



OVERC.O.M.E.

Cross-border cOoperation
in Managing Emergency



Co-funded by
the European Union

OPERATING GUIDELINES TO IMPROVE COORDINATION AND COOPERATION



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Section 0

0.1 OVERC.O.M.E. Project

OVERC.O.M.E. project has been funded by the European Union Mechanism of Civil Protection (UCPM) under the Call UCPM – 2022 – PP . It has been implemented by a consortium of Italian and French end-users: the Italian National Fire and Rescue Service (CNVVF), the French Departmental Fire and Rescue Service of Savoie (SDIS73), together with the International CBRNE Institute (ICI) of Belgium. The coordinator of the project is the CNVVF. One of the objectives of the project is to improve the quality of CBRN operations, enhancing the coordination to take the “right decision” and facilitating the interoperability toward a “Team Europe” approach as well as to Improve the cooperation for any type of general joint Intervention at the border.

Thus, OVERC.O.M.E. intends to improve current tools, covering the lack of procedures and standard operational forms in CBRN, to harmonise the type of data useful to the coordination of an emergency and facilitate the flow of information to respond to the operational needs, especially when more than one country is involved. The project takes into consideration the standard international model actually used in USAR operations (INSARAG Guidelines 2020) which is intended to be the leverage to improve standardisation in CBRN scope, applying a methodology that comes from USAR operations as a possible model. The project will test the CBRN forms and the CBRN procedures during two exercises in 2024 to enhance mutual cooperation in a scenario simulating an intervention at the border between Italy and France and will enhance the already available data management system in USAR operations, named “Prometheus” that could also be used by the teams during a CBRN emergency.

In the frame of protocols of cross border cooperation (CBC) already existing between the Ministries of the Interior of France and Italy signed in 2007, OVERC.O.M.E. is also aimed at enhancing a virtual operational room between Turin (Italy) and Chambéry (France) to improve operations at the border and make it as a model for other borders’ joint action. Thus, S.O.F.I.A. which stands for Operational Room France Italy Alpine Arch (Sala Operativa Francia Italia Arco Alpino/Salle Opérationnelle France Italie Arc Alpin) is developed In the frame of OVERC.O.M.E. to facilitate the coordination of cross-border interventions in terms of: a) correct classification of an event; b) unambiguous address; c) standard acronyms for equipment and resources; d) translation on real time of additional information.

At the end of the project Prometheus will be therefore enhanced for CBRN (for full coordination for all the phases) and for general interventions in the frame of S.O.F.I.A. (for the alert phase).

0.2 Operating Guidelines to improve coordination and cooperation

The purpose of this document is to share intervention procedures in cross-border CBRN scenarios. In addition to the procedures, the document indicates the capabilities and methods of intervention of the teams in order to facilitate knowledge and cooperation activities.

0.3 S.O.F.I.A: (Operational Room France Italy Alpine Arch)

The aim of S.O.F.I.A. is facilitating the exchange of resources and information among Fire Departments from different states that have to cooperate in general transborder interventions. Toward this aim, the following sections and internal tools have been designed and implemented in S.O.F.I.A.:

- an Alert System which, following the opening of an intervention, sends out a double notification: a phone pre-recorded message in the language of the recipient and an e-mail to the mailing list and phone numbers configured in the system;
- a chat between two Fire Departments involved with simultaneous translation is also present in the System;
- a Log-book that automatically records the actions in S.O.F.I.A. with the possibility to insert manually logs and that permit to track the intervention and responsibilities;
- a map area with competences areas that permit to identify the event location and through it the involved Fire Departments;
- function of dispatch of a specific resource is possible starting from the request form and vehicles and teams are sent according to the request form and availability.

RETURN TO THE LIST OF INTERVENTIONS

1

2

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Support request

Nature of the Intervention

Operational units involved

Specific equipment request

Destination

New intervention - Support request

Intervention address

Date and time
Tuesday, 28 Jan 2025 13:44:14

Neighbouring country 1

Neighbouring country 2

City

Location

Address

Telephone number

GPS coordinates

SELECT LOCATION

Headquarter that received the call

☐ Torino
 ☐ SDIS-73
 ☐ Direzione Regionale Piemonte
 ☐ Test

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Support request

Nature of the Intervention

Operational units involved

Specific equipment request

Destination

New intervention - Nature of the Intervention

☐ Fire

☐ Forest
☐ Accommodation/Housing
☐ Light vehicles
☐ Heavy goods vehicles
☐ Industrial building
☐ Local/machinery/ski lifts
☐ Train
☐ Explosion

☐ Accident

☐ Motorcycle
☐ Car
☐ Heavy vehicles
☐ Dangerous chemicals involved
☐ Train
☐ Aircraft
☐ On the road
☐ Off the road
☐ In water
☐ In tunnel
☐ In the escarpment

☐ Rescue of persons

☐ In the mountains
☐ On snow/ice
☐ In water
☐ In avalanche

☐ Other types

☐ Landslide
☐ Flood
☐ Missing person search
☐ Release of dangerous substances
☐ Building collapse with people involved

☐ NBCR

☐ NR
☐ B
☐ C
☐ Explosive
☐ Altra richiesta specifica
☐ Malicious Act

Notes

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Support request

Nature of the Intervention

Operational units involved

Specific equipment request

Destination

New intervention - Operational units involved (Italy)

☐ Rescue team
☐ CRA/SUB
☐ PCA
☐ SAPR
☐ Medical Rescue

☐ USAR
☐ MMT
☐ AIB
☐ TAS

☐ SAF
☐ ACP
☐ SNOW
☐ IIR

☐ NBCR

☐ Detection and identification
☐ Sampling
☐ Hazmat containment
☐ Decontamination first

☐ NBCR
☐ Population protection
☐ Pollution recovery
☐ Decontamination population

☐ Analysis and identification
☐ Modelling
☐ Lab analysis

Units request

☐ Rescue team
☐ CRA/SUB
☐ PCA
☐ SAPR
☐ Medical Rescue

☐ USAR
☐ MMT
☐ AIB
☐ TAS

☐ SAF
☐ ACP
☐ SNOW
☐ IIR

☐ NBCR

☐ Detection and identification
☐ Sampling
☐ Hazmat containment
☐ Decontamination first

☐ NBCR
☐ Population protection
☐ Pollution recovery
☐ Decontamination population

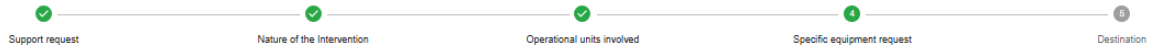
☐ Analysis and identification
☐ Modelling
☐ Lab analysis

Units request

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New intervention - Specific equipment request (Italy)

☐ APS	— 0 +	☐ ABP	— 0 +	☐ Carro autorespiratori	— 0 +
☐ ACT/BOSC	— 0 +	☐ APS bimodale	— 0 +	☐ Polisoccorso	— 0 +
☐ AG	— 0 +	☐ AS	— 0 +	☐ CA/BARCA	— 0 +
☐ Drago/elicottero	— 0 +	☐ AF/PCA – UCL	— 0 +	☐ AF/NBCR	— 0 +
☐ AF/USAR	— 0 +	☐ Carro luci	— 0 +	☐ AF/LOG	— 0 +
☐ BUS	— 0 +	☐ RI/MP	— 0 +	☐ MMT	— 0 +

Specific equipment request

New intervention - Specific equipment request (France)

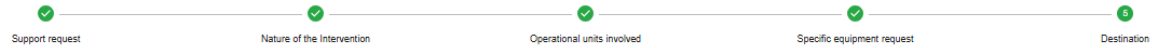
☐ APS	— 0 +	☐ ABP	— 0 +	☐ Carro autorespiratori	— 0 +
☐ ACT/BOSC	— 0 +	☐ APS bimodale	— 0 +	☐ Polisoccorso	— 0 +
☐ AG	— 0 +	☐ AS	— 0 +	☐ CA/BARCA	— 0 +
☐ Drago/elicottero	— 0 +	☐ AF/PCA – UCL	— 0 +	☐ AF/NBCR	— 0 +
☐ AF/USAR	— 0 +	☐ Carro luci	— 0 +	☐ AF/LOG	— 0 +
☐ BUS	— 0 +	☐ RI/MP	— 0 +	☐ MMT	— 0 +

Specific equipment request

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New intervention - Destination

Jurisdiction country

Jurisdiction country ▼

Headquarters

☐ Torino ▼ ☐ SDIS-73 ▼ ☐ Direzione Regionale Piemonte ▼ ☐ Test ▼

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Details

Headquarter

Name Direzione Regionale Piemonte
Street Strada del Baroccholo, 71/73 - 10095 GRUGLIASCO (TO)
Country Italy

Contacts

[+ ADD A NEW EMAIL](#)

Email	Actions
dir.piemonte.sofia@gmail.com	

[+ TELEPHONE NUMBER](#)

Priority	Number	Description	Actions
1	900	sala operativa Dir. Piemonte	

Users

[+ ADD USER](#)

Name	Email	Actions
Alessio Daniele	alessio.daniele@vigilfuoco.it	

Country list

[+ ADD](#)

Country code	Language code	Actions
IT	it	
EN	en	
FR	fr	

S.O.F.I.A. is a multilingual platform realised during the project phase in English, French and Italian, which can be implemented also in other languages.

The operator, after logging in, will view the pages in his/her own language.

Following an event, the operations room opens an emergency on S.O.F.I.A. platform, enters the human and instrumental resources sent and, if necessary, requests the operations room of the neighbouring country to send personnel and vehicles in support.

The login on the platform takes place with personal credentials so to track of the activities carried out, reported in a logbook.

With regard to CBRN interventions, these are detailed in two special areas in order to specify the nature of the intervention and the type of CBRN resource sent or requested.

A dedicated tutorial will be available at the end of OVERC.O.M.E. project at the following link: <https://prometheusproject.eu> section OVERC.O.M.E.

0.4 Prometheus CBRN

Prometheus is a Management System for the coordination of complex emergencies, aimed at information management and resource coordination.

Non-volatile information (e.g. radio or telephone), conveyed through digital forms, re-consultable, visible to all actors and in real time.

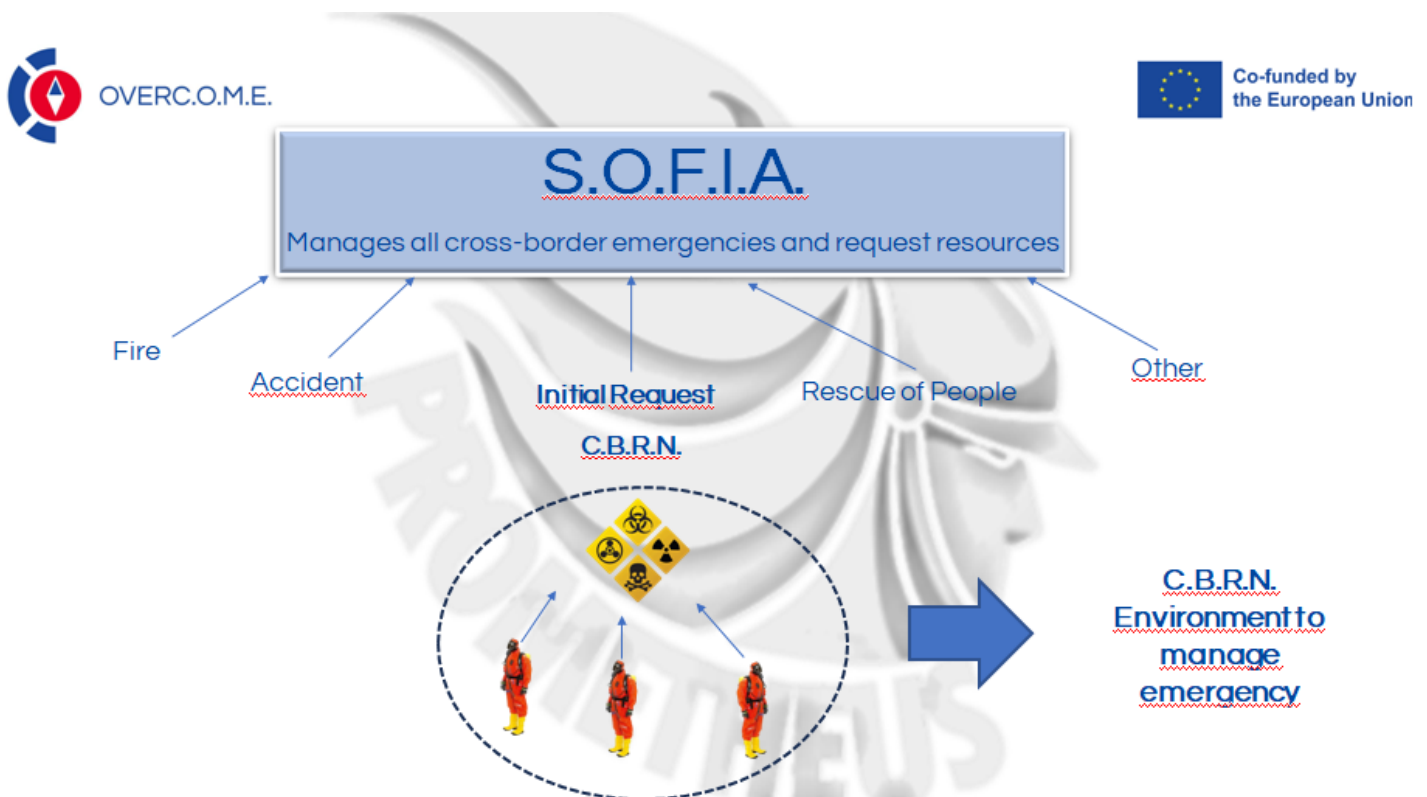
Display of deployed and deployable resources throughout the scenario with advanced map support.

Possibility of sharing general information via an internal Cloud.

The user who connects to Prometheus sees 3 access buttons, respectively to the USAR area, the CBRN area and the SOFIA area.

Access to one or more areas of the system depends on the user's account type.

If a CBRN intervention, opened immediately on SOFIA, is configured as a relevant intervention that cannot be managed with the present functions alone, an Emergency can be opened in the Specific CBRN area (Prometheus CBRN).



In detail, the following functions are present within the CBRN area:

- Management of all CBRN Activities;
- CBRN Teams Management;
- Cartography management;
- Assignment of CBRN teams to work areas;
- Data collection from the affected area;
- Cartographic evolution;
- Logistical requests;
- Situation Reports;
- Witness interviews;
- Injuries management;

- Automatic and manual logbook.

A dedicated tutorial will be available at the end of OVERC.O.M.E. project at the following link:
<https://prometheusproject.eu> section OVERC.O.M.E.

0.5 interconnection between S.O.F.I.A. and Prometheus

As mentioned above, if a CBRN intervention, opened immediately on S.O.F.I.A, is a relevant intervention that cannot be managed with the present functions alone, an Emergency in the specific CBRN area (Prometheus NBCR) can be opened.

It is configured as a hypothesis for the use of the systems, that the management of the CBRN event through the use of Prometheus CBRN, is carried out by the Command Post (CP) set up in the vicinity of the event while the request for further resources between neighbouring states is made through S.O.F.I.A. managed directly by the Operations Rooms of the countries involved.

0.6 Terms and definitions

Cross Border Event: a civil protection event occurring in a 20-25 km range from state border, relating to scenarios not exceeding 24/48h. It can be indirect or direct event and is assumed that the involvement of cross-border resources compared to domestic resources is more effective in terms of the protection of people, goods and environment.

CBRN event: an event that involve a chemical, biological, nuclear, radiological scenario

Cross Border intervention: a Cross border and CBRN event

Control Room involved: Control room located in the nation where the emergency scenario is running

Neighbouring Control room: Control room located in the neighbouring country where the emergency scenario is not running

0.7 Acronyms

BoO	Base of Operation
CBRN	Chemical Biological Radiological Nuclear
CP	Command Post
CNVVF	Corpo Nazionale Vigili del Fuoco
CWA	Chemical Warfare Agent
ERCC	Emergency Response Coordination Centre
HAZ-MAT	Hazardous Material
GC/MS	Gas Chromatography-Mass Spectrometry
GPS	Global Positioning System
ICS	Incident Command System
ICT	Industrial Toxic Chemical Compounds
INSARAG	International Search And Rescue Advisory Group
LEMA	Local Emergency Management Authority

PPE	Personal protective equipment
SAR	Search and Rescue
USAR	Urban Search and Rescue
VOC	Volatile Organic Compound
SOFIA	Operational Room France Italy Alpine Arch
SPME	Solid Phase MicroExtraction

Section 1 – Actors

The aim of this section is to identify the actors that can be involved during a transborder emergency followed by their description, functions and competences.

