

# **Risk assessment for workers of SMEs within an industrial park**

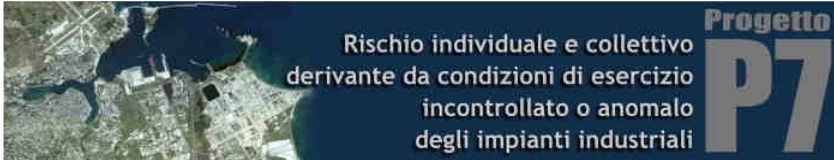
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- SME in Industrial Park: OSH – Major Accident - Environment
- Case Study Brindisi Industrial Park
- Questionnaire
- Operating proposals:
  - Unified risk assessment (Converting environmental risks in personal risks)
  - harmonizing health protocols,
  - addressing protection equipment
  - promoting safety culture





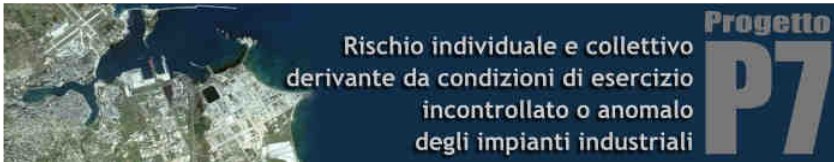
## SME's in industrial Park

An industrial park is a structured site, accommodating hundreds of enterprises, which exploit mutual synergies and share materials, commodities, infrastructures and services

Trends toward Industrial parks where several separate organisations are working on the same site and responsibilities are not always clear.

Major Accident scenarios impact many single facilities and may involve workers of different firms. Furthermore emissions from singles plant may impact the ambient air quality of the overall park, affecting workers health.

As industrial parks evolve from old industrial sites, the soil is usually highly polluted, due to the industrial activities in past decades.



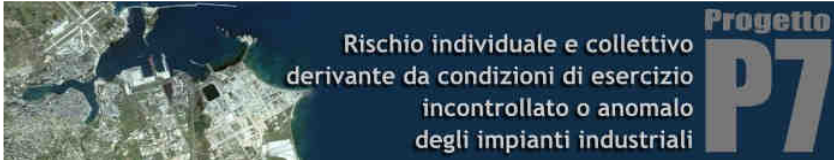
## SME's in industrial Park: Integrating Enterprises

Even though the duties of Occupational Safety and Health (OSH) management are spread among a number of employers, but hazards affect all workers in the area, without discriminations.

In a few countries, including Italy, most workers within industrial parks are employed by a number of small/medium sized enterprises – SME's

Outsourcing works not risks!

Need of shared criteria – methods – tools within the cluster



## SME's in industrial Park: Integrating OSH, MAH, PPC

### Occupational accident OSH

Lower Consequences – Higher Probability – small community firm

### Occupational Diseases OSH

Certain Consequence - small community

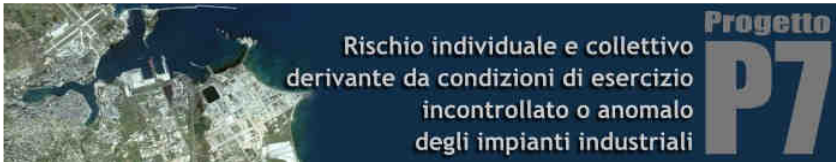
### Major Accident MAH

Higher Consequences - Lower Probability – larger communities

### Environmental Pollution PPC

Uncertain Consequences - larger community

In an industrial clusters most occupational and accidental risks are shared by many operators (including contractor, transport, and maintenance firms). Air (Soil) Pollution is related to the present (Past) industrial activities.



