




**WORKSHOP ON  
STRENGTHENING THE SAFETY  
MEASURES AT HAZARDOUS  
ACTIVITIES**

**Vadul-lui-Voda, 13-14 December  
2007**

A photograph of a river valley in Vadul-lui-Voda, showing a wide river, green trees along the banks, and a grassy hillside in the background. The image is framed by a red border.

**Good practice in  
providing the  
guidelines on safety  
to operators**



## First of all... Brief presentation

Since 1985, year of establishment, **ICARO** Ltd has reached a primary position at national level in the field of industrial safety and environmental protection.



### Tuscany - Cortona





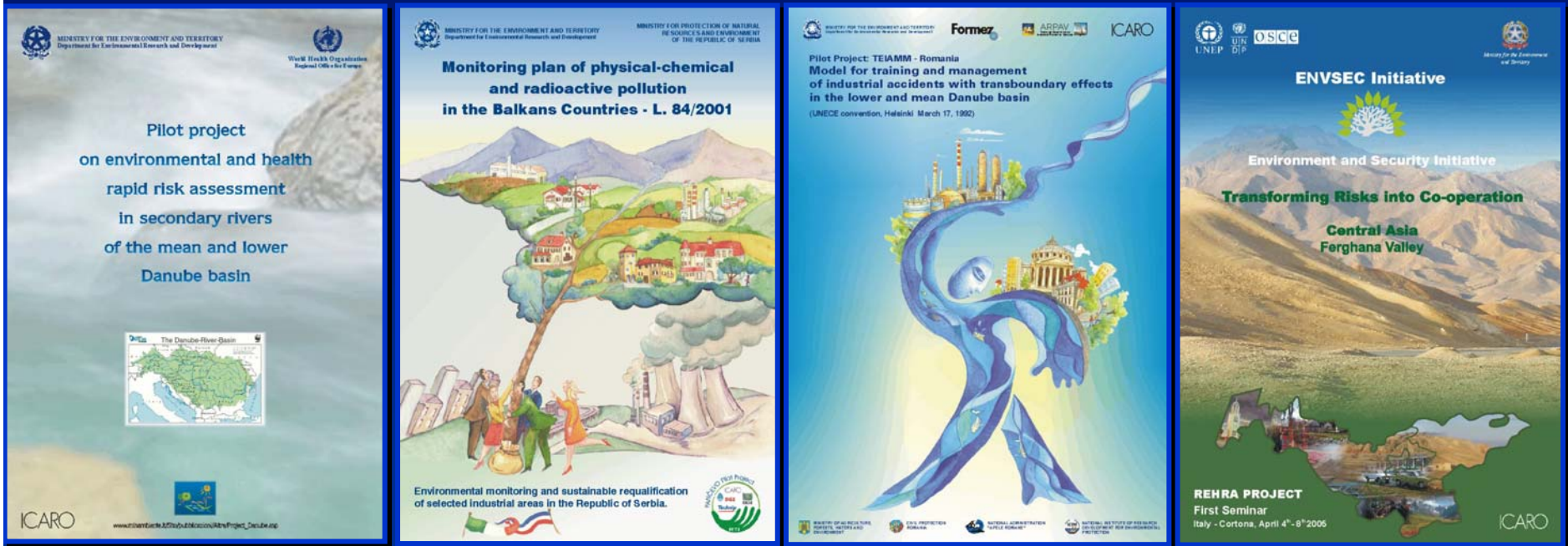
## First of all... brief presentation





# First of all... brief presentation

## Assistance to EEC and CA Countries



2000/2002

