who can provide them. During preparedness, it shall be possible to outline and plan the types of resources that can, as a rule, be useful to such purpose while implementing, if necessary, the necessary agreements. The armed forces, for example, are often indispensable either to

provide specific means of transportations such as aircraft or to provide support in special cases and conditions to clear roads during natural or human disasters.

Fundamental support can come from local authorities who should have updated data about companies authorized to supply goods in case of need and possibly access appropriate websites to contact them.

In case the <u>assessment team</u>, during the USAR Assessment activities, shall need resources (tools, equipment, vehicles,...) that it does not have, it shall request them specifying in detail the characteristics of what it needs and why.

Section 5 - Conclusions

SUBSECTION	CONTENT/DESCRIPTION	RECOMMENDATION
1. Access To Worksites	All the difficulties related to access the sites to be assessed.	The national operations centres can collect and constantly update both ordinary and complex historical data in case of emergency, in order to build and progressively update the database with the history of the activities carried out, the resources employed and handled, the criticalities faced and the chronological order and of the relative documents drawn up or filed. Such data collection can be further refined thanks to sensitive parameters, and it is possible to draw up maps correlating the data of the first and second group, according to the objectives pursued each time (with the support of pre- and post-event aerial or other images and satellite data). Local authorities should therefore: - map and periodically update the possible landing pitches or areas in their territory - constantly update the various road plans and possible access routes to the areas of their territory. The first responders are from the area and know the road network and any criticalities resulting from the disaster. They can therefore suggest the most appropriate roads and means of transportation to reach the disaster sites. The USAR assessment teams can deal with this barrier effect through personal equipment and techniques facilitating access to work sites by correctly selecting individual workers' personal equipment. In case of disaster, and upon knowing the site to be assessed, the USAR Team Management shall ask for information regarding access (local road network) to the sectors or sites assigned. Such information shall be useful for selecting the most appropriate and fast means of transportation to reach the assigned sector/site.

SUBSECTION	CONTENT/DESCRIPTION	RECOMMENDATION
2. Performance, Knowledge, Skills & Training Of The Assessment Teams	Any indication useful for defining the assessment team, its members and their skills and necessary training.	As to the composition of the assessment team, it is useful to suggest as follows: - Module Leader (Management) - Liaison Officer (Management) - Staff Officer (Staff Management) - Structural Assessment Officer (Reconnaissance and Assessment) - Haz-mat assessment officer (Reconnaissance and Assessment) At least one of the staff members shall be experienced in cartography, IT and communications and shall be familiar with IT platforms in use at national and INSARAG levels. The Team' activities and corresponding skills shall be as follows: 1) facilitating the set-up of the coordination structure of the USAR modules (UCC) in line with the resources deployed on site for initial planning of search and rescue activities 2) dividing the assigned area into sectors if not previously identified (ASR1) 3) defining the operating priorities within the assigned sectors (ASR 2), i.e. identifying the sites where there may be survivors 4) drafting the necessary maps for both the assessment and later rescue teams 5) providing instructions to the various module means, as to the ordinary road network within the area of interest. Training and preparation of the USAR staff who may be part of the USAR Assessment and Reconnaissance Team, that can be extended to all types of USAR Module (Light, Medium, Heavy, should include the following:

SUBSECTION	CONTENT/DESCRIPTION	RECOMMENDATION
		- organization and participation in national and international exercises (full scale exercises) - organization of and participation in national and international field exercises for USAR assessment - simulated USAR assessment exercises (table top exercises); - UCC training (an important coordination tool that becomes more efficient if the teams in the area of intervention are formed in a homogeneous and adequate way) - interacting with the involved population, usefully drafting guidelines as a reference document after training - interacting with local authorities and first responders, in order to understand what information to gather and how to use it.
3. Interaction With The Affected Population	Any difficulty linked to the interaction with the affected population.	The national operations centres, if difficulties in interacting with the population are limiting the work of the assessment team, can consider possible support actions such as sending other assessment teams or first responders to relieve the assessment team. Local authorities, while drawing up their Emergency Plan, shall analyse in detail the weaknesses of their territory to assess and include the most suitable behaviors and actions in the corresponding procedures, identifying more particularly waiting areas and shelters. The first responders, instead, can act as an intermediary between the population and the USAR assessment team to help finding useful information from the population. They can also provide information on the inhabitants of the affected area and share the early information collected.

SUBSECTION	CONTENT/DESCRIPTION	RECOMMENDATION
		USAR assessment teams believe that the interaction with the population affected by the disaster is one of the most delicate aspects that a rescuer shall face during a disaster, and for this reason they should be usefully trained about it.
4. Time Pressure	Any issues linked to time pressure.	The national operations centres may, in the short term, assess the scenario, and consequently the resources to be moved and where. The first responders, if having useful information to provide to the assessment team, as they live in the area, can provide really effective support. USAR assessment teams, in addition to being trained appropriately for interaction with the affected population and time pressure, can more effectively manage time through the First Rapid ASR2.
5. Communications & IT	Anything linked to communication and IT support	The national operations centres can standardise information flows and dissemination at all central and local organisation levels as well as staff training on how to use the information. They can also assess the need for and the type of communication support required by the teams (radio communications, field portal systems and IT personnel) during their deployment. Local authorities should identify ways and means to communicate with the population, while assessing: - whether to use an alert system in case of disaster, identifying how to register to it and how to disseminate information to the population - whether to define the information tools to reach the different population groups, by identifying the various possible means, bearing in mind that it is necessary to reach people who can use different means of information and think about how to cover as many inhabitants as