## Case Study: Brindisi Industrial Park 1

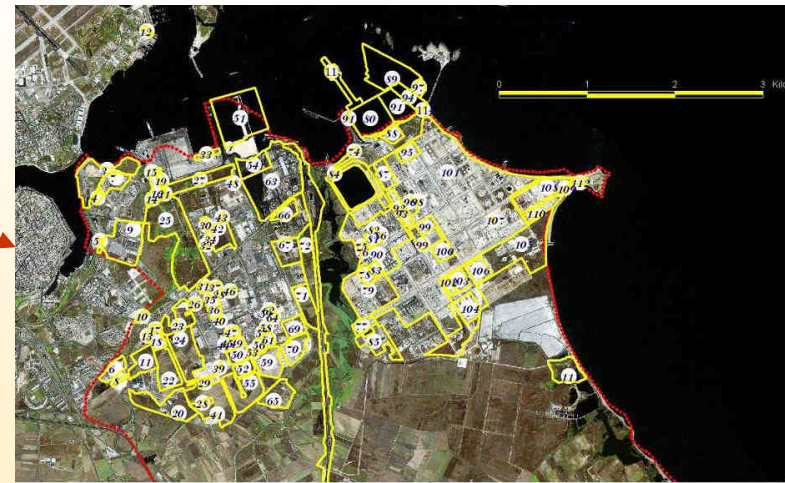
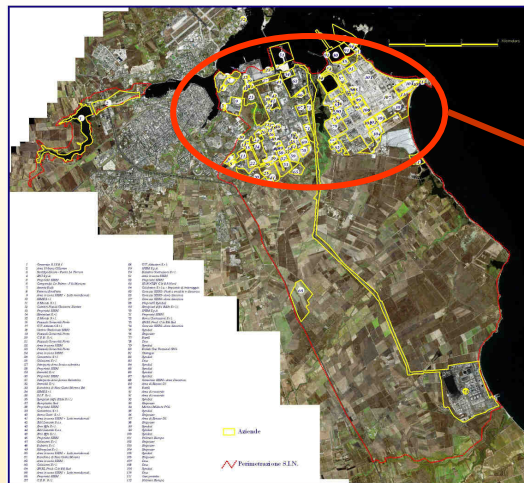
200 firms, 5000 workers

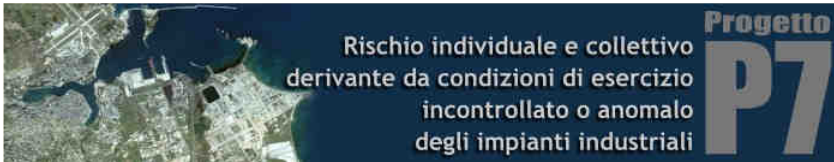
A few larger petrochemical and chemical plants (Large Multinational Companies) Massive Production (Polymers – Energy) (1/3 workers)

Many small firms (local enterprises) supply of mechanical and chemical goods, maintenance, transport, services, manufacturing of final products. (2/3 workers)

Occupational Safety and Health is managed by 200 independent employers... But the most OSH risk area shared by a number of firms.

Major Accident Scenarios managed by 5 operators involve workers of many firms





## Case Study: Brindisi Industrial Park 2

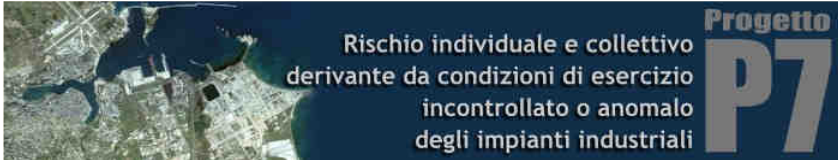
*Fatal accidents in Brindisi:  
small maintaining firms operating at large plants*

*4 Nov 2008 1 death*

*13 May 2009 1 severe injuries*

*June 2010 1 death + 4 severe injuries*





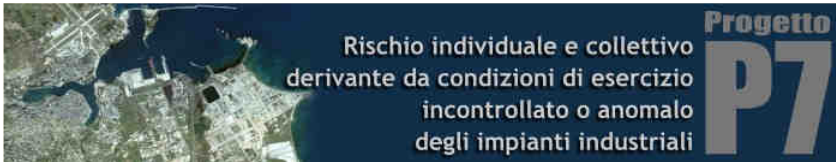
Rischio individuale e collettivo  
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Progetto  
**P7**

## Case Study: Brindisi Industrial Park 3

### Total Amount of Hazardous Substances in Petrochemical Cluster within the Park

Substance Type	Threshold limit Seveso Directive	Actual Amount
VERY TOXIC	20	0
TOXIC	200	190,000
OXIDIZING	200	470
FLAMMABLE	50000	15
HIGHLY FLAMMABLE	200	0
EXTREMELY FLAMMABLE	50000	5700
HIGHLY FLAMMABLE