2002/2003

2002/2004

2004/2006

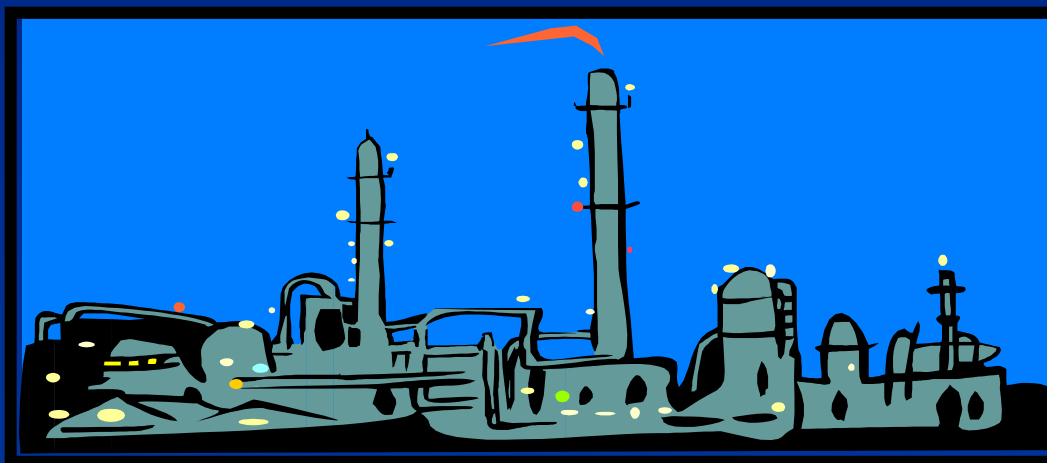


## Good practice

### 96/82/EC Seveso II Directive

In EU Countries Seveso II Directive has defined the “Safety Standards” to which the operator of hazardous sites has to refer.

From this experience of more than 10 years, it is possible to retrieve useful information to provide guidelines on safety to operators of hazardous sites.

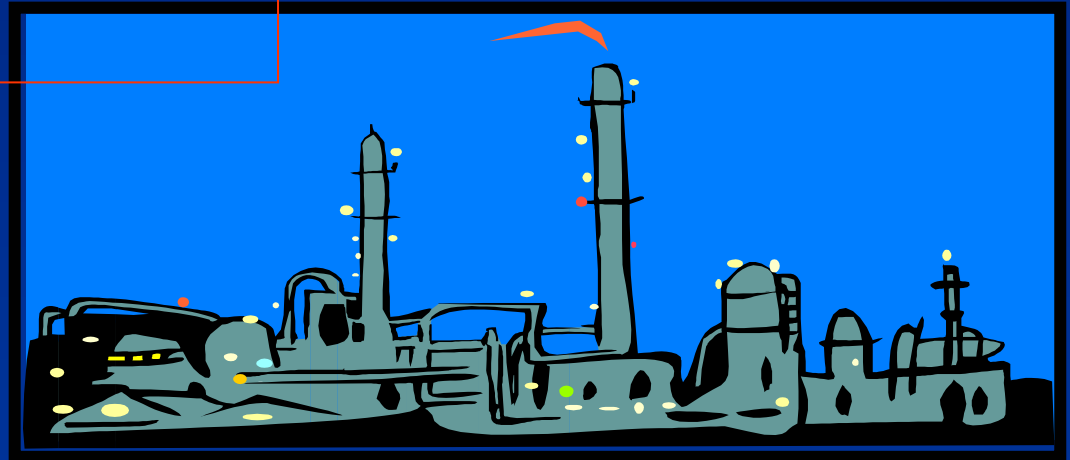




## Main Definitions

### Establishment

“an area under the control of an operator, where dangerous substances are present in one or more installations, including common or related infrastructures or activities”.





## Main Definitions

### Hazardous Substances

“substances, mixtures and preparation listed in the Attachment I – 1st part to UE 96/82/CE - SEVESO II Directive or according the criteria laid down in the **Attachment I – 2nd part to UE 96/82/CE - SEVESO II Directive**. Raw materials, products, by-products, residues or intermediates and also those substances potentially generated during an accident are included”

Column 1		Column 2	Column 3
Categories of dangerous substances		Qualifying quantity (tonnes) of dangerous substances as delivered in Article 3 (4), for the application of	
		Articles 6 and 7	Article 9
1.	VERY TOXIC	5	20
2.	TOXIC	50	200
3.	OXIDIZING	50	200
4.	EXPLOSIVE (where the substance or preparation falls within the definition given in Note 2 (a))	50	200
5.	EXPLOSIVE (where the substance or preparation falls within the definition given in Note 2 (b))	10	50
6.	FLAMMABLE (where the substance or preparation falls within the definition given in Note 3 (a))	5000	50000
7 a.	HIGHLY FLAMMABLE (where the substance or preparation falls within the definition given in Note 3 (b) (1))	50	200
7 b.	HIGHLY FLAMMABLE liquids (where the substance or preparation falls within the definition given in Note 3 (b) (2))	5000	50000
8.	EXTREMELY FLAMMABLE (where the substance or preparation falls within the definition given in Note 3 (c))	10	50
9.	DANGEROUS FOR THE ENVIRONMENT in combination with risk phrases: (i) R50: 'Very toxic to aquatic organisms' (ii) R51: 'Toxic to aquatic organisms'; and R53: 'May cause long term adverse effects in the aquatic environment'	200 500	500 2000
10.	ANY CLASSIFICATION not covered by those given above in combination with risk phrases: (i) R14: 'Reacts violently with water' (including R14/15) (ii) R29: 'in contact with water, liberates toxic gas'	100 50	500 200

The hazardous substances and relevant threshold values defined by Seveso II Directive are quite the same of those ones taken into consideration by the Helsinki Convention

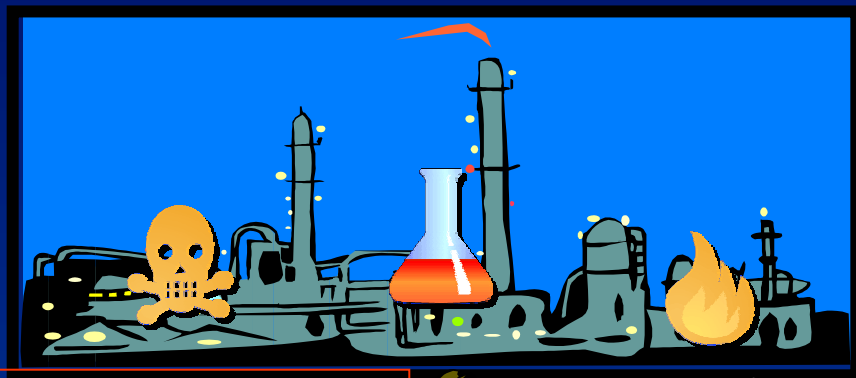


## Criteria of application

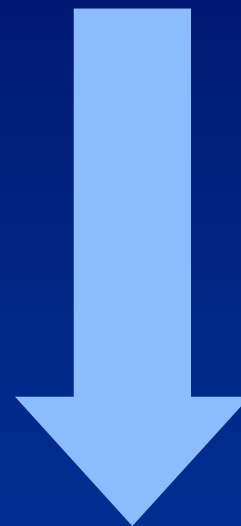
Dangerous substances

>

Column 2 of Annex 1



Establishment



**Safety Management  
System**





# Safety Management System

Safety management system should include the part of the general management system which includes the organizational structure, responsibilities, practices, procedures, processes and resources for determining and implementing the major accident prevention policy

*Definition  
from  
Directive*



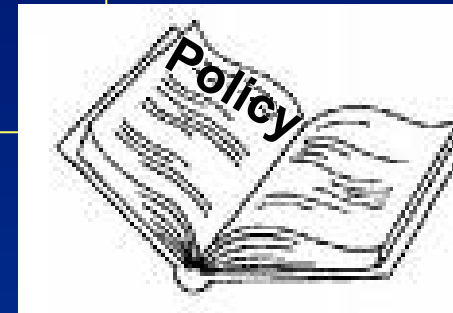
*References*

*Guidelines on a Major Accident Prevention Policy and Safety Management System, as Required by Council Directive 96/82/EC (Seveso II) – published by the European Joint Research Centre.*



# Safety Management System

## Major Accident Prevention Policy



The major accident prevention policy should be established in writing and should include the operator's overall aims and principles of action with respect to the control of major-accident hazards

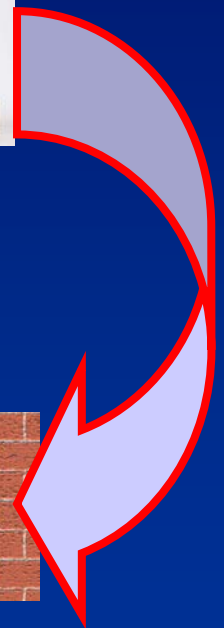
- Contains the list of general principles on safety;
- Must be shared with all the employees and diffused in all areas of establishment.



# Safety Management System

## Main Elements

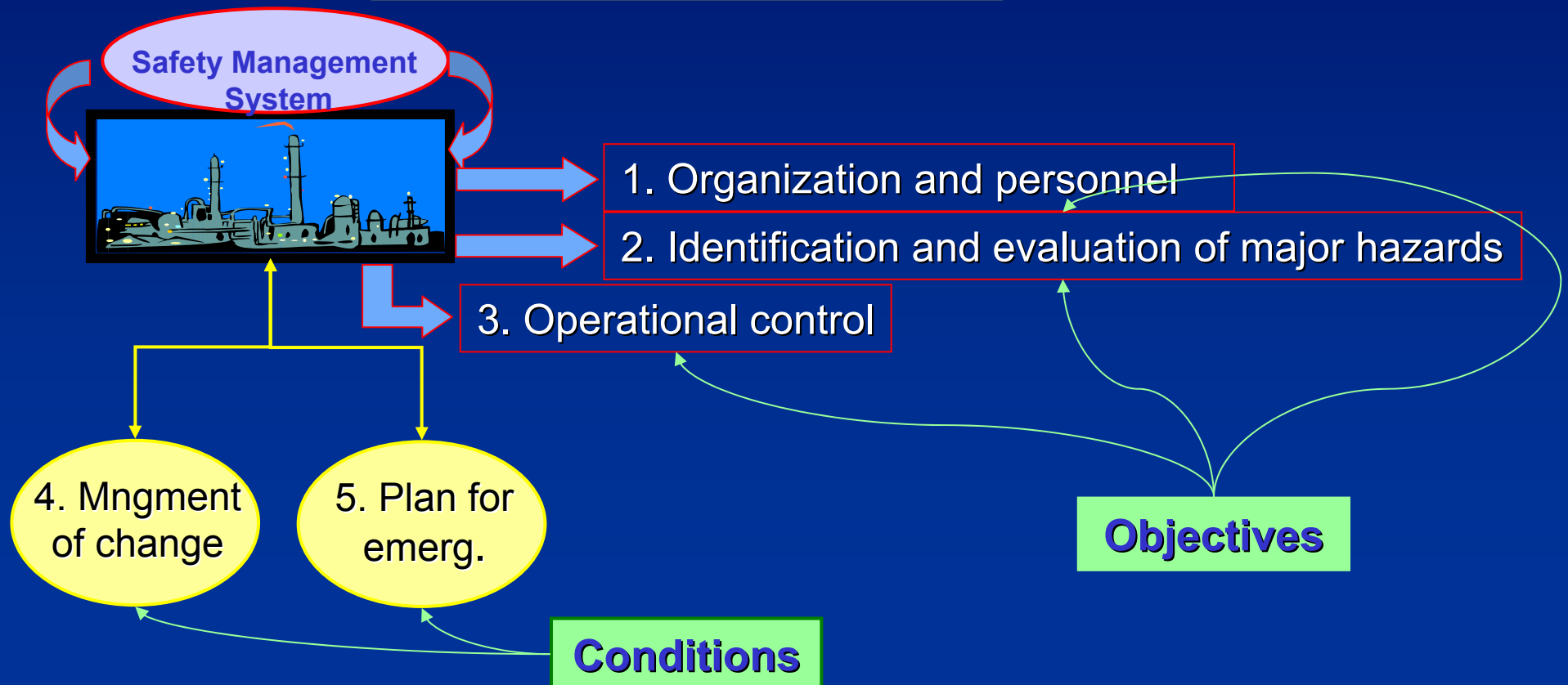
- organization and personnel
- identification and evaluation of major hazards
- operational control
- management of change
- planning for emergencies
- monitoring performance
- audit and review