This section is divided into four parts:

- A– describing all the possible actors involved during a CBRN event during a transborder emergency;
- B - specific terms of references for the International Liason Officer and the interaction with the Command Post;
- C - description of the head of reinforcement team and head of the sector during a transborder emergency;
- D –brief description of the actors interacting using S.O.F.I.A., Prometheus CBRN and both of them.

Part A

**CONTROL ROOM - SALA OPERATIVA VVF – SALA OPERATIVA SAPEURS POMPIERS
SALLE OPERATIONNELLE VVF - CENTRE OPERATIONNEL DEPARTEMENTAL D'INCENDIE ET DE SECOURS**

Activities according to different phases:

PREPAREDNESS

- Inform neighbouring control room about resources available in case of event; usual general consideration, not each day;
- Check communication reliability and availability between all the actors involved according to specific procedures to agree and plan with the counterpart (e.g. 1 time a month to test reliability of communication systems).

RESPONSE – MOBILIZATION

Control Room involved:

- Receives the distress call and collects all the information necessary to define the scenario;
- In case of event, transfers the alert/warning state to neighbouring control room;
- In case of event, transfers the alert/warning state to government agencies and to hierarchical structures superior (Regional Directorate, National Operations Centre);
- Sends request form to the Prefecture to mobilize cross-border resources;
- Received the authorization from the Prefecture and superior hierarchical structures (Regional Directorate/National Operations Centre), sends the resource request form to neighbouring control room;
- Sends liaison officer to support incoming cross-border resources;
- Shares the useful information about the scenario to neighbouring control room in order to take on the external resources.

Neighbouring control room:

- In case of cross border event, receives the alert/warning state from the control room involved, confirming resources availability and reliability
- In case of event transfers the alert/warning state to government agencies and to superior hierarchical structures (Regional Directorate, National Operations Centre);
- Sends the request form to the Prefecture to mobilize cross-border resources
- Received the authorization from the Prefecture and superior hierarchical structures, notifies the resources mobilization to involved control room;
- Sends the Factsheet form of the incoming human resources and capabilities to dispatch to the affected neighbouring country.

RECOVERY – DEMOBILIZATION – LESSONS LEARNED

- Notifies to government agencies and to neighbouring control room the end of operations;
- Notifies external resources mobilizations;
- Is involved in intervention debriefing.

EMERGENCY MANAGEMENT - DTS (DIRETTORE TECNICO DEI SOCCORSI COMANDO PROVINCIALE VIGILI DEL FUOCO) – COMMANDANT DES OPERATIONS DE SECOURS - COS (DIRECTEUR DU SERVICE D'INCENDIE ET DE SECOURS)

Activities according to different phases:

PREPAREDNESS

- plans activities and revise, if needed, emergency plans;
- joins regular meetings in order to update bilateral procedures/agreements;
- organises joint training according to the needs and manage the procurement activities to upgrade and maintain tools and equipment;

RESPONSE – MOBILIZATION

- in case of possible cross border event is informed by the involved control room and decides if it is necessary the request of external resources;
- establish the necessary resources;
- manages the emergency scenario and coordinates all the resources involved (internal and cross border);
- Implements operational action plan, logbook, report plan and information management plan
- organizes and manages operational meetings (e.g. debriefing meetings and reports);
- establishes communication modalities;
- mobilizes resources;

RECOVERY – DEMOBILIZATION – LESSONS LEARNED

- defines the end of operations and informs the control room;
- manages operation debriefing.

LIAISON OFFICERS OF THE CBRN TEAM - UFFICIALI DI COLLEGAMENTO DEL TEAM CBRN - OFFICIER DE LIAISON

Responders, alerted by his/her control room, dispatched to the affected State. L.O. of the CBRN Team acts as reference for incoming cross border resources, manages operational and logistic needs and facilitate communications with the host nation affected by the emergency, supervising information exchange and making coordination smooth.

POLICE - FORZE DI POLIZIA - GENDARMERIE

Located in safe area, it patrols the scenario's area and carries out its own procedures in compliance with what established by fire fighters and governmental agencies.

MEDICAL EMERGENCY UNITS - SOCCORSO SANITARIO - SECOURS D'AIDE MEDICALE URGENTE

Acquired the necessary information, they identify the available resources to respond properly. The staff in site intervene if required in safety conditions under fire fighters' instructions. They wear proper PPE (Personal Protective Equipment) depending on the activity to perform within the scenario and properly addressed by responders

NATIONAL OPERATIONS CENTRE - CON: CENTRO OPERATIVO NAZIONALE – COGIC: CENTRE OPERATIONEL DE GESTION INTERMINISTERIELLE DES CRISES -

It collects information about the intervention, prepares communications at high strategic level. It monitors the necessary resources in order to provide additional specialist support. It validates

important reinforcement also in relation with the ERCC (European Response Coordination Centre), if the magnitude of the event exceeds the national resources.

REGIONAL CONTROL ROOM - SALA OPERATIVA DIREZIONE REGIONALE (SOR) -CENTRE OPERATIONEL ZONAL (COZ)

It collects information about the intervention, prepares communications at a high level to inform CON/COGIC. It monitors the necessary resources in order to provide additional specialist support at a zonal/regional level

LOCAL, PROVINCIAL, NATIONAL CIVIL PROTECTION SYSTEM – SERVIZIO DI PROTEZIONE LOCALE, PROVINCIALE E NAZIONALE - ASSOCIATIONS AGREES DE PROTECTION CIVILE

Gives operating and logistic support if required by the emergency management and performs activity in the medium and long term after the emergency (food supply, stockpiling of supplies vital to the affected population, psychological and counselling support, temporary schools, ...)

PREFECTURE - PREFETTURA ITALIANA – PRÉFECTURE FRANÇAISE

Authorizes cross-border resources mobilization at the very moment of the request. If necessary, it declares the state of the emergency. It interfaces with neighbouring Prefecture in order to ensure the complete operability of the actors on site, facilitating the effectiveness of cross-border intervention.

FIRE DEPARTMENT - COMANDO VIGILI DEL FUOCO - SDIS (COMMANDEMENT)

Activities according to different phases:

PREPAREDNESS

- plans activities;
- attends regular meetings in order to update bilateral procedures/agreements;
- assess training joint needs;
- guarantees vehicles and equipment availability and reliability;

RESPONSE – MOBILIZATION

- guarantees resources availability and reliability;

RECOVERY – DEMOBILIZATION – LESSONS LEARNED

- manages intervention debriefing.

Part B

The role of the Liaison Officer and the Command Post

The aim of this section is to describe the role of the Liaison officers and the functions of the Command Post within the framework of a cross-border emergency where the affected country activates, depending on the level of the emergency, a Host Nation Support (HNS) Cell.

To ensure proper HNS in case of a disaster, the affected country should consider setting up/integrating national arrangements to allow international emergency support.

Emergency management actors should be identified and made aware of their responsibility in the different phases of HNS especially such as:

- preparation of country briefings and initial orders for incoming teams;
- identification and training of liaison officers (LO) to join the incoming team;
- setting-up and training of HNS team/cell providing logistical support and facilitating custom and border crossing procedures;
- setting-up of a Command Post where the Incident Commander manage the on-going emergency and deliver briefing to incoming teams, dispatching them on-site;
- closure of the emergency gathering all the relevant information to inform key-role actors in order to quickly get to the recovery phase.

Finally, the emergency management should receive proper hand-over procedures after demobilization of teams requested by the affected country.

ROLE OF THE L.O. OF THE CBRN TEAM

The Liaison Officer (LO) is a responder that acts as a reference for the team of the other State involved, in order to manage operational and logistic needs, facilitates communications between the two parts involved in the emergency (the one affected and the one assisting) and decision making between the two parts, supervising information exchange, harmonize the actions from different actors and make coordination smooth.

LO. of the CBRN Team main tasks:

- assisting the Team Leader on command team operations ;
- ensuring coordination of teams facilitating the decision making process within, for instance, the Command Post;
- monitor of progress of the CBRN capacity results and outputs to refer to the Team Leader and the Host Nation LO;
- facilitate and find solutions on specific issues raised during deployment (i.e. logistics, procurement, political, bottlenecks in implementation, project management compliance, etc.);
- communicate clear instructions to team members in order to fulfil the CBRN mission;
- obtain and coordinate space, furniture, equipment, and internal and external communications for the CBRN emergency on-going;
- Take and keep contact with the Liaison officer in charge of other nations, taking part in meetings, for instance, at the Command Post office;
- provide status reporting of team activities with respect to the program plan or schedule;

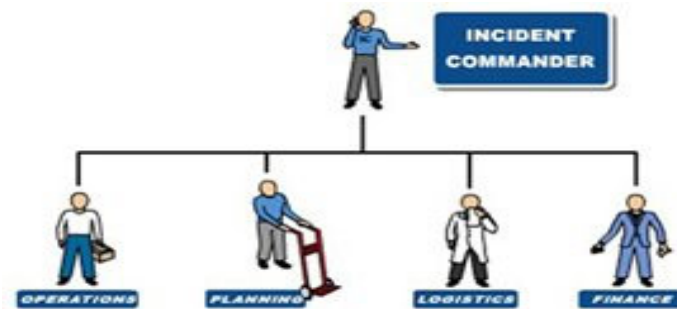
- Filling of all relevant documentation about the mission requested;
- Collect team logistic and operational needs, if the CBRN mission gets prolonged;
- Update his own control room and organization from the beginning to the end of the mission, also using proper software and applications.

LO. of the CBRN Team skills and capabilities:

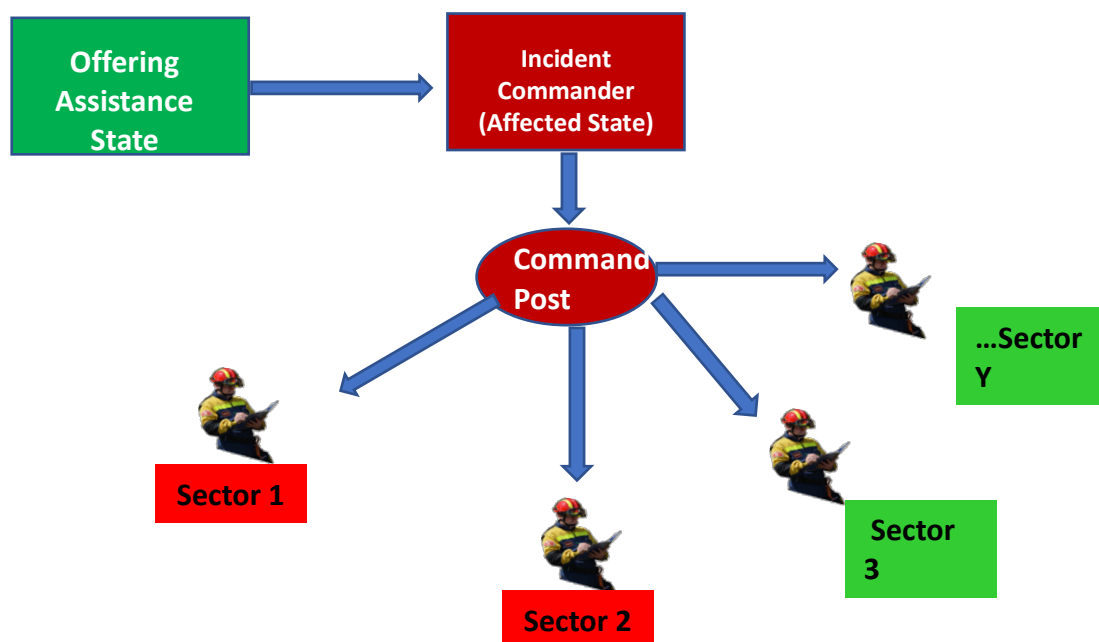
- Trained and informed on HNS system;
- Skilled on CBRN;
- Language skills;
- IT skills (e.g. SOFIA and PROMETHEUS knowledge);
- Preferably trained and informed on EU CP Mechanism.

CP – Command Post

The Command Post is in charge of administrative, planning (collect and analyse information, foreseen future situation, share information), command (give orders and follow the achievement of the tasks) and logistic functions following the internal specific procedures of the affected country (e.g. ICS system), where the LO of the CBRN Team has an important role in supporting the incoming teams.



The command post has the task to collect data and report to its own hierarchy, to disseminate information to media. In addition, the CP has got a specific role in a multi-agency activities where, during an emergency, has to identify, address, dispatch and monitor "ad-hoc" resources.



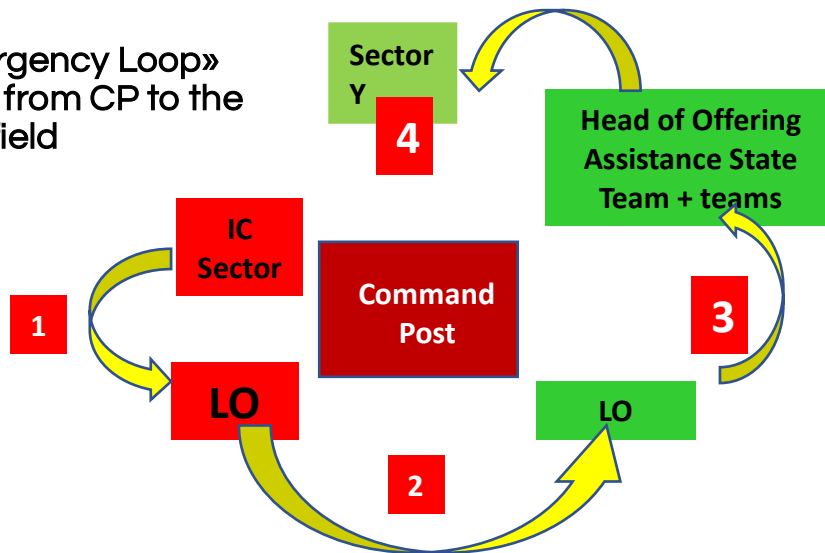
The Command Post may not be established in any emergency event because a certain number of human and logistical resources are required in a short time. For this reason, emergency could be classified referring to event's magnitude, and in order to define the kind of response, this could be classified, for example, as follow:

- basic/light: CP is not strictly required, CP's functions are in charge to the emergency coordinator (e.g. DTS in Italy and COS in France);
- intermediate/medium: CP is mandatory and the affected State L.O. of the CBRN Team is part of it, sharing information between the Support State Team and CP;
- advanced/heavy: Different Command Posts could be present, dividing the area in different sectors.

Once the CP is established, it is important to define how the information is conveyed to the teams employed in the field and, vice versa, how the on-field teams can report to the Command Post, avoiding communication errors as much as possible.