SUBSECTION	CONTENT/DESCRIPTION	RECOMMENDATION
		possible (homepage of local authority websites, newspapers, radio and television, etc. ..)
		- when it is necessary to pre-alert the population and how, for example in case of weather alert and taking into account the distribution of the potentially affected population within the territory.
		Local authorities should also assess the possible weaknesses of their communication networks and decide whether and how to strengthen them by saving data in a different storage.
		In relation to the hours following a disaster, local authorities should, if possible, assess the stability and/or damage to their communications network and, taking them into account, identify how to communicate to provide information to the affected population and the various parties involved in the rescue.
		The first responders, if able to keep on finding correct and timely information about the incident can be a real added value for the assessment team, as they are able to provide detailed and certain information.
		The assessment team shall update the means of communication provided, so as to ensure information flow even in difficult conditions such as:
		- damaged and/or congested communication infrastructure
		- excessively busy communication channels
		- lack of reliable means of communication.
6. Incident and Whole Emergency Management	Every possible role linked to emergency management.	The national operations centres should identify in a standardised way their organizational responsibilities and roles in case of emergency and the local and regional players they shall interface with, monitoring and assisting, where necessary, the various persons that manage the

SUBSECTION	CONTENT/DESCRIPTION	RECOMMENDATION
		emergency so that activation and mobilization shall be effective and timely. Local authorities, in the event that a disaster of such a size that it requires the support of parties outside the local area, shall be familiar with and know how to fit properly into the information and management flow of those who manage the various levels of emergency. First responders shall be able to understand and know, the role and tasks of the assessment team as well as of the various parties that have responsibilities in managing the disaster. The USAR assessment teams, in order to contribute usefully to deal with the barrier effects arising from incorrect incident or whole emergency management shall cooperate and, where necessary, set up the USAR Coordination Centre (UCC). The main task of the UCC shall be to channel all information from the affected territory.
7. New Technologies Dependency and Support	New technologies can constitute a barrier effect if in excessive large numbers while having different modes of operations which do not communicate with each other or are not useful within the limited time use.	The USAR assessment teams shall use such technologies including drones and data management systems supporting the work of the USAR team. More particularly, it is possible to use high endurance fixed wing drones able to embark multiple payloads (sensors), be conducted in bvlos operations (beyond the pilot's view) and to stream to remote operations rooms. Infrared sensors and streaming images to remote locations extends the use of drones. In addition, there are software systems that can collect, digitally transmit, manage and analyse data from disaster scenarios (earthquakes, building collapses, attacks, etc.) through data acquisition and transmission, information analysis and management.

SUBSECTION	CONTENT/DESCRIPTION	RECOMMENDATION
8. Media Management	Any problem or difficulty linked to managing information and media, including social media	The national operations centres should be responsible for collecting data on the emergency situation, analysing it, formulating the message on the basis of the criticalities identified and the directives received from the top management, and disseminating the official content outside, including any accompanying images. Local authorities, should identify which media to use in the event of an emergency and how to manage information coming both from them and social media, deciding in particular not only which social media to monitor but also whether to do so in a one or two-way. Local authorities and rescuers should share information collected through local and social media, after verifying them as they are useful in understanding where it is most urgent to start assessing. Assessment teams should interface both with national operations centres and with local authorities in order to collect reliable and useful information for their activity. To this end, the identification of a press officer within the USAR team shall be extremely useful.
9. Use of Aircrafts / Helicopters and Generally Air, Land and Water Vehicles	Any activity or problem linked to using aircraft dedicated to specific spaces or needs in case of emergency.	The national operations centres, intending to understand the means to be used according to the situation, can draft a series of documents including the characteristics of any means of transportation that can be used in case of complex disasters, on the basis of previous similar experiences. Such documents shall detail the procedures for using special means, such as aircrafts and drones while describing: - the operating characteristics of each aircraft - the potential and limits of use

SUBSECTION	CONTENT/DESCRIPTION	RECOMMENDATION
		- the loading plans divided by persons and instruments and an early analysis on the most suitable means depending on the activity to be carried out. Local authorities, regarding the support they can provide as to such barrier effect, should: - map and periodically update the possible pitches or landing spaces in their area - constantly update the various road networks plans and possible access routes to their own areas. <u>The assessment team</u> should provide equipment that can be adjusted according to the load capacity and the most appropriate means of transportation, selected on the basis of the information on the scenario characteristics (ground vehicles, VVF helicopters, canadair, outsourced aircraft, ...). The choice of mobilization by land shall depend primarily on distance. Except for some borderline situations where climatic factors or the isolation of the location to be reached require the use of other means, vehicles are essential, both for approaching the red zone and assessing it as fast and methodically as possible. The transportation of USAR resources can also be planned and arranged by air, which allows for: - early deployment of resources with a consequent reduction in Time pressure - reaching areas that are difficult to access by land due to variables that would limit access to the epicentre of the disaster and that may be linked to particular weather conditions, impracticability of communication routes due to damaged infrastructure and excessive number of requests for help from the affected populations in the suburbs.

SUBSECTION	CONTENT/DESCRIPTION	RECOMMENDATION
10. Activities Outsourcing	In the course of a complex emergency, it may be necessary both to carry out assessment and search and rescue operations and to use equipment and means that are not in the hands of the national operations centres or other related bodies.	The national operations centres themselves should identify, through their internal divisions, the needed means and equipment and who can provide them. During preparedness, it shall be possible to outline and plan the types of resources that can, as a rule, be useful to such purpose while implementing, if necessary, the necessary agreements. The armed forces, for example, are often indispensable either to provide specific means of transportations such as aircraft or to provide support in special cases and conditions to clear roads during natural or human disasters. Local authorities who should have updated data about companies authorised to supply goods in case of need and possibly access appropriate websites to contact them. In case the assessment team, during the USAR Assessment activities, shall need resources (tools, equipment, vehicles,...) that it does not have, it shall request them specifying in detail the characteristics of what it needs and why.