# Safety Management System

## General structure





# Safety Management System

## Review and monitoring





# Safety Management System

Operating structure



Manual of the Safety Management System

In Italy:  
Review of Safety Management System is required by law every two years

Procedures



Criteria

Training



Recording





# Safety Management System

## Role of Authority



- Definition of safety strategy
- Develop a clear, coherent and consistent control framework
- Promote an efficient inter-agency co-ordination (different local authorities, industry other stakeholders)
- Dissemination of guidelines (e.g from Seveso II) to operators (workshop, seminars, leaflets)
- Organization of Inspections on sites regarding general approach to the SMS



# Safety Management System

Definition of plan for improvement

In Italy:

Review of Safety Report is required by law every five years



Safety Report



Risk Assessment



Top Event	Frequency (events/year)	Consequences (lethal zone)
1. Release of LPG ...	$1,0 \times 10^{-4}$	24
2. Run away reaction in ...	$2,1 \times 10^{-4}$	48
3. Overfilling of tank n. ...	$3,6 \times 10^{-6}$	40



# Safety Management System

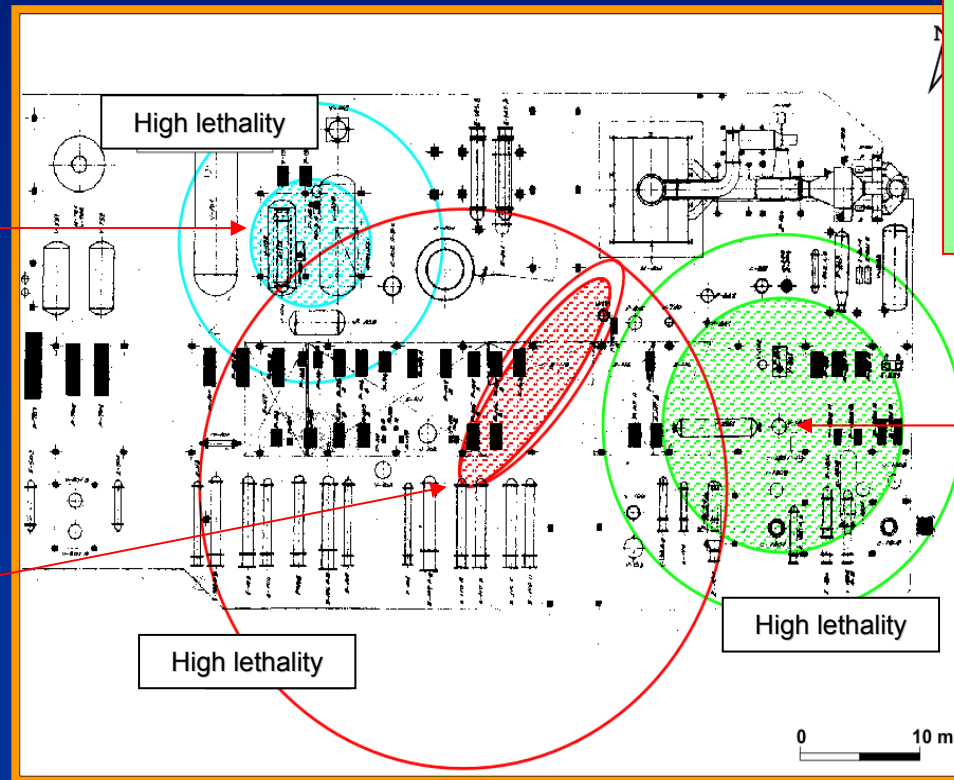
Definition of plan for improvement

Risk assessment is:

- the KEY DOCUMENT of SMS;
- The basis for the definition of the plan of improvement

Top Event 1

Top Event 2



Top Event 3

Picture of the risk associated to the processing unit



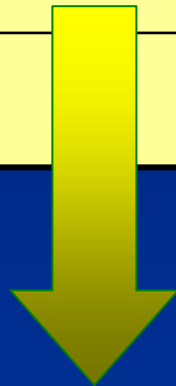
## RISK MATRIX (example)

<b>F R E Q U E N C Y</b>	Probable	4				
	Improbable	3				
	Very improbable	2		<b>TOP EVENT 1</b>	<b>TOP EVENT 2</b>	
	Extremely improbable	1			<b>TOP EVENT 3</b>	
<div></div> <div></div> <div></div>	Acceptable Risk		1	2	3	4
	Improvement region		Slight	Minor	Major	Massive
	Unacceptable Risk		<b>C O N S E Q U E N C E S</b>			



## RISK MATRIX (example)

Acceptable	Improvement
Top Event 1	Top Event 3
Top Event 2	



Measures for risk reduction

F R E Q U E N C Y	Probable	4				
	Improbable	3				
	Very improbable	2		TOP EVENT 1	TOP EVENT 2	
	Extremely improbable	1			TOP EVENT 3	
			1	2	3	4
			Slight	Minor	Major	Massive

	Acceptable Risk
	Improvement region
	Unacceptable Risk

### CONSEQUENCES

Reduction of frequency

Reduction of consequences



# Safety Management System

Definition of plan for improvement

Top Event 3

Reduction of frequency



Alarm and trip systems



Piping inspection



Reduction of amount



Improved technology

And more...

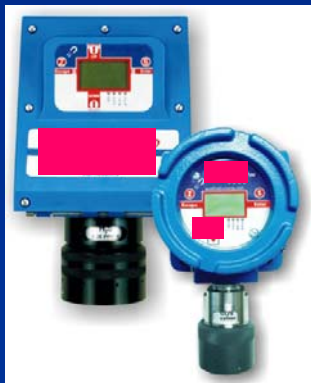


# Safety Management System

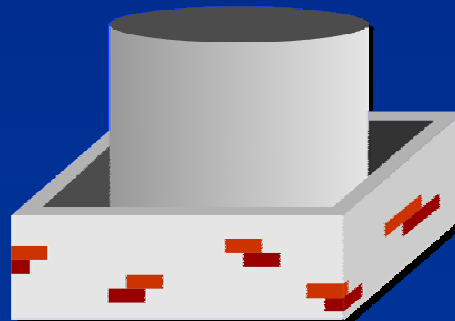
Definition of plan for improvement

Top Event 3

Reduction of consequences



Detection systems



Containment areas



Isolation valves



Fire fighting

And more...



# Safety Management System

Definition of plan for improvement

Top Event 3

And more...

Training on:

- Process control
- Inspection
- Maintenance

Training on:

- Risk assessment
- Emergency management
- Fire fighting

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# Safety Management System

## Definition of plan for improvement

### Top Event 3

### Emergency Plan for single Top Event

Time	Operator 1 (control room)	Operator 2 (chief in shift)	Operator 3 (emergency squad)
30 s	Detects alarm and alert the chief in shift.		
5 min	Shut down the unit.	Organizes the team. Requires emergency squad.	
10 min		Supervise the action in the plant.	Activates fire monitors.
Protection devices	None. Availability of self-breathing apparatus in C.R.	Gas mask, anti-acid gloves...	Anti fire protection.