In order to achieve this point and obtain a standardization of communication, it should be used an "emergency loop" method, as shown in the following schemes:

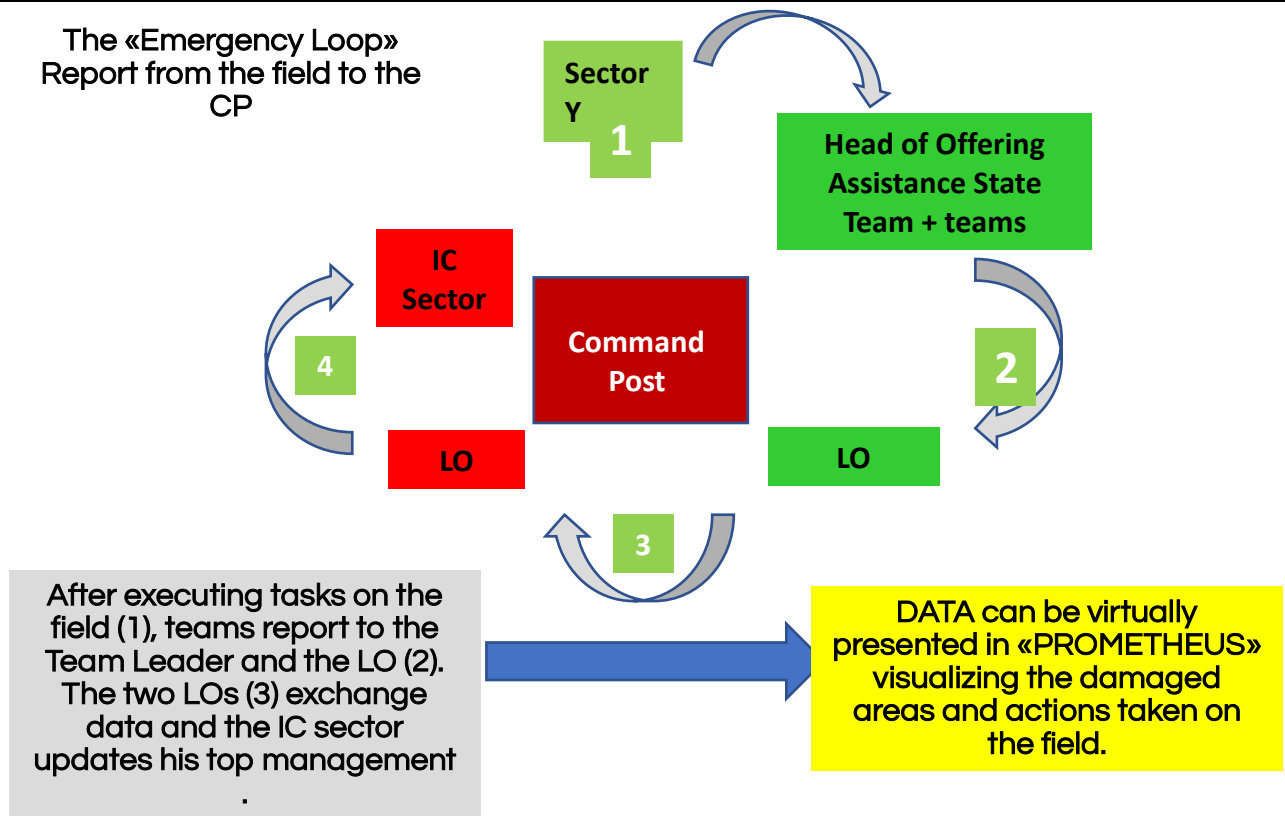
The «Emergency Loop» Information from CP to the field



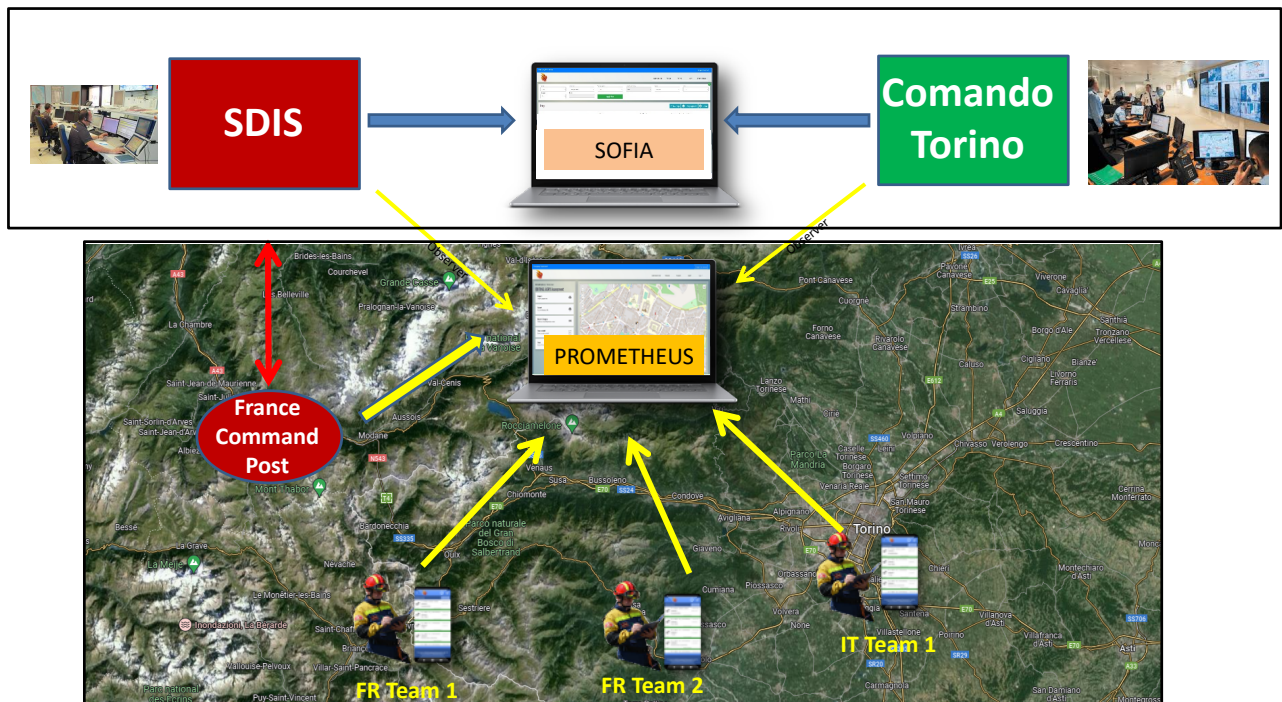
How Offering State receives tasks, instructions:
initial briefing (1) «translated» to the LO (2) communicated to teams (3) and dispatched on-site (4)

After point 4, a new «loop» can start...depending on the scenario evolution and mitigation actions

The «Emergency Loop» Report from the field to the CP



The emergency loop can change according with the emergency level, paying attention to use “neutral” words that can be understandable for both organizations.
A software information sharing system like Prometheus, customised to reduce misunderstanding and overcoming language barrier as much as possible as well as enhancing coordination during the emergency.



Part C

The head of reinforcement team and the head of the sector during a crossborder emergency

In order to ensure optimal collaboration and coordination between the rescue teams of the State affected by the emergency event and the rescue teams from the neighbouring State, it is appropriate that the foreign team is correctly inserted within the existing chain of command.

In fact, each State has its own response structure with respect to emergencies that may occur, in order to guarantee an appropriate intervention taking into account the magnitude of the event, the vulnerability of the area and the resources available. This also allows for the optimal transmission of information, organisation of operations and the establishment of an appropriate chain of command.

This “arrangement” permits to have a fluid, secure and reproducible organization of command on an intervention site. Typically the chain of command adopted is of a pyramidal type and the response system is of a modular type, increasing with respect to the magnitude of the event or vulnerability of the area. The French intervention scheme is attached to this document as a useful example.



In the event of a cross-border emergency, the liaison officer of the affected state will be responsible for ensuring the inclusion of the cross-border team within the response scheme as well as the correct transmission of information, with reference to the emergency loop previously described.

Part D

Actors interacting with S.O.F.I.A., Prometheus CBRN and both of them

S.O.F.I.A. is dedicated to the staff of the operational room of the Department/Commands/Countries involved. After logging in with a personal account, the control room opens a new intervention when an event occurs in an area close to the border between two States. The communication exchange as well as the alerts can be also merely informative therefore not generating a request of support.

The activation of the CBRN area in Prometheus is decided by the Department/Command when a significant transborder event occurs and the management goes beyond S.O.F.I.A. tasks.

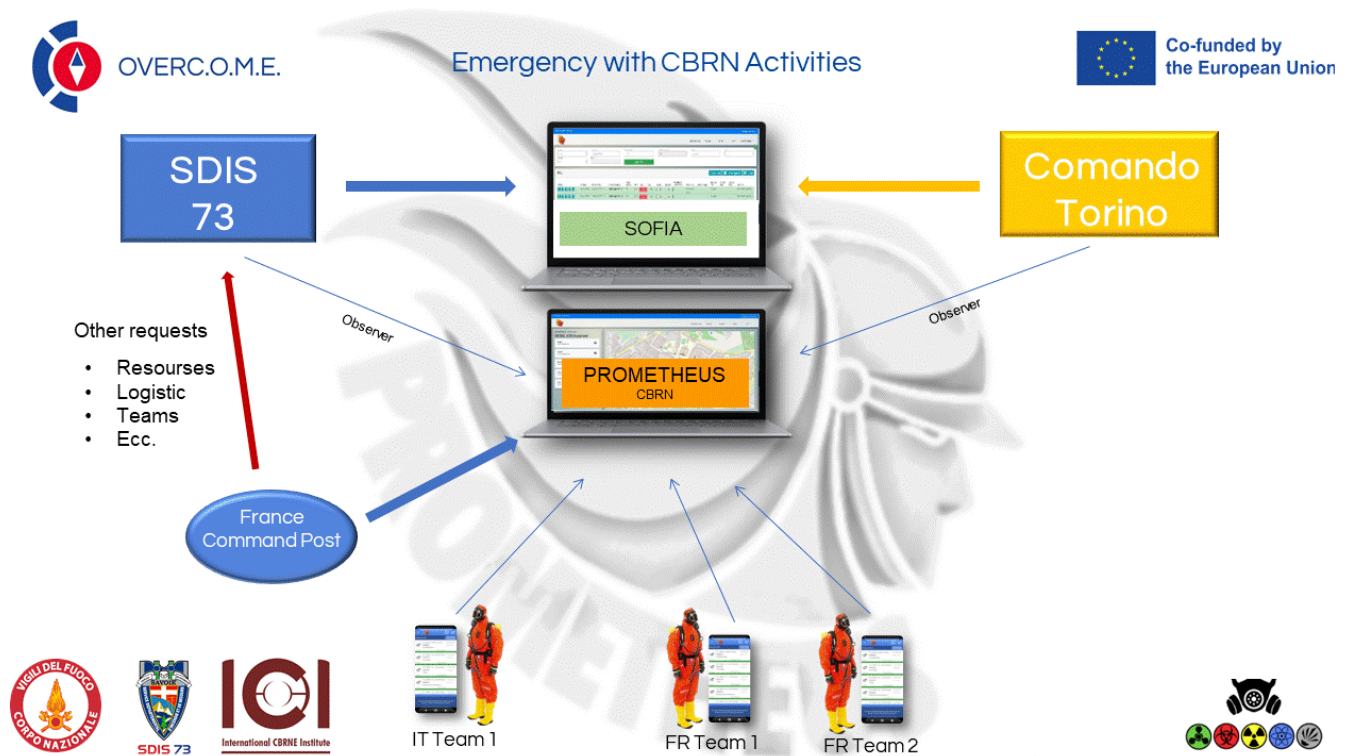
The management of the area is under the established Command Post (CP), which can be created virtually until the on-site coordination resources reach the area.

The operators manage the teams arriving or already on site according to their characteristics, under the instructions of the CP manager, assign tasks and analyse the information arriving in Prometheus from the assigned teams by filling in forms in the app.

The operators request new resources through the operations room of the competent Department/Command/country to carry out the intervention.

It remains the prerogative of the operations room of the competent Department/Command to communicate and make requests to the peer entity of the other State involved through S.O.F.I.A.

The communication flow is the following:

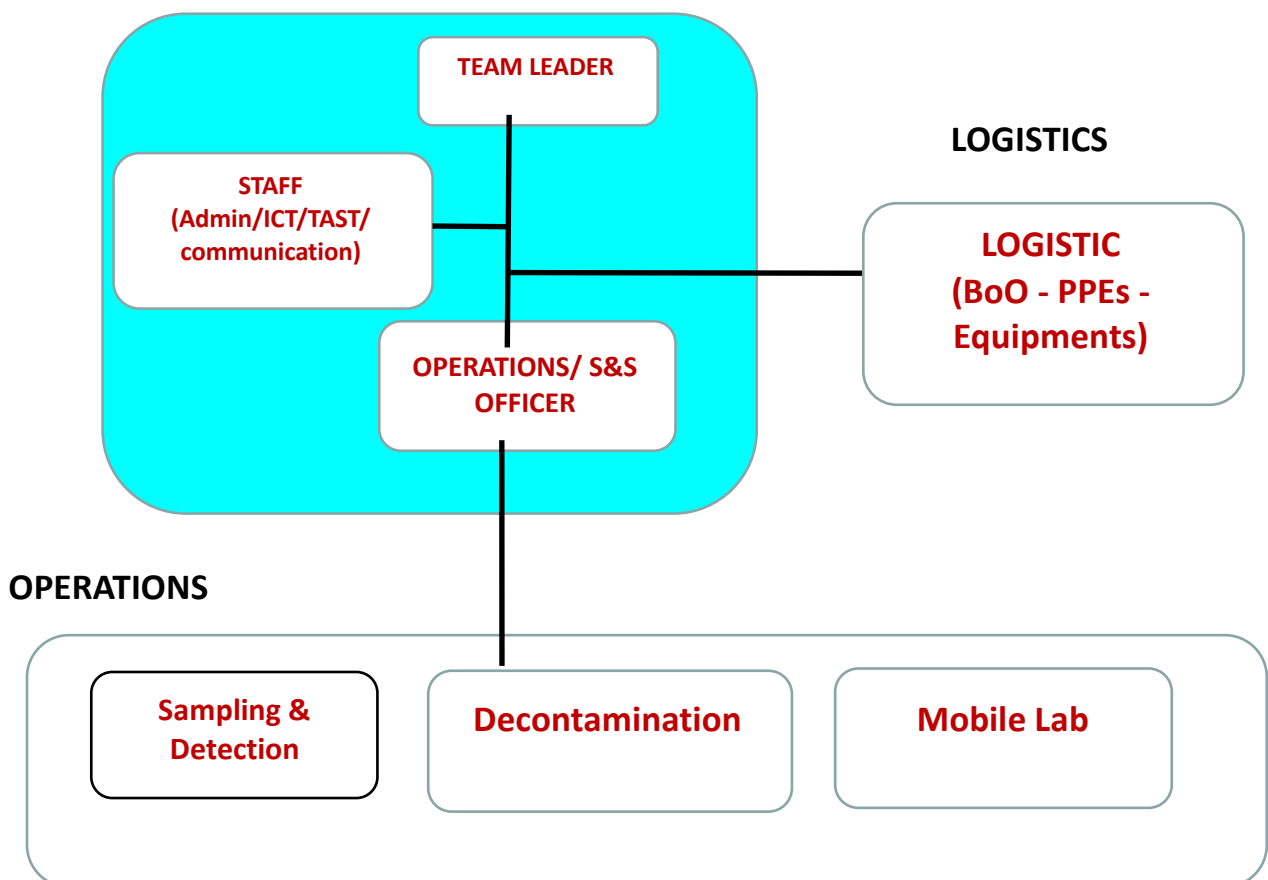


Section 2 – Team Composition, Equipment and Tools

The aim of this section is to identify the minimum level necessary for CBRN teams. Similar training and similar device provided to teams can produce a good response level in case of working 'together' during emergency.

A possible distribution of tasks within a team for a cross-border emergency intervention is the one indicated in the following diagram:

MANAGEMENT



The numerical consistency of the team can vary depending on the type of scenario. Logistics may or may not also be present depending on the scenario envisaged by the cross-border emergency and the assumptions of its duration.

The team also has the possibility of setting up a coordination centre for the intervention in order to guarantee the following functions:

- Coordination of intervention teams (local operations room);
- Daily report of the progress of the intervention activity;
- Collection of all analysis reports and modeling/forecasting activities;

- Information management activities;
- Management of relations with the media.



In the list below, we define proper equipment and tools, updated with the “state-of-the-art” involved during a transborder emergency:

- TRAINING ACTIVITIES
- PREPARDNESS
- RESPONSE
- SAMPLING
- DETECTION
- MODELING
- DECONTAMINATION
- STABILISATION – RECOVERY.

2.1 Training activities

The training activity is important to be able to achieve mutual knowledge between the teams that allows them to work together. It is not always possible to have teams working with the same methodologies or with the same equipment, but what is important is that each team knows the ways the other works in order to be able to organize itself to form a team capable of working in a complementary way.

Below is a list of the activities:

- Training activities on equipment and tools to use during a cross-border intervention;
- Updating of the equipment available during the annual meeting;
- Perform almost 1 exercise per year to test a cross-border scenario.

The results of the training activity must lead to:

- Perform how to analyze and communicate results;
- Update on results management (phase 3 operational).

2.2 Preparedness

The preparation phase includes all activities related to the preparation of the team, in a context where a possible cross-border emergency could occur:

- Activation mode among two or more Countries;
- Methods of information about the type of event possibly using management data software presented here in these guidelines and specific training to handle softwares;
- Methods of direct contact between the emergency manager and the team leader of the intervention team;
- Access routes to the intervention area in a cross-border scenario;
- Knowledge of the territory and its criticalities/risk situations.

2.3 Response

The following activities are present during a CBRN response phase:

- Reconnaissance and zoning, involving actions like: evaluation of non CBRN hazards; information collection and reflex cordon;
- Detection and monitoring, having as activities: CBRN materials presence of danger measurements and later confirmation; CBRN materials presence measurements confirmation. Cordon definition/adaptation upon measurements distinguishing: high danger internal areas and presence of volumic contamination confirmation (dust/gas) and further concentration/activity evaluation;
- Sampling, having as activities: Samples collection; Surface contamination concentration/activity evaluation and types of CBRN materials identification and related emitted R-sources;
- Analysis and identification;
- Modelling (dispersion);
- Population protection considering actions like: cordons deployment and area access control; Search and rescue; Extraction of immediate threatening risks on people; Gathering; Sheltering; Evacuation; Sorting of victims (first aid sort; medical sort; first aid treatment; (para)medical treatment; Public registration; Evacuation to hospital(s) / information of hospital(s) and advice for further needed actions to follow;
- Fight and react against the effects of the CBRN event considering actions like: Contamination spreading prevention/leakage stopping and hazmat containment; Recovery of pollution; hotspots location; neutralization/recovering of sources, drums; contamination

recovering/decontamination; source transportation to a secure area; Equipment and vehicle contamination inspection and decontamination.

- Decontamination

people and mass decontamination (in the very first stage of the emergency, then to delegate to the Health service). Some countries have some differences on who is delegated to provide mass decontamination (First responders, health service, identified organization defined on specific agreement/protocol) .

Besides, as for radiological decontamination this mainly can be afforded by responders, considering actions like: measurement sort (Count rate screening or, at least, dose rate screening) ; dry decontamination (field decon); wet decontamination (full decon); post decontamination control (Count rate screening or, at least, dose rate screening) (efficiency of decon).

Furthermore, it is essential to keep Public registration on decontaminated, sorted victims and the following addressing to hospital(s), previously informing interested hospital(s).

- Protection and Decontamination of responders and actions like: self-protection advice application (time, shielding, distance, internal contamination prevention, limit values, ...); proper PPE (protective suit and mask) wearing; dosimeters use; rescuer contamination control (PPE and Body) and Responders' decontamination followed, if needed, dose management and (Para)medical support.

Finally, as far as Law enforcement/investigation actions are concerned some Countries provide this service to the Police forces and first responders can facilitate and support activities like: Security at facilities/areas outside the security perimeter; Security at public registration, monitoring / decontamination, triage/first aid areas and during transport to hospital; Preservation of evidence; establishment of a temporary morgue area and securing police equipment including weapons.

2.4 Sampling

One of the most important CBRN capability is the sampling, useful for field and laboratory analyzes with the aim of detecting CBRN materials. The Composition of the sampling team and related tasks, the coding to be used for the samples, the instrumentation supplied with the sampling team and the sampling procedure could be different with respect to the emergency service organization.

Regardless of the type of sampling carried out, it is quite important that each sampling point is dated, and geolocated, via GPS.

Also, always photograph the pick-up point. At the end of the operations, proceed with the decontamination of the samples, leaving the red zone and send them to the laboratory in a temperature-controlled environment.

Write on the sampling form (see Sampling Form in Prometheus System) the identification number of the container, the SPME fiber or the Tedlar bag in order to maintain a unique link between the samples and the relative form.

2.5 Detection

The detection activity is very often accompanied by sampling, both because some field instruments supplied to the staff require a sample for their use, and to carry out any more accurate analyses at the chemical laboratory, as well as a matter of repeatability of the test.

Sampling and detection team's composition and related tasks and instrumentation supplied to the support team will then be described below, for each of them it will be specified what it can receive as input (molecular aggregation state of the substance), the alphanumeric coding of any sample as input to the instrument, its operation and the output results.

For a more correct and complete instrumental measurement campaign, before carrying out each survey, make a measurement of the meteorological values (wind direction and intensity, temperature and atmospheric pressure).

SAMPLING AND DETECTION TEAM COMPOSITION

Each country, depending on their procedures or mandate, presents a minimum number of CBRN trained people to carry out sampling and detection team composition. As for team composition, we can consider, single scenario, a minimum of 3 operators (to a maximum of 7 operators) CBRN trained. The minimum tasks are as follows:

- n. 1 operator collect the samples/ take measures (detection);
- n. 1 operator: collaborates in the sample collection without coming into direct contact with the sample, prepares the materials supporting the sampling and uniquely codifies the sample. Collect measures (detection);
- n. 1 operator verifies the safety of the site, checks the correct application of procedures, collects and records output data related to sampling and maintains radio contact with the operations manager.

Above all, when we consider a large number of CBRN skilled operators (e.g. 7 operators or more), depending on the situation (radiological and chemical scenarios) we need to take into account - having already evacuated, inspected and decontaminated people involved in dangerous areas - these missions:

- assessment, search and characterization of the risk;
- localization of the hazard origin;
- marking out of the dangerous zones;
- search and recovery for sealed sources or chemicals;
- search for contamination on the ground and in the air in the « soiled zone »;
- cut off and parting samples to perform analysis in more than one laboratory.

In addition to CBRN paths dedicated to rescue and evacuate the population involved.

In order to carry out the actions before mentioned, responders must protect themselves with proper suit and use specific pieces of equipment like, for instance: anti-contamination protection suit, made up of 2 layers, gas or liquid tight; filter masks and breathing apparatus with spare air bottles, filters; pliers and test tubes allowing taking samples; polyethylene rolls and bags to contain contamination and to recover the soiled material and marking material.

Below some pieces of equipment for radiological and chemical scenarios are presented:

+ Radiological:

- count rate meters (counts per second) to find sealed sources or contamination;
- dose rate meters (dose rate and dose) to warrant security of these two men;
- individual electronic dosimeters;
- mobile photons spectrometers allowing the identification of the radioactive elements;
- lead boxes and lead shields insure the seclusion of the irradiant sources;
- pliers.

+ Chemical:

- colorimetric tubes and special colorimetric tubes for thioether (yperite), hydrocyanic acid (tabun), hydrofluoric acid (sarin and soman), ammonia (VX), phosphoric acid (neurotoxic)
- explosimeters, oxymeters;
- pH meters and thermometers;
- electrochemical detectors for a few acids, ammonia, chlorine, etc...;
- infra red detectors;
- detectors of CWAs (sulphur yperite (mustard gas) and phosphorus, in the shape of liquid or vapor, suffocating, neurotoxic or bloodtoxic gas, ...);
- kit for detection of gaseous neurotoxics;
- paper for toxic liquids detection;
- hydrocarbon containment equipment and related parts like: anti-deflagrate pumps; plug hole obturators; pliant tanks and special barrels and foam or absorbent substances.

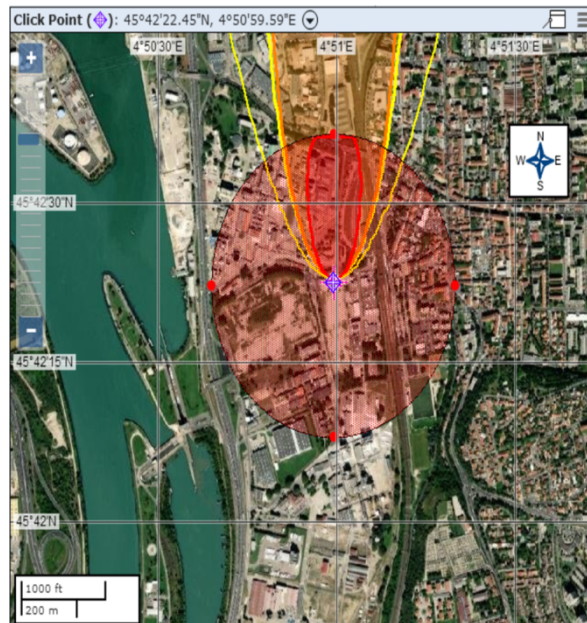
Finally, it is important to have a proper logistic to perform decontamination for responders and people, like: mobile containers rapidly to deploy on-site having, as an example, lines for invalid and valid persons/responders.

2.6 Modeling

The modelling activity is preparatory to the activity related to the protection of operators and the population. It allows you to make a simulation of the scenario forecast and is particularly useful in cases of relevant scenarios capable of generating spillovers on large portions of territories. In addition, the

forecasting system can also be used in the case of scenarios that present significant environmental risks.

The team has software that can generate case predictions of chemical and radioactive releases with identification of isodose levels.



The team has the following modeling software. The software is also present within the Prometheus CBRN software.

ALOHA stands for the Areal Locations of Hazardous Atmospheres. It is a computer-modeling tool for estimating the movement and dispersion of hazardous chemical gases. ALOHA can predict the rates at which gases may escape into the atmosphere from broken gas pipes, leaking tanks, and evaporating puddles. Then, it can predict how a hazardous gas cloud might disperse in the atmosphere after an accidental chemical release. A great advantage in using ALOHA is that it is easy to use and distributed widely.

HOTSPOT is a Health Physics code developed by the Lawrence Livermore National Laboratory (LLNL) and designed for short-term release duration. HOTSPOT uses a modified Gaussian plume model to simulate the release of radioactive material in the atmosphere. It is a fast and field-portable set of software tools, useful in an emergency and unplanned situation.

ANALYSIS

The analysis activity is conducted within the chemical/radiological laboratory. The need to use these laboratories repeatedly to carry out field measurements arises. If it is necessary to carry out specific investigations or if the contaminant is not detectable through field equipment. The laboratory can be mobile (following the intervention teams) or fixed within the Fire Brigade Command. The analysis times are

normally longer than field analysis and normally not less than 2 hours (time for transferring samples to the laboratory, analysis and production of the report).

The identification of toxics and radionuclides is based on various technologies:

- Infra red;
- Fluorescence and Raman spectrometry;
- Gas chromatography;
- Gamma spectrometry.

The instruments could be handled or moved on field-laboratory. Some of this instruments could give automatic results but, due to the high skill requested, results are validated by expert in order to prevent false positive.

Instruments' details are reported in the annexes of the section 2.

2.7 Decontamination

Decontamination is the method that allows you to limit the exposure of people and prevents you from limiting contaminated areas to red zones only. It therefore represents a fundamental activity in the field of NBCR intervention. Decontamination is carried out with different techniques in both the chemical and radiological fields.

Decontamination procedures can be applied to personnel, vehicles and instrumentation and in general to everything that is introduced for the need to intervene within the red zone.

Radiological decontamination of responders

"Radioactive contamination" means the spreading of a radioactive substance in the form of dust, particulate matter, liquid, gas or vapour into an environment or on a surface or matrix or finally on an individual. In an operational situation where there is the presence of radioactive material, contamination of personnel, vehicles, equipment may occur; When radiation sources in the environment are sealed, contamination generally does not occur. The demarcation of the red zone includes contaminated areas.

Anyone leaving the "red zone" as well as any material, object or vehicle must normally be monitored for contamination control; Depending on the outcome of the monitoring, decontamination may or may not be carried out.

Field decontamination aims to:

- limit the spread of radioactive contaminating material beyond the red zone;
- reduce exposure to contaminated people.

Talking about tosecond aspect, is important to underline that only extremely high contamination can produce immediate effects (burns) and thus be perceived by the contaminated subject.

Monitoring phase is extremely important in the event of radioactive decontamination, it allows you to operate selectively (only on those who are actually contaminated and only in the areas of the body that are actually contaminated). In the end, radiological decontamination is only aimed at removing the contaminant and not at "neutralizing" it.



Chemical decontamination of responders

"Chemical contamination" refers to the spreading of a chemical in the form of dust, particulate matter, liquid, gas or vapour into an environment or surface or matrix or finally onto an individual. In an operational situation where there is the presence of chemical material, contamination of personnel, vehicles, equipment may occur; When radiation sources in the environment are sealed radiations generally does not occur. The demarcation of the red zone includes contaminated areas.

Anyone leaving the "red zone" as well as any material, object or vehicle that is taken out of the red zone must normally be monitored for contamination control; Depending on the outcome of the monitoring, decontamination may or may not be carried out.

Field decontamination aims to:

- limit the spread of chemical contaminating material beyond the red zone;
- reduce exposure to contaminated people

With regard to the second aspect, it should be noted that only an extremely high level of contamination can produce immediate effects and thus be perceived by the contaminated subject.

Wet "primary decontamination", verification of contamination levels, removal of PPE, re-verification of contamination levels, possible "secondary decontamination".

Eventually, a decontamination can be accomplished in several ways, depending on the hazard. Typically, it consists of a dry decontamination, such as adsorption, brushing and scraping, are useful alternatives for physical radioactive contaminated particles while for chemical and biological agents a wet decontamination in which the individual is flushed with water to remove or dilute the contaminant, considering the agent's reactivity with water and its solubility.

Personal Protective Equipment for operators

Operators that decontaminate should wear Category/level 4 coveralls with respiratory protection with self-protector or filter mask depending on the estimated risk of spreading contamination.

In case of rain, the fire protection suit can be worn over category 4 suits.

Some differences and the need for comparison between French and Italian procedures have been identified on this aspect; more details will be provided in the second draft of the document after the first testing exercises.

Notes on equipment decontamination

The equipment (measuring instruments and so on), vehicles and materials used in the red zone must be monitored when leaving the zone.

Contaminated material/tools/vehicles during the control monitoring can be decontaminated by washing with water, soap and possibly brushes, taking care not to spread the water used for this operation (also consider the possibility of immersing objects in water). Water should be retained.

All contaminated items for which it is not convenient or appropriate to proceed directly to decontamination must be bagged if possible and, in any case, catalogued and stored in such a way as to avoid spreading contamination.

Mass decontamination

Indeed, as surprising as it may seem, the problem of the complete care of a large number of infected people is relatively recent. Two types of decontamination currently exist:

1 – mass decontamination, which could be described as "rough", particularly in the armed forces, where the desired effect is to send personnel back into combat as quickly as possible and where, because of the protective clothing used, the effectiveness does not need to be optimal. The number of people assigned to operations is reduced while the flow of people to be decontaminated is significant;

2 – "fine" decontamination developed in certain hospital or occupational medicine departments where total efficiency is sought. The number of people assigned to each contaminated person can reach ten and the decontamination time is often in the order of half an hour.

The mobile decontamination unit permits to decontaminate efficiently a flow of few dozens of peoples. The configuration is adaptable to the situation of population that must be take in account:

- two disabled lines;
- or one disabled line and two valid lines;
- or four valid lines.

2.8 Stabilisation - Recovery

The missions of the emergency services do not include returning to normal. They are simply about securing and stabilizing a situation in order to allow the action of the building and environmental decontamination services.

However, after emergency, equipment and specific instruments requires ordinary or extraordinary maintenance. In some cases, some pieces of equipment need to be delivered the manufacturing company to be restored and/or reconditioned.

It is opportune to consider also the adequacy of specific tools and equipment and to change them if are not proper for the emergency.

Section 3 - Operational Phases

With reference to this section and starting from possible scenarios, aspects and phases to consider during trans- border emergencies are as follows:

- Preparedness;
- Response;
- Recovery;
- Mitigation/Lessons Learned.

3.1 Preparedness

This phase is the time frame of operational stages between the end of a rescue mission or emergency and the start of a new one.

In this phase, the CBRN personnel undertake all the actions aimed to ensure the state of maximum preparation and readiness for deployment or get dispatched in case of an emergency activation. Each country informs the neighboring control room about the resources that are available in case of cross-border event. Moreover, must be performed a communication check about all the actors that can be involved in case of activation.

Within this framework, it is important to train personnel, to practice and get familiar with activities and procedures, as well as operating methods for cross-border working teams with expertise in certain areas (e.g. detection). This way, it is vital to arrange exercises with teams at the borders trying to improve, day by day, coordination and cooperation.

For instance, in a preparedness stage it would be necessary to foresee a table-top or a field exercise with the neighboring Country making it possible to play it on different levels (operationally, tactically and strategically).

3.2 Response

Recognizing that a CBRN incident has or may occur is critical. The affected Country after receiving this information will disseminate or inform about the incident via several routes, including, if we cover the Civil Defence framework, malicious acts, intelligence agencies, public and emergency service control rooms. The involved Control Room will get in contact with the neighboring country in case it is possible a cross-border intervention. First responders will take advantage of pre-determined risk information contained in operational response plans, labeling of hazardous substances and transportation containers, if the incident covers this situation and, later on the spot, will observe signs and symptoms from victims, animals, plants or the environment; this to better evaluate the occurring scenario.

A first approach to the scenario will consider a proper use of PPE (Personal Protective Equipment), based on a first assessment provided by CBRN experts, to dress in specific zone. This will be better explained in the CBRN detection paragraph.

The emergency scene should be isolated to mitigate any consequences. Effective “Hot-warm-cold zones” managements required to control access to and from the incident scene, control the movement of contaminated or not contaminated victims, provide working methods for responders and contain the release of any substances.

Saving of life is the first priority of all responding agencies. Contamination of victims/casualties must be considered as part of the initial assessment and an effective method for rescue, decontamination and medical treatment must be provided. The provision of timely warnings and/or evacuation of the public where appropriate, may also contribute to the saving lives by reducing the risk of exposure.

Following the immediate operational response, specialist advice should be sought to assist with consequence management. This may include hazard identification or confirmation, establishing levels of contamination.

In case of cross-border CBRN event, the support team could be involved in essential activities as follows:

- Saving people in a CBRN environment (if there are people still involved);
- Reconnaissance and zoning;
- CBRN Sampling;
- CBRN detection (hand-held or stand-off devices);
- CBRN Analysis (field laboratory or fixed one);
- Containment of dangerous substance spills and further transfer in vessels (if needed);
- Chemical and Radiological Dispersion modeling and prediction;
- CBRN Decontamination and support for people and mass decon.

Results from previous actions could provide information about treatment of casualties, how to better define contaminated areas and provide forecast/prevision activities, in the very first moment of emergency, to help Authorities for the decision making-process.

ZONING

Zoning is the first procedure to perform once the on-field teams arrive at the scenario and the scope is the delimitation of dangerous areas in order to protect people and first responders themselves.

For these reasons, hot, warm and cold zones are established to provide areas for functions as decontamination and support operations and to define the necessary protection in order to guarantee a safe access into the area.

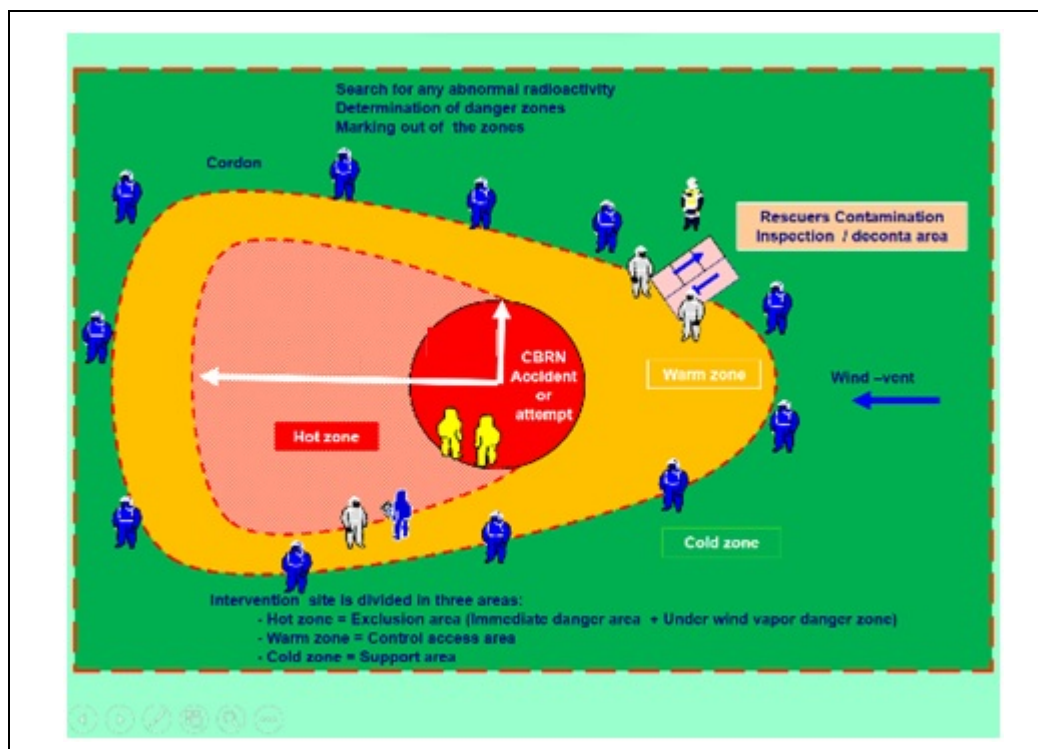
- **Hot zone** is the area immediately surrounding a CBRN incident, which extends far enough to prevent adverse effects from released contamination and radioactive irradiation to population and personnel outside the zone. Inside this area, there is immediate danger to human beings, and it is classified as an

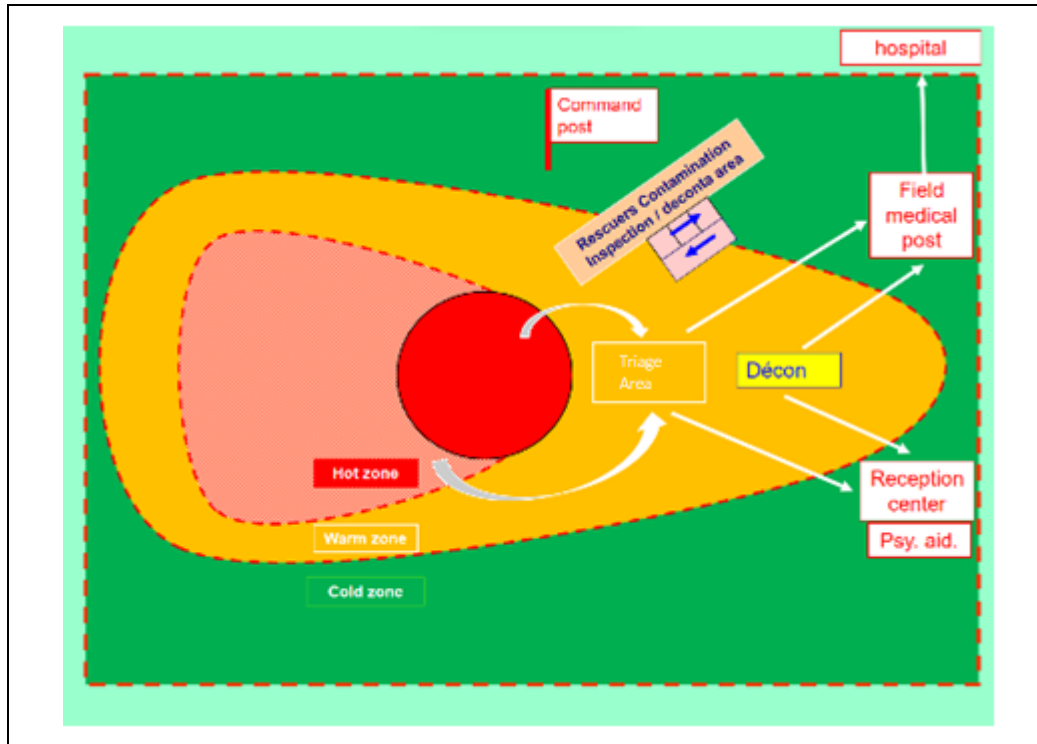
exclusion zone. Entry is restricted only to trained and adequately protected CBRN teams. When there is no data about the CBRN incident, this zone is defined with a minimum radius, for instance, of 300 m around the source.

- **Warm zone** is the area between the hot and the cold zones where personnel, decontamination equipment and hot zone support can be deployed. It includes control points for the access corridor and thus assists in reducing the spread of contamination. Entry is restricted to adequately protected CBRN and Decontamination teams. It is, too, the zone where population extracted from Hot zone will be grouped.
- **Cold zone** is the area where the Command Post (CP) and support functions that are necessary to control the incident are located. This area is safe for non-protected operators also for long term exposure.

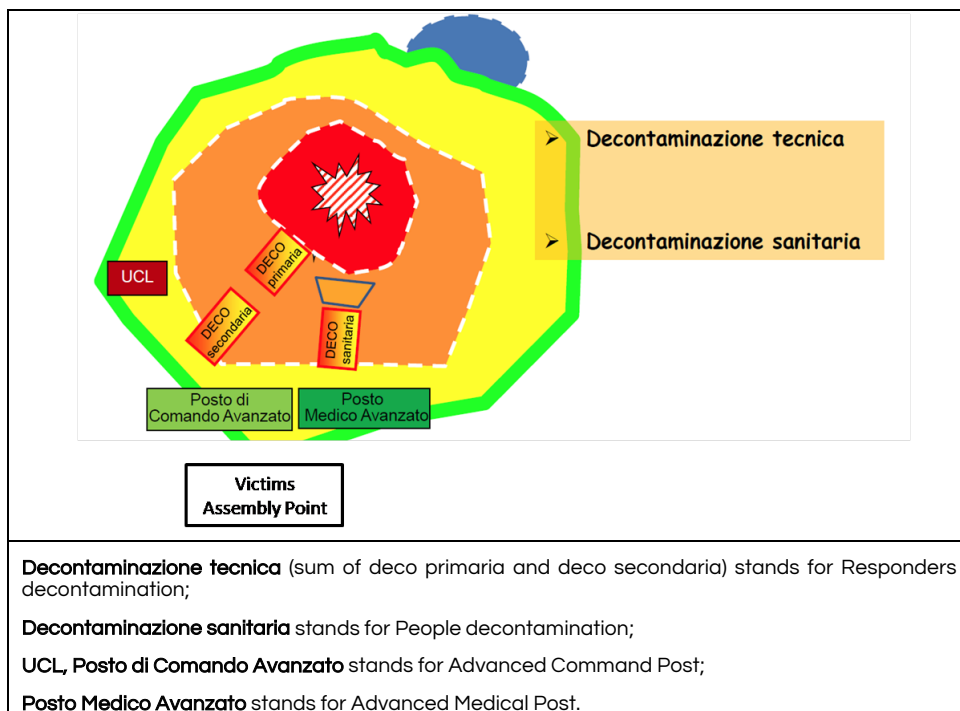
The above-mentioned zones will be shaped regarding the wind conditions and the topography of the area. Entry points and the associated decontamination facilities as well as Command Post must be situated upwind. At these entry points, a clear boundary with standardized procedures for entering and leaving the exclusion zones including decontamination and registration of persons (accountability), vehicles and pieces of equipment have to be established.

In picture, you find a zoning delimitation with a single decontamination corridor for responders.





The decontamination corridor for victims coexist with the decontamination corridors for responders, as described in picture below. For sure, Decontamination corridors are present If decontamination is needed.



CBRN SAMPLING

Chemical, biological, radiological, and nuclear (CBRN) sample management is the process that includes the collection, packaging, transport, storage, transfer, accountability, and reporting associated with environmental samples related to CBRN hazards to inform decision makers for further CBRN operations, medical support and isolation of contaminated areas.

For this kind of activities, specific and standardized procedures are adopted, like:

- Determine the analytes to be analyze;
- Proceed to the sampling point identified by hand-held device (instrumentation);
- Take a sample in a clean area, which will be used to define "the white", the reference.

Following, to evaluate the type of sampling (solid, liquid or gaseous) and the appropriate container (vials, Sampling bags, SPME), then label the sample with a unique code and take a photo of the sampling.

In case the samples must be analyzed in a fixed lab or in another field lab, a proper and shared "chain of custody" must be arranged.

CBRN DETECTION

One of the most important capabilities that can be performed is the CBRN field detection. This activity is carried out by operational personnel wearing the most appropriate PPE, depending on the type of event. Once the PPE dressing has been carried out, there are many field detectors that can be used by the team:

- For Chemicals scenarios it is available:
 - a multigas, indicating the concentration in ppm or in percentage of various gases based on the sensors install in the instrument; in standard configuration there is the concentration of explosive gases, the percentage of oxygen, the concentration of CO (carbon monoxide) and the concentration of H₂S (sulfuric acid);
 - a Photoionizer (PID) for the evaluation of only the concentration in ppm of volatile organic compounds (VOC);
 - an Ion Mobility Spectrometer (IMS) for the evaluation of the family of chemical substances present, both for CWA (Chemical Warfare Agent) and for TIC (Toxic Industrial Chemical);
- For Nuclear and Radiological scenarios instead, we have:
 - a personal thermo luminescence dosimeter (TLD) for evaluating the accumulated dose;
 - an electronic dosimeter for evaluating the instantaneous dose rate and the accumulated dose absorbed by the user;
 - a field NaI (sodium iodide) spectrometer for the evaluation of the instantaneous dose rate and the recognition of the radionuclide present;

- An intense-dosimeter with a scintillation probe for macroscopic research of radioactive sources and a probe for evaluating contamination of vehicles and personnel.
- Finally, for Biological scenarios, there are no field instruments available for the identification of biological pathogens but it is necessary to sample and take it to the laboratory.

Furthermore, another important capability is the sampling, useful for field and laboratory analysis with the aim of detecting chemical and radiological agents, and in special cases also biological agents.

CBRN ANALYSIS

This analysis is performed in a CBRN field laboratory that, in case of transboundary emergency, could cooperate with another CBRN field laboratory.

Following an analysis of this type, it will be possible to identify qualitatively and quantitatively the chemical or biological or radiological substances present in the sample. This way, results can be shared to the National Authority of the affected country to better perform a decision-making process.

CONTAINMENT OF DANGEROUS SUBSTANCE SPILLS AND FURTHER TRANSFER IN VESSELS

In case of incident with hazardous materials, responders have to manage events with the presence of dangerous substances on the road and railway, with the need to transfer the substances into special tanks or vessels for their safely subsequent movement. In this case, the material is fully identified with a proper labelling so the substance is very well acknowledged and responders with specific equipment can make the scenario safe by transferring the substance in a new vessel provided by the private transportation company.





Transfer operations involve considerable risks due to the characteristics of the substances: flammability, pressure, density, phases, etc.

Transfers from tankers or iron tanks to fixed tanks (or vice versa) must be carried out using appropriate piping, depending on the substances to be transferred. It is important to assess the compatibility of materials. Sometimes, for LPG for example, two iron or rubber pipes are needed, one for the liquid phase and one for the gaseous phase.

A pump and/or compressor can be used to transfer any hazardous substances.

MODELLING AND PREDICTING CHEMICAL AND RADIOLOGICAL DISPERSION

Dispersion modelling is a powerful tool that can be used during operations to understand the evolution of the scenario with respect to hazardous materials and the consequences for responders and the population.

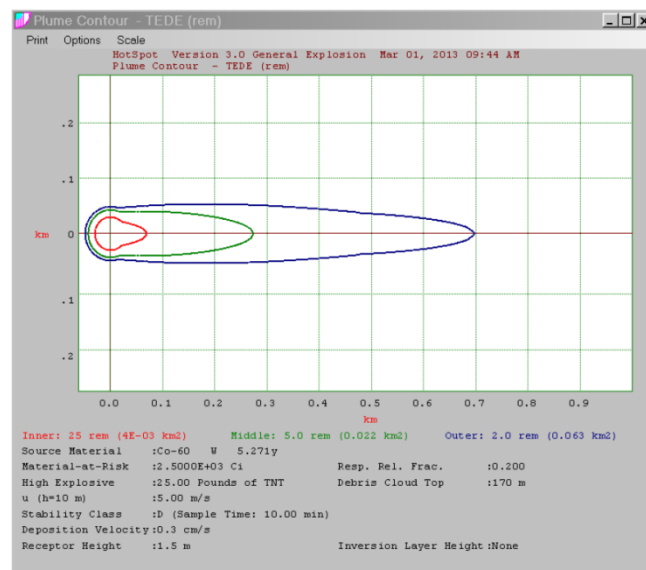
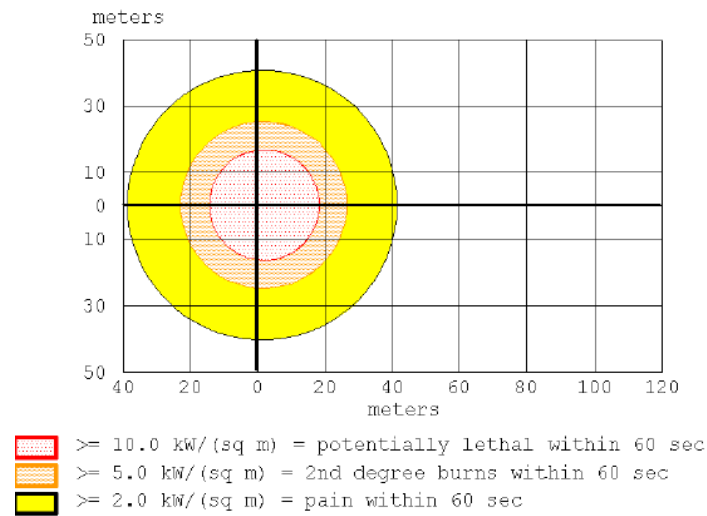
The results depend on the data that can be obtained from the area concerned, and in the early stages of operations, in most cases, there are a considerable number of uncertainties.

For these reasons, output models are not intended to provide a detailed description of the area involved, but a quick and reasonable result that can be used to develop a more effective strategy.

Dispersion models require a certain amount of data to work properly and most of this is supplied by the teams on the ground. These are displayed in the summary table as follows:

	Data Description	Why this data	Who provide the data
Site Data	- Time - Coordinates - Terrain	Definition of the location of the dispersion and the surrounding environment	-Local Authority -Industry/Chemical private factory. -Hazmat team
Material Data	Material involved in the scenario Characteristics Properties	Depending on the material involved, the dispersion and consequences on people and first responders is different	- Hazmat team - Stand-off detection - More detailed by: Chemical Lab Radiological Lab
Atmospheric Data	Wind Solar	Meteorology greatly influences dispersion	Portable Meteo Station or meteo data from the internet, Decontamination team and Stand-off team Other meteo stations installed in the area
Source Term	Source storage condition Source physical status (gas, liquid, solid, mixture) Source Pressure and Temperature Release typology	Definition how much and how fast a source is released into the atmosphere	Local Authority agency Hazmat team
Threshold Values	Red Zone Thresholdvalue Orange Zone Thresholdvalue Yellow Zone Thresholdvalue	Definition of the dangerous areas with respect to specific functions as decontamination and support operations.	Refers to proper standardized procedure

The results obtained are usually plotted in graphical maps, where the red, orange and green zones are drawn, described in a report where also medical and technical indications are provided.



Starting with this report it is possible to make some evaluation on the emergency strategy and also provide new directives to on-field teams with respect to the results obtained.

For these reasons, the report will be shared with the on-field teams that will verify the results obtained with the modeling software and in this way, they will be aware about the risks linked to operations performed in specific areas.

It is also possible to plot important sites around the CBRN incident and the effects on them, allowing an evaluation of the possible countermeasures to adopt.

CBRN Decontamination

A CBRN decontamination phase is conducted during a CBRN event response, where responders operate to mitigate the hazards of dangerous substances that can defile emergency operators.

It is a “step-by-step” process aimed to reduce contamination on responders to a specific safe level and to prevent the transfer of contamination outside the containment area.

The procedures used are based on field analysis of the hazard and risks involved. Field analysis consist of checking detection results to determine the general hazards, such as persistence, flammability and toxicity, and then evaluating the relative risk associated to the contaminants (for example, vapor versus liquid, blister versus nerve agents, radiological versus chemical and biological hazards).

The area where to deploy a decontamination spot must be chosen on the basis of:

- morphology of the territory;
- safety distance from the intervention point (greater than 50 m, for instance);
- possible soil contamination;
- wind direction;
- site size sufficient to contain the decontamination unit;
- presence of sufficient water resources. Otherwise, local authorities will be requested to provide it.

This area will be indicated and fenced off to prevent unauthorized persons from entering. Support will be requested from the local authorities for the disposal of potentially contaminated waste and, if necessary, contact will be established with a local health emergency unit through the doctor present in the module.

The scenario of the decontamination operations will be coordinated by the decontamination manager who will organize the ordinary and emergency procedures. The staff must scrupulously follow his instructions during the entire decontamination activity.

A decontamination can be accomplished in several ways, depending on the hazard. Typically, it consists of a dry decontamination, such as adsorption, brushing and scraping, useful alternatives for physical radioactive contaminated particles or a wet decontamination in which the individual is flushed with water to remove or dilute the contaminant, considering the agent’s reactivity with water and its solubility.

If some episodes of injury or objective contamination of operators in the red zone should be happen, their decontamination will take absolute priority over the ordinary. For this purpose, a specific area will be provided for undressing and decontamination before being sent to healthcare personnel for more in-depth medical assessments.

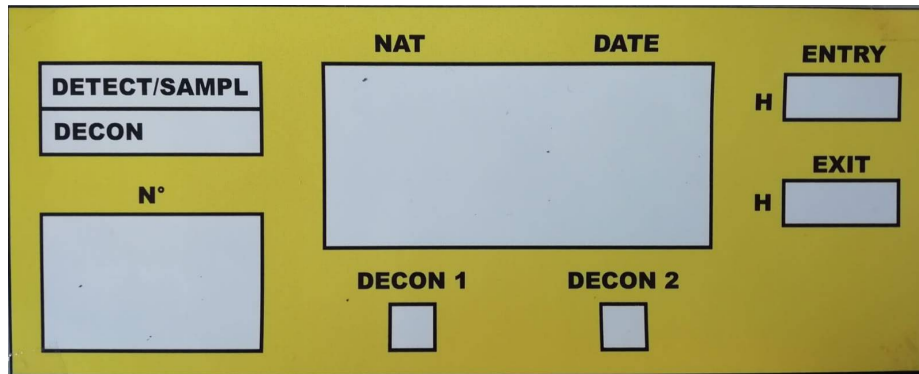
The decontamination team supervise the operations and assist the personnel to decontaminate their outer clothing from top to bottom, moving the contaminant toward the ground.

Reusable equipment and PPE, used during the interventions, will be decontaminated for subsequent use, if not reusable they will be confined, reported and set aside on site, for subsequent disposal at the expense of the local authorities. The waste water produced by decontamination will also be disposed of by the local authorities, subject to confinement in containment basins.

The area starts with an entry point, clearly designated for identifying the beginning of technical corridor. The area dedicated to receiving an emergency will be duly indicated.

The decontamination operations on each operator will be traced on a specific form.

At the end of the process, a decontamination ticket will be delivered which each operator will take care to keep for any eventuality.



The form is yellow and contains the following fields and labels:

- DETECT/SAMPL** and **DECON** (stacked boxes on the left)
- N°** (label above a box on the left)
- NAT** and **DATE** (labels above a large central box)
- ENTRY** and **H** (label and box on the top right)
- EXIT** and **H** (label and box on the middle right)
- DECON 1** and **DECON 2** (labels above two small boxes at the bottom)

In the picture is showed the decontamination ticket in which the deco operator had to fill in:

- The team to which the operator belongs (detection team/sampling team/decontamination team);
- The number of operators that had to be decontaminate;
- The hour in which the operator come inside the red zone;
- The hour in which the operator come out from the red zone;
- The date of the intervention and his nature (chemical, radiological or biological);
- A flag under decon 1 (in case the operator has been primary decontaminate) and under 2 (in case the operator has been secondary decontaminate).

Mass CBRN Decontamination

Body decontamination is the removal and/or neutralization of a chemical, radioactive, biological or nuclear agent from the skin. It is done by moving, extracting or neutralizing the contamination in order to:

- prevent or reduce radiation poisoning or exposure: avoid internalization of contamination by reducing exposure time and concentration of the contaminant;
- avoid the transfer of contamination: avoid secondary contamination by transfer of contamination (protect contaminated victims, those involved, first responders and care teams, keep the hospital clean).

Decontamination aims to move, neutralize or destroy contaminants of all types in order to limit their toxic effects. Decontamination takes place in the controlled area before evacuation to the rear structures. All persons present must be decontaminated (or for the radioactive component, at least controlled).

External decontamination is part of a process that may include the following steps:

- clearance;
- sorting by symptoms and/or contamination control;
- respiratory protection;
- powdering and wiping (chem) or contamination fixation (rad);
- undressing, at least the first layer of clothing (undressing by the responders or mutual undressing or self-undressing depending on the resources available);

- medicalization and administration of antidotes (before decontamination, if vital emergency or after decontamination);
- putting in survival conditions;
- wet decontamination;
- control of the effectiveness of the decontamination, if possible;
- monitoring;
- evacuation.

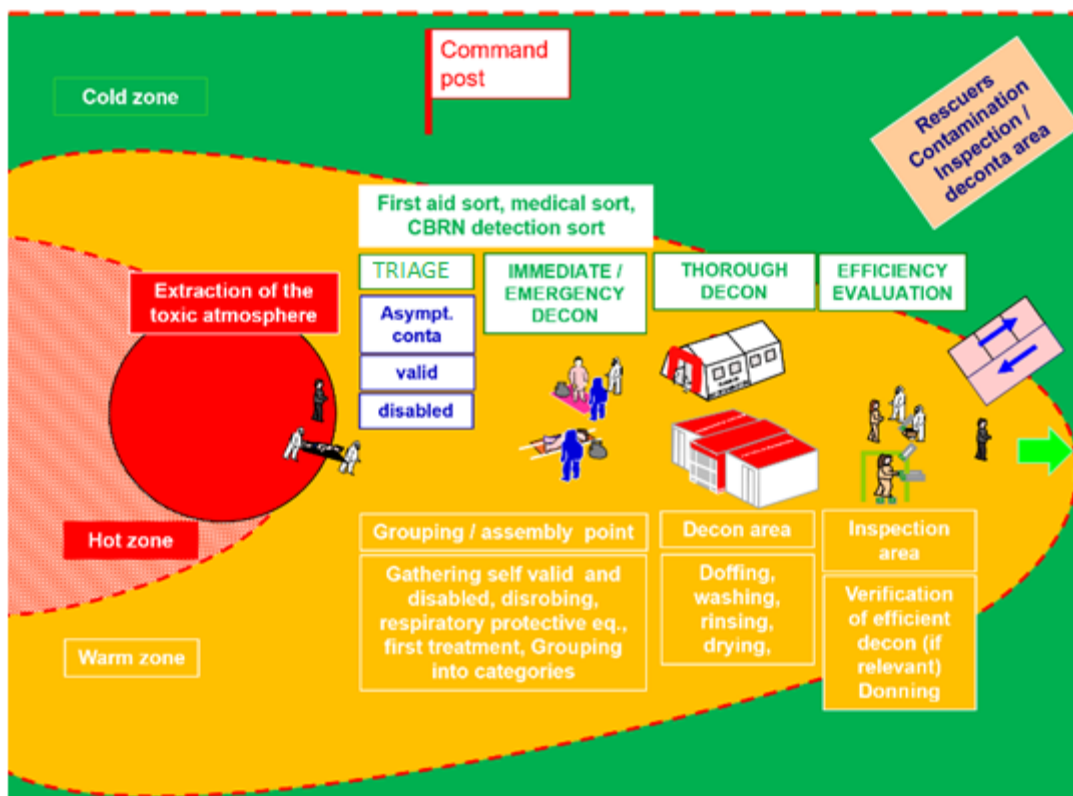
Two kinds decontamination:

- immediate (emergency): undressing is an essential act of decontamination;
- in-depth.

Depending on the situation, both may be complementary.

Prerequisites for decontamination:

- importance of knowledge of the agents (physicochemical properties);
- importance of knowledge of the body surface (body structure, permeability);
- post-contamination phase: fate of the agents after contact with the body surface (toxicokinetics, biological targets).



Decontamination with mobile decontamination units is only one solution. Indeed, there is no single answer to the event: a whole series of parameters impact the choice of the maneuver idea:

- chemical nature of the pollutant;

- physical form of the pollutant;
- weather conditions;
- number of people involved;
- number of people injured;
- topography;
- resources of the intervention zone;
- capacity to increase power.

3.3 Recovery

Depending on the extent of the intervention, the recovery activity may or may not be carried out and planned by the competent bodies according to the indications of the rescuers (assessment of the damage and related impact).

Specialist advice and resources may also be required as part of the recovery management phase, including the provision of long-term health monitoring, psychological support, building and environmental decontamination, re-establishing public confidence and the return to normality.

3.4 Mitigation/Lessons Learnt

In this stage, it is important to arrange a debriefing for all responders. It may be useful to provide psychological counselling for responders and, if necessary and depending on the scenario, long term health monitoring.

Operating guidelines will be updated at the end of a cross-border technical meeting to be held alternately in France and Italy during the first quarter of each year. It is necessary to arrange meetings on an annual basis.

Section 4–Standardised CBRN Forms

Four CBRN Forms have been drafted, tested, fine-tuned and delivered in digital format. These are the following:

1. Factsheet Form;
2. Sampling Form;
3. Detection Form;
4. First Responders' Decontamination Form.

At the end of the project, by March 2025, these Forms will be available at the following link:

<https://app.prometheusproject.eu> .

The image below is the login page to access the Forms In Prometheus System.



Username

Password

☐ Ricordami

LOGIN

[Password dimenticata?](#)

Annexes

Annex 1 Section 1 - Part C

France emergency response

This annex represents, as a useful reference, the French emergency response system and its chain of command in case of emergency situations.

The first incident commander is the head of the first engine.



The second level is the head of several engines. He is in contact with the head of each vehicle. Themselves are in contact with the engine crew.



The third level is the head few groups of vehicles. He is in contact with the heads of these groups, themselves in link with the head of each vehicle.

He is, often, help by a small command post, managing collect and synthesis of information and support.

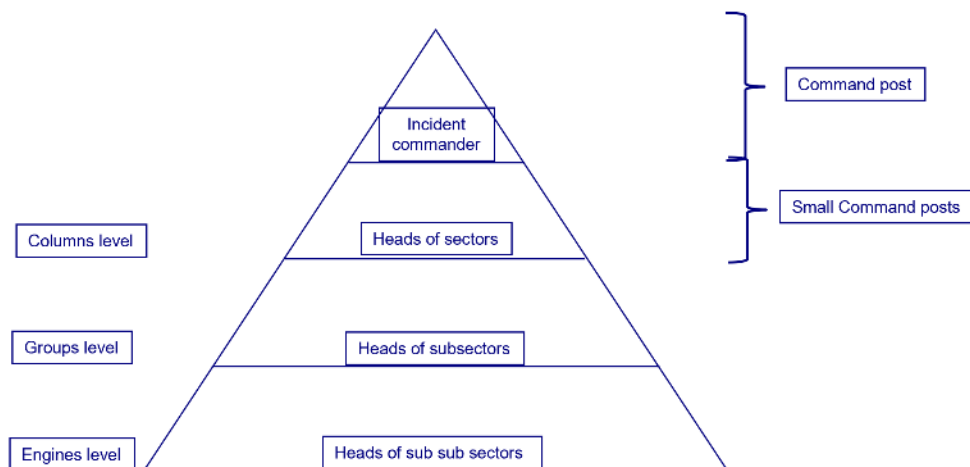


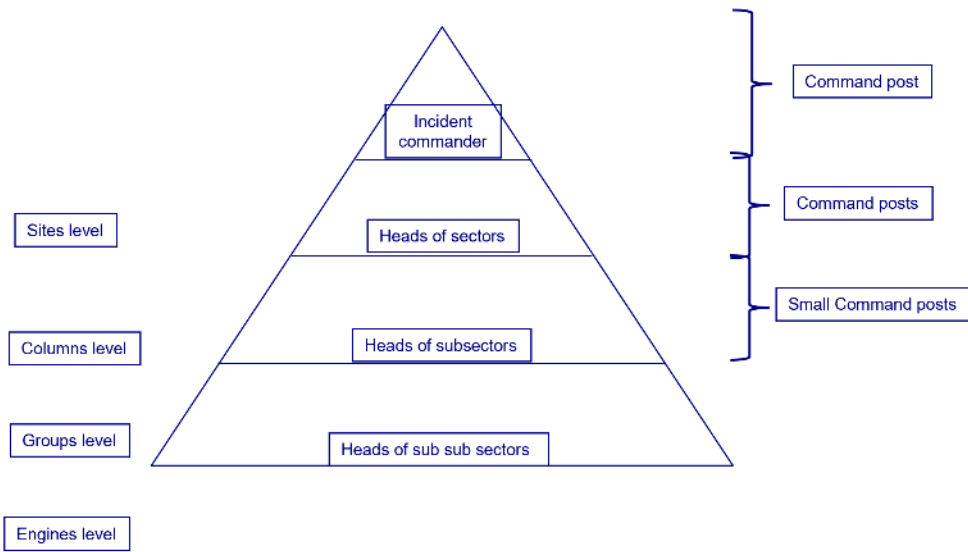
“colonne” chief

The fourth level is the heads described previously. He is help by a important command post.

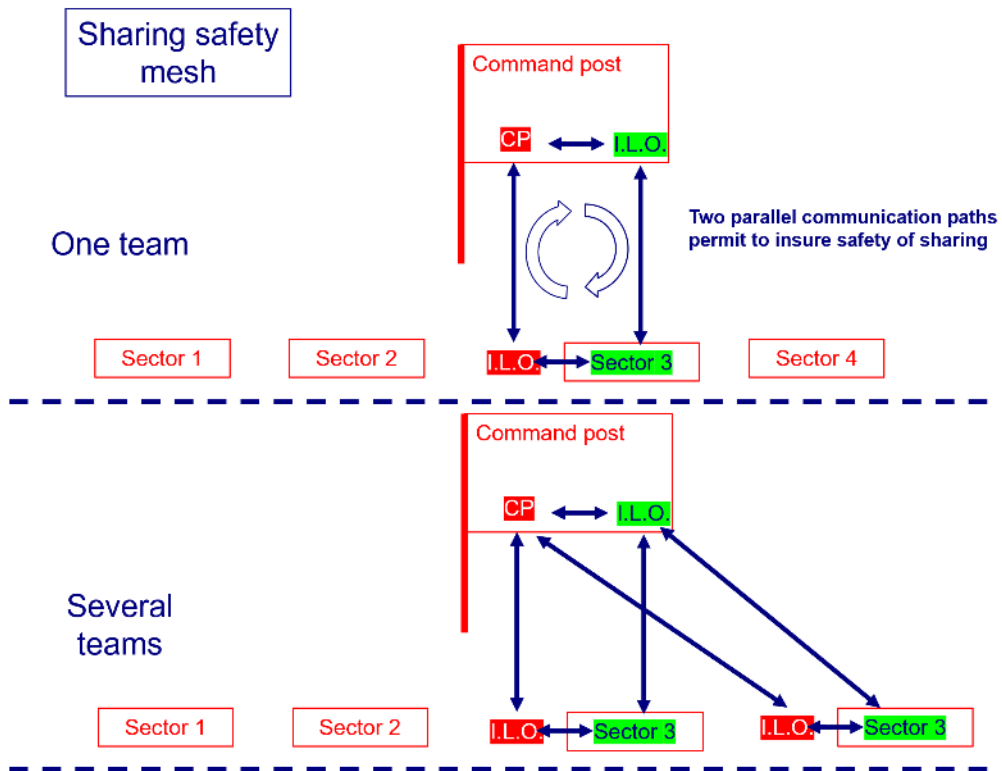


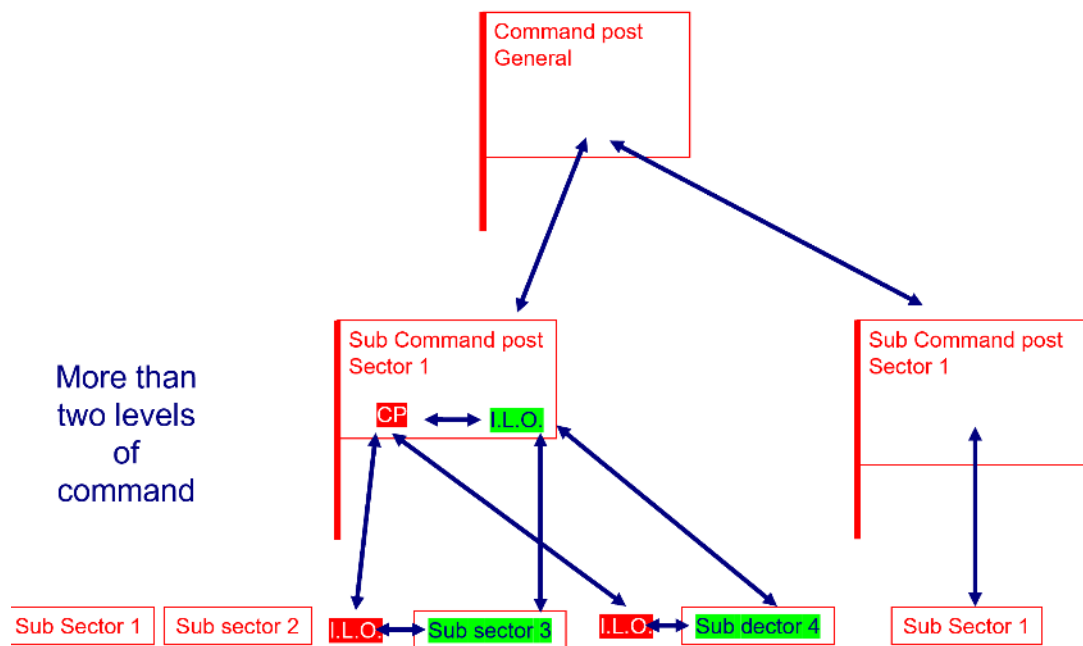
This arrangement permits to have a fluid, secure and reproducible organization of command on an intervention site. Depending on the magnitude of the event, the means may be injected at one or another levels of command:





Each foreign team is able to find its own place in this pyramidal organisation as it is described in the following drawings:





The Hazardous materials teams head are not supposed to be incident commander or head of sector. The operational executives of the intervention remain, often, regular (non-specialised) responders.

Italy emergency response

This section describes the Italian emergency response system, designed to ensure a quick and effective intervention during emergencies such as fires, accidents, floods, or other dangerous events.

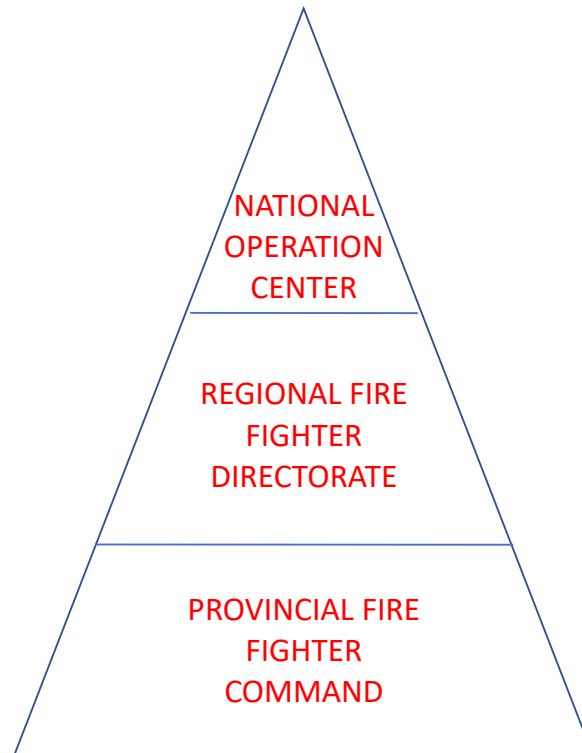
Below are the key steps and components of this system:

1. Call Reception: The call is handled by an operator at the fire department's control center. The operator collects crucial information such as the type of emergency, the exact location, and other necessary details to organize the response;
2. Evaluation and Dispatch: The control center operator evaluates the request characteristics and determines the appropriate response. This could include one or several fire engines together with specialized rescue teams/vehicles. CBRN Teams is one of the specialized rescue teams.
3. Deployment and Travel: Once the request has been processed, the fire department personnel head towards the incident site as quickly as possible.
4. Incident Response and Emergency Management: Upon arrival at the scene, the first fire department team leader performs an initial assessment to determine the situation and establish an intervention plan. In this phase, other vehicles or specialized personnel could be requested to be deployed. In order to manage complex events or collaborate with other emergency agencies (such as the police, medical emergency services, or law enforcement), a fire fighter officer could be deployed, assuming also the liaison officer role.

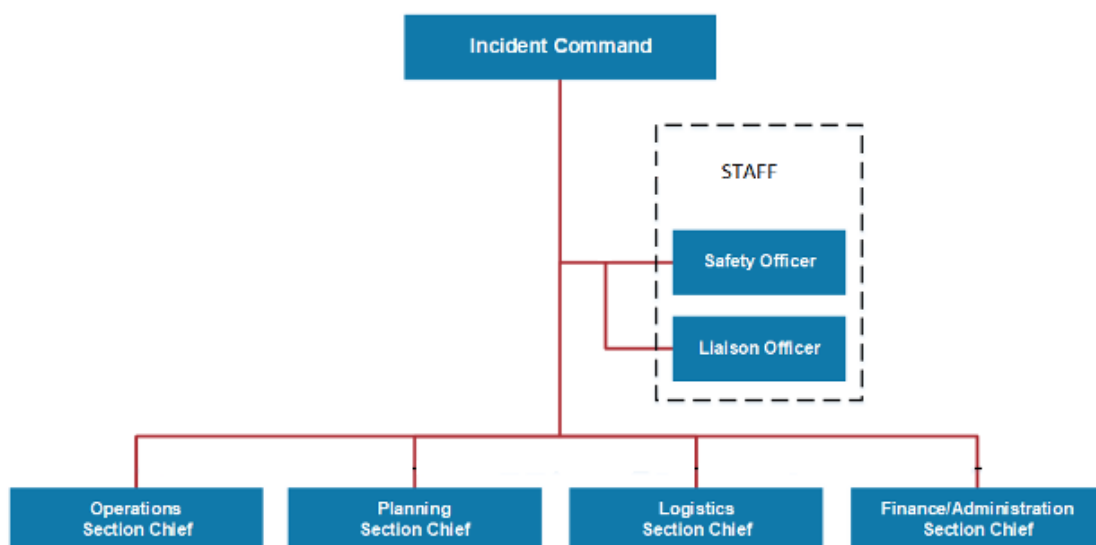
Then all the personnel is involved in the containment, control and elimination of the danger, together with the rescue of , injured, or endangered individuals.

5. Conclusion of the Intervention: After the emergency is resolved, fire department personnel proceed with cleanup operations and return to base.

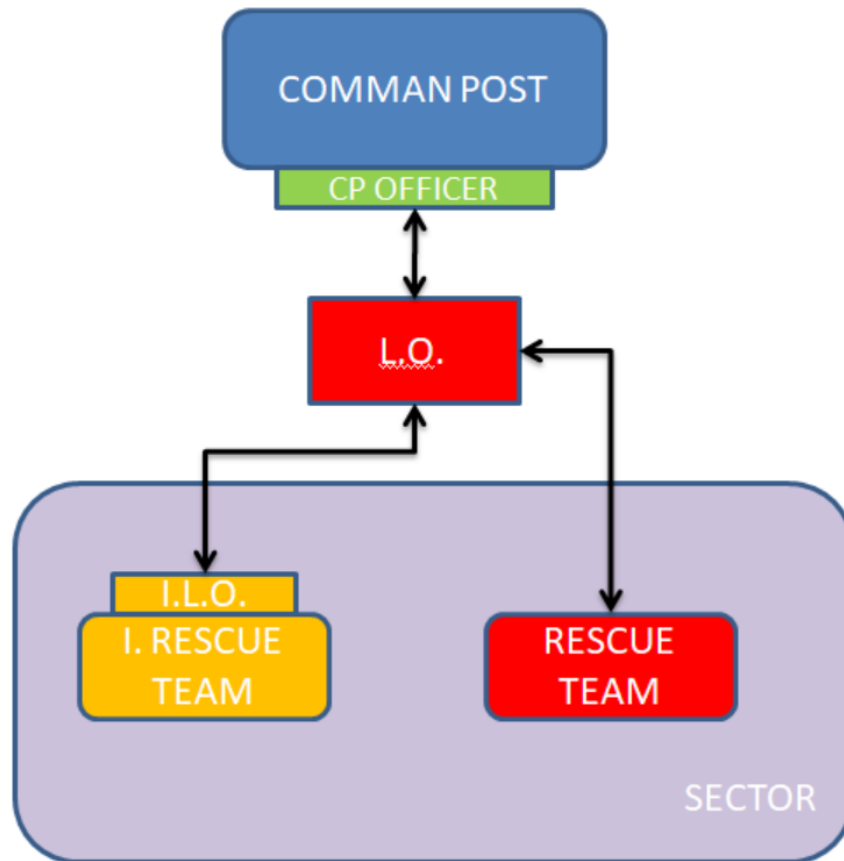
In case of large scale events, other resources could be deployed following a piramidal way, as represented below:



Moreover an Incident Command System is activated:



The operational coordination and sharing information is made following the scheme represented below:



Annex 1 Section 2

Within this annex the methods used by the teams for the various activities planned during a CBNR type intervention have been listed.

In particular, the equipment used for sampling and the field tools used for the risk assessment phase are indicated.

Sampling systems allow substances to be sampled for subsequent laboratory analysis. In principle, field instrumentation is used for the first phase of rapid assessment, also with a view to defining the situation in order to be able to make the necessary decisions to face the next phase of the intervention. Laboratory analysis is more specific and necessary to have more details on the composition/identification of the contaminant. In some cases, laboratory analysis is the only system for detecting the contaminant.

FIELD DEVICES CHEMICAL

The following are the chemical analysis activities that are conducted by the CBNR team complete with indications relating to the sampling method and related indications. The sampling information conducted by the team can be useful in view of a common activity in the field of cross-border emergencies.

TELLTALE MAPS

Sampling needed: NO

Input Molecular Aggregation State: Liquid/Aeriform

Operation: apply the sample to the part where the reagent is present and wait for the result by changing the color

Output result: the color change can be of type 0/1, i.e. presence/absence of the substance, or of continuous type that indicates its quantity, e.g. pH;

Coding of the post-analysis telltale map:

- Sample Type - Aeriform = AE, Liquid = LQ
- State where the sample is taken - ex. Italy = ITA
- Region where the sample is taken - ex. Piedmont = PIE
- Province where the sample is taken - ex. Torino = TO
- Sampling Team – Italian CBRN Team =IT, French CBRN Team =FR,
- Serial number of the reveal map - ex. P/N: 40.110.0011
- Date of sampling - ex. 24062010
- Timetable - ex. 1110
- Operator - ex. John Smith = MR

Labeling example: AE_ITA_PIE_NO_CBRN-IT_P/N 40.110.0011_24062010_1110_MR

At the end of the analysis, label the telltale paper and place it in a clean transparent container and attach it to any samples taken at the site.

COLORIMETRIC VIALS

Sampling needed: NO

Input Molecular Aggregation State: Aeriform

Operation: insert the colorimetric vial with the most suitable internal reagent into the suction pump, through the pump itself, which can be either electric or manual, suck up the sample of substance to be analyzed and wait for the result by changing the color

Output result: the color change can be of type 0/1, i.e. presence/absence of the substance, or of continuous type indicating its quantity;

Colorimetric vial coding after analysis:

- Sample Type - Aeriform = AE
- State where the sample is taken - ex. Italy = ITA
- Region where the sample is taken - ex. Piedmont = PIE
- Province where the sample is taken - Torino = TO
- Sampling Team - Italian CBRN Team =IT, French CBRN Team =FR,
- Colorimeter vial serial number
 - Instrument Serial Number - ex. S/N 11111
 - Sampling Date - ex. 24062010
 - Hour - ex. 1110
 - Operator - ex. Mario Rossi = MR

Labeling example: AE_ITA_PIE_NO_CBRN-IT_S/N 11111_24062010_1110_MR

At the end of the analysis, label the colorimetric vial, place it in a vial container and attach it to any samples taken at the site.