# Safety Management System

Definition of plan for improvement

Top Event 3

Emergency Plan for single Top Event

Periodic Emergency simulation

- Verify resources and time
- Train people
- Identify improvements





# Risk management of hazardous sites

## Role of Authority



### Central Authority

1. Screening of the territory in terms of hazardous sites
2. Creating a preliminary ranking of the risks
3. Management of the information regarding each single operator in order to guarantee continuous co-operation



# Risk management of hazardous sites

## Role of Authority



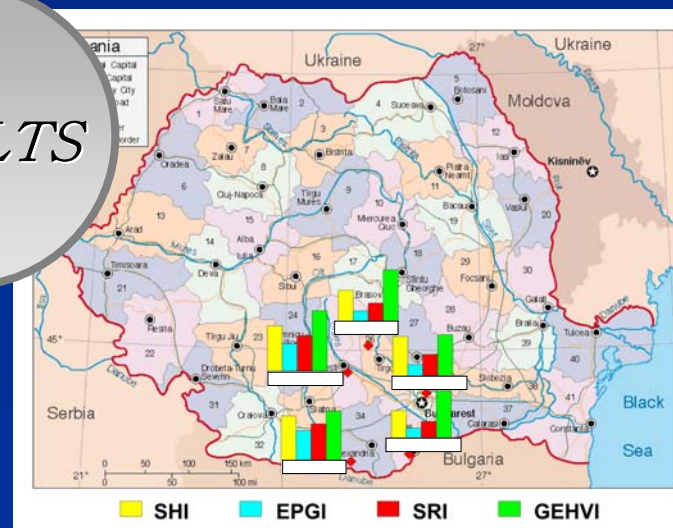
## Risk Assessment

### 1. Screening of the territory in terms of hazardous sites

*TARGET*

Rapid but exhaustive risk assessment of the major accidents potentially associated to hazardous site