MULTIGAS

Sampling needed: NO

Input Molecular Aggregation State: Aeriform

Operation: the multi-gas instrument allows you to perform field analyses on the concentration values of the gases/vapours present in the volume of air analysed by performing a continuous reading. The gases/vapours that can be observed depend on the sensors installed inside it, but the standard configuration includes the reading of explosive gases, oxygen, carbon monoxide and hydrogen sulfide.

Turn on the instrument, take the reading in a clean area verifying the reliability of the measurement, enter the contaminated area and continue to perform the measurement.

Output Result: Whenever outliers are detected, the instrument will start emitting an audible and light warning; Take the position and time of the measuring point, photograph the measurement position framing the context and the instrument so that the measured value can be read.

The spatial field of measurement will allow, once an appropriate threshold value has been established for each individual chemical species, to delimit the contaminated and dangerous zone from the clean one

Coding of the instrumental survey:

- State where the survey is carried out - ex. Italy = ITA
- Region where the survey is carried out - ex. Piedmont = PIE

- Province where the survey is carried out - ex. Torino = TO
- Sampling Team – Italian CBRN Team =IT, French CBRN Team =FR,
- Instrument serial number - ex. S/N 11111
- Timetable - ex. 1110
- Operator - ex. John Smith = MR

Labeling example: ITA_PIE_NO_CBRN-IT_S/N 11111_24062010_1110_MR

At the end of the analysis, produce a short report and photographic file (labeled according to the coding just described) from which the anomalous values of the observed chemical substance and the perimeter of the contaminated area on a map and physics emerge.

PID

Sampling needed: NO

Input Molecular Aggregation State: Aeriform

Operation: the PID instrument allows you to perform field analyses on the concentration values of volatile organic compounds (VOCs) present in the analyzed air volume by performing a continuous reading. Since the instrument is calibrated with n-pentane, the concentration value that we will read on the instrument will be correct only if the observed gas is n-pentane, for all other VOCs on the other hand, the value read on the instrument can only give us an indication of the presence of a VOC in the analyzed area and its apparent quantity, except for a k factor to be determined as a function of the observed gas, provided that the observed gas is known.

Turn on the meter, take the reading in a clean area by checking the background value, enter the contaminated area and continue to perform the measurement.

Since the analysis is non-destructive, the sample that enters the instrument is expelled from the instrument as it is, consequently it is possible to do sampling by connecting Tedlar bags to the instrument in order to carry out more accurate laboratory analyses as well. To have a representative sample, fill the bag with Tedlar for about 10/15 seconds.

By framing the context and the instrument, making sure that the measured value can be read. Once an appropriate threshold value has been established, the spatial field of measurement will make it possible to delimit the contaminated and dangerous area from the clean one.

Coding of the instrumental survey and of the eventual sample:

- State where the survey/sample is carried out - ex. Italy = ITA
- Region where the survey/sample is carried out - ex. Piedmont = PIE
- Province where the survey/sample is carried out - - ex. Torino = TO
- Sampling Team – Italian CBRN Team =IT, French CBRN Team =FR,
- Instrument serial number - ex. S/N 11111
- Date of detection/sampling - ex. 24062010
- Timetable - ex. 1110
- Operator - ex. John Smith = MR

- Type of activity: Survey and Sampling = RC or just Survey = R

Labeling example: ITA_PIE_NO_CBRN-IT_S/N 11111_24062010_1110_MR_RC

At the end of the activity, produce a short report and photographic file (labeled according to the coding just described), from which the apparent anomalous values of the observed chemical substance and the perimeter on a map and physics of the contaminated area emerge. If sampling is also carried out, label all Tedlar bags and attach them to the sampling report.

ION MOBILITY SPECTROMETER (IMS)

Sampling needed: NO

Input Molecular Aggregation State: Aeriform

Operation: the CHEMPRO100 instrument, exploiting IMS (ion mobility spectrometry) technology, allows to perform field analyses on the basis of superposition of theoretical spectra and spectra detected for the qualitative identification of families of gases/vapors present in the analyzed air volume, performing a continuous reading.

Turn on the instrument, set the instrument by selecting the library of families for which you want to search according to the scenario you are facing: the initial choice is made between the library of families of industrial toxic chemical compounds (ICT) or the library of chemical war compounds (CWA). Carry out a first reading in a clean area, verifying the absence of any detectable gas, enter the contaminated area and continue to perform the measurement.

Output result: Whenever a chemical species belonging to the selected family will be detected, the instrument will start to emit an audible warning and will return the subfamily of the identified chemical species to the screen; Take the position and time of the measuring point, photograph the measurement position by framing the context and the instrument so that the display can be read.

The instrument, from the moment it is switched on until it is turned off, historicizes the measurements made and therefore it will be possible, once the survey is completed, to download the data collected to evaluate the accuracy of overlap between the theoretical and the detected spectra.

The relevant space field will make it possible to delimit the contaminated and dangerous area from the clean one.

Coding of the instrumental survey:

- State where the survey is carried out - ex. Italy = ITA
- Region where the survey is carried out - ex. Piedmont = PIE
- Province where the survey is carried out - ex. Torino = TO
- Sampling Team – Italian CBRN Team =IT, French CBRN Team =FR,
- Instrument serial number - ex. S/N 11111
- Survey date - ex. 24062010
- Timetable - ex. 1110
- Operator - ex. John Smith = MR

Labeling example: ITA_PIE_NO_CBRN-IT_S/N 11111_24062010_1110_MR

At the end of the analysis, produce a short report and photographic file (labeled according to the coding just described) from which the subfamilies of the observed chemicals and the perimeter on a map and physical of the contaminated area emerge.

Some differences and the need for comparison between French and Italian procedures have been identified on this aspect; more details will be provided in the second draft of the document after the first testing exercises.

FLAMES SPECTROMETRY

Sampling needed: Possible, to insure evaporation:

Principle: Flame spectrometry with hydrogen cartridge, supplemented by Portable Persistent Product Sampling System

- detection of phosphorus and sulfur atoms, nitrogen and arsenic bonds
 - * toxic substances in vapor phase in ambient air (direct measurements): phosphorus, sulfur, arsenic and nitrogen products in gaseous form
 - * toxic substances in liquid phase on contaminated media (indirect measurements with vaporization tool).

The toxic substance itself is detected and not the decomposition products as for other devices for which detection is a function of the degradation of the toxic substance.

- measurements:
 - * fast response time, but desorption time that may be long
 - * distance: location close, that induce no problem of interference with neighbors
 - * interference: triggering by combustion residues (ineffective in case of fire),
- response:
 - * phosphorus compounds P (agents G and V)
 - * sulfur compounds S (mustard and agents V)
 - * arsenic compounds As (lewisites)
 - * nitrogen compounds N (nitrogen mustard, HCN).

The flames spectrometer may be explosion-proof.

FTIR

Sampling needed: YES

Input Molecular Aggregation State: Liquid/Solid

How it works: the FTIR instrument, exploiting the homologous technology (Fourier Transform in the Infrared) allows to perform field analyses on the basis of superposition of theoretical spectra and spectra detected for the quantitative and qualitative identification of chemical substances present in the analyzed sample.

Turn on the instrument, perform a self-test by placing the rubber sample supplied with the instrument on the reading sensor and close the chamber by screwing on the specific pin.

Once you have received the OK from the self-test, unscrew the pin, remove the rubber sample and perform the analysis with the real sample in the same way. The quantity of sample to be taken is minimal as it must be able to be contained in the reading chamber of the instrument.

The duration of the analysis can take up to a few minutes.

To evaluate the correct interpretation of the superposition of the spectra, the operator can visually check, immediately after the analysis, the theoretical and real spectra of each individual substance in order to validate the analysis carried out by the instrument.

Output Result: The instrument will display all recognized chemicals within the sample with their percentage composition. It may happen that the sum of the individual percentages does not add up to 100%.

Once the analysis has been performed, open the reading chamber, remove the sample and place it in a special container. Take the location and time of the sampling and take pictures of the sampling operations.

Sample Coding:

- Sample Type - Liquid = LQ/Solid = SL
- State where the sample is taken - ex. Italy = ITA
- Region where the sample is taken - ex. Piedmont = PIE
- Province where the sample is taken -ex. Torino = TO
- Sampling Team – Italian CBRN Team =IT, French CBRN Team =FR,
- Sampling Date -

Labeling example: LQ_ITA_PIE_NO_CBRN-IT_24062010_1110_MR

At the end of the analysis, produce a brief report of the survey carried out from which the observed chemicals and their position on the map emerge, associating the samples analyzed and labeled according to the coding just described to the relative spectra.

RAMAN

Sampling needed: YES (using the Vials)/NO (using the laser pointer)

Input Molecular Aggregation State: Liquid/Solid

Operation: the RMX instrument, exploiting RAMAN spectrometry, allows to perform field analyses on the basis of superposition of theoretical spectra and detected spectra for the quantitative and qualitative identification of chemical substances present in the analyzed sample.

Turn on the instrument, perform a self-test by placing the bakelite sample, supplied with the instrument, in the reading chamber and close it, taking care to check that the laser pointer is placed in its housing.

Once you have received the OK from the self-test, open the chamber, remove the bakelite sample and perform the analysis with the real sample. The analysis can be carried out either by taking a sample, inserting it into the vial and then into the reading chamber.

In the case of using the internal reading chamber, the quantity of sample to be taken is equal to the size of the vial, on the contrary, in the case of using the external laser, it is sufficient to bring the pointer as close as possible to the substance to be analyzed without touching the substance. In the case of transparent packaging, the external laser pointer is able to detect the substance even by bringing it close to the container.

This type of analysis with Raman spectrometry, in some cases, suffers from the problem of fluorescence of some substances, so if it happens to repeat the analysis of the substance with FTIR.

The duration of the analysis can take up to a few minutes.

To evaluate the correct interpretation of the superposition of the spectra, the operator can visually check, immediately after the analysis, the theoretical and real spectra of each individual substance in order to validate the analysis carried out by the instrument; Alternatively, the instrument historicizes the measurements carried out and therefore it will be possible, even once the survey is completed, to download the data collected to evaluate the accuracy of overlap between the theoretical and the detected spectra.

Output Result: The instrument will display all recognized chemicals within the sample with their percentage composition. It may happen that the sum of the individual percentages does not add up to 100%.

Once the analysis has been performed, open the reading chamber, remove the sample and place it in a special container. Take the location and time of the sampling and take pictures of the sampling operations.

Labeling example: ITA_PIE_NO_CBRN-IT_S/N 11111_24062010_1110_MR

SAMPLING DEVICE

SPME SAMPLING

Materials for sampling:

- Fiber preloaded and packaged in FFA "fast fiber assembly";
- Supelco sample holder complete with pre-stretched and packaged fiber;
- Sample ID labels
- In the open field, use GPS to geolocate the pick-up point;
- In a closed field, find a plan of the structure where you operate and locate the pick-up point
- Camera
- Use the appropriate PPE for the scenario,
- Use the appropriate radio system

TEDLAR SAMPLING

Materials for sampling:

1. Sample Bag

It is a rectangular bag, one of the most widely used sampling systems, which can be made of different materials such as Tedlar or Kynaro Flex film (in any case, the materials used must minimize the problem of contamination/pollution of the sample). Each bag is equipped with a polypropylene valve with "Open" or "Closed" positions.

The capacity of the sampling bags can be 1 and 3 litres; if you use a "Vacuum-Chamber" you must check that the dimensions of the bag and the dimensions of the chamber are compatible.

2. Vacuum system:

Ejector valve to be applied to the air outlet of a self-protector to create a vacuum in the "Vacuum-Chamber"

For 3 litre bag: For 1 litre bag

- 80% vacuum -0.4 bar - 80% vacuum -0.2 bar

- 50% vacuum -0.2 bar - 50% depression - 0.1 bar

Visually monitor the filling of the Tedlar bag to avoid bursting.

3. "Vacuum- Chamber"

Rigid container into which sampling bags are inserted and filled directly using the negative pressure provided by the vacuum system.

The Vacuum Chamber has rigid walls that will not collapse under vacuum conditions. All surfaces in contact with the sample are made of inert materials.

4. Sampling bags

It is recommended that the bag is not filled for more than:

- 80% for road and rail transport;
- 50% for air freight;

5. Sample ID Labels:

6. In the open field, use GPS to geolocate the pick-up point through a GPS:

7. In a closed field, find a plan of the structure where you operate and locate the sampling point;

8. Camera;

9. Use the appropriate PPE for the scenario;

10. Use the appropriate radio system

CHEMICAL LABORATORY DEVICE

GC MS

Laboratory Procedure:

The main steps to better perform analysis are as follows (to put the following point in a technical annex):

1. The sample is recorded in the analysis report.

2. The sample is placed in the glove box through the side opening.
3. The analyst removes the first containment bag with the sampling code and keep it outside the glovebox.
4. The analyst closes the glove box and starts processing the sample.
5. Using gloves, the analyst takes the sample and removes it from the second containment bag.
6. If the sample needs to be treated, the reference analytical procedure will be followed.
7. When ready, the sample will be analyzed with specific technique depending on Chemical or Biological or Radiological sample.
8. A report will be drawn up with all the sample details and the relative results.
9. Once the sample has been analyzed, sample and instruments will be decontaminated.

Following an analysis of this type, it will be possible to identify qualitatively and quantitatively the chemical or biological or radiological substances present in the sample. This way, results can be shared to the National Authority of the affected country to better perform a decision-making process.

Gas chromatography (GC)

Among the analysis capabilities we find gas chromatography on chemical agents, through which it is possible to be able to identify the chemical substances present in the emergency scenario, in any state of molecular aggregation (solid, liquid and gaseous).

The analysis of workers is always accompanied by sampling, as codified in the procedure (see annex). Samples are taken at the place where the substances are to be tested, then they are taken to the laboratory and prepared where they will be examined with GC/MS. Alternatively, the GC/MS can be given as input.

- Sampling containers (vials, jars, tedlar bags, absorbent vials);
- SPME fiber or MICROSYRINGE.

For sample preparation, on the other hand, it will be necessary to:

- Laminar Flow Hood or Glove Box;
- Oven for thermal setting.

Annex 2 Section 2

FIELD RADIOLOGICAL DEVICE

Gamma spectrometry

The team is specialized in the use of gamma spectrometry to be carried out in operational situations. The aim is to identify the composition of radionuclides present in soil contamination and to determine the surface concentration of radionuclides deposited in the soil, which could then activate operational levels of intervention.

The spectra are collected by a system using a gamma spectrometer –NaI (TI) detector- which carries out the acquisition at a height of 1 m from soil surface.

The presence of photoelectric peaks at various energies is used for the identification of the contaminating radionuclide. The analysis of counts in the selected ROIs is converted into surface contamination data. For operational reasons, this analysis is carried out by the elaboration of the software of which the system is composed, set with the parameters that the operating context provides largely depending on geometrical conditions.

In this geometry, the contribution to the spectrum covers an area of several hundred m². The source to be measured is essentially a large soil sample, since the unshielded detector measures the flux of photons emitted by the volume of the soil consisting of a radius of the order of 100 m and up to a depth of about 30 cm (depending on the energy of the photons).

To have a sequential in situ gamma spectrometric measurement for mapping purposes, a vehicle-mounted NaI(Tl) spectrometer is used; spectrum data is stored on a rugged notebook (equipped with management software) along with geographic coordinates and time data provided by a GPS device. The CNVVF uses Mirion's SPIR Mobile system.

The spectrometry permits the identification of radionuclides "photons emitters" (gammas and X-rays). The detection crystals are NaI (TI) or CsI (TI) detector (the CsI permits to detect/Identify at -20°C).

To the before mentioned radiological devices, teams are also provided with hand-held equipment to identify radiological contaminated areas like count rate meters (counts per second) to find sealed sources or contamination; dose rate meters (dose rate and dose) to warrant security of responders; individual electronic dosimeters; mobile photons spectrometers allowing the identification of the radioactive elements and lead boxes and lead shields insure the safe storage of irradiant sources.