*RESULTS*





# Risk management of hazardous sites

## Role of Authority



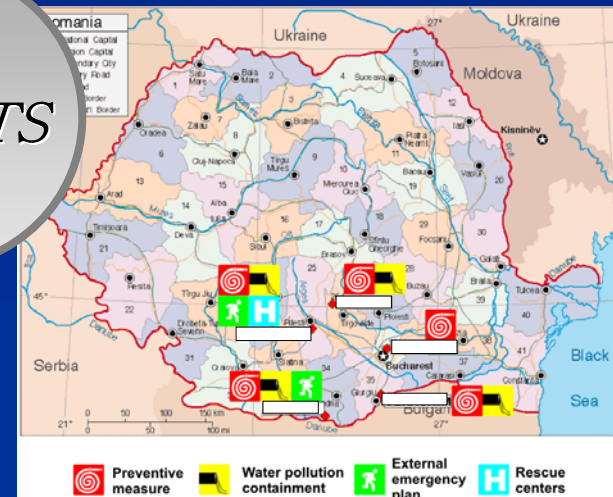
### Risk Assessment

## 2. Creating a preliminary ranking of the risks

*TARGET*

Identification of the areas of intervention in the national context

*RESULTS*





# Risk management of hazardous sites

## Role of Authority



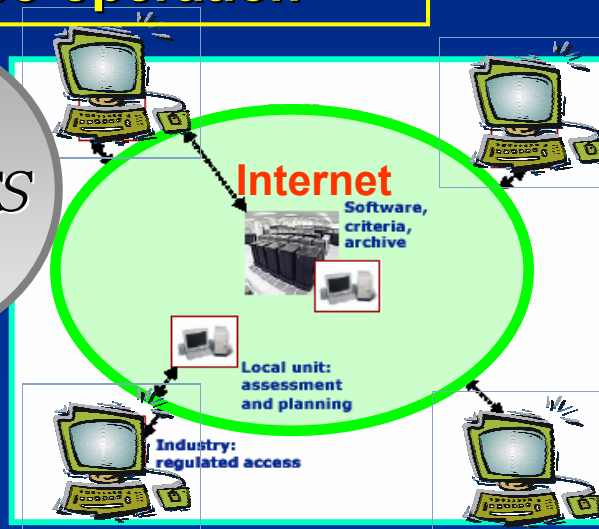
## Risk Assessment

### 3. Management of the information regarding each single operator in order to guarantee continuous co-operation

*TARGET*

Definition of an efficient procedure to manage and diffuse information

*RESULTS*





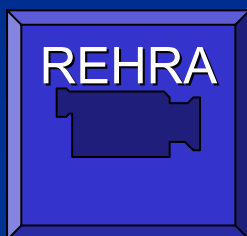
# Risk management of hazardous sites

## Role of Authority



## Risk Assessment – possible solution

### REHRA Methodology



Specialized software for managing risks associated to hazardous sites at national level

- **Rapid Environment and Health Risk Assessment**
- **GIS based software**
- **Possibility for Web-expansion**



## Finally... Some considerations

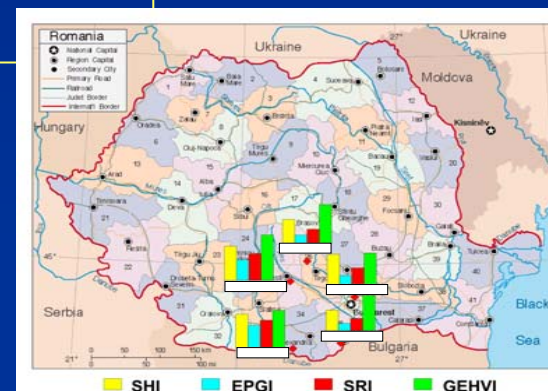
- **Safety Management System (SMS) is a structured tool that allows the definition of the organization and the procedure dedicated to risk reduction.**
- **SMS main elements are defined in the 96/82/CE Directive “Seveso II”.**
- **SMS requires continuous audit and monitoring in order to improve the process.**
- **Plan for safety improvement should be defined periodically, identifying the measures for risk reduction (technical and organizational).**





## Finally... Some considerations

- Authority has the role to promote the awareness on risks at hazardous sites.
- Good and widely applied guidelines to provide to operators can be derived by EU Directives associated to prevention of major accidents.
- An efficient process of co-operation with hazardous sites operators should be installed, based on a preliminary screening and ranking of the risks at national level.





## References

- **Guidelines on a Major Accident Prevention Policy and Safety Management System, as Required by Council Directive 96/82/EC (Seveso II)**  
<http://mahbsrv.jrc.it/GuidanceDocs-SafetyManagementSystems.html>  
New Guidance on the Preparation of a Safety Report to meet the Requirements of Directive 96/82/EC as amended by Directive 2003/105/EC (Seveso II)
- **New Land-Use Planning Guidelines in the context of Article 12 of the Seveso II Directive, as amended by directive 105/2003/EC, adopted by the Committee of Seveso Competent Authorities**  
<http://mahbsrv.jrc.it/GuidanceDocs.html>
- **IAEA, UNEP, UNIDO, WHO. Method for classification and prioritisation of risk due to major accidents in process and related industries. IAEA, November 1996**
- **Rapid Environment and Health Risk Assessment (REHRA)**  
<http://www.icarocortona.it>  
[n.manning@icarocortona.it](mailto:n.manning@icarocortona.it)
- **OECD Guiding principles to chemical accidents: prevention, preparedness and response, 2003**  
<http://www.oecd.org>

ICARO

UNITED NATIONS  
ECONOMIC COMMISSION



***THANK YOU !!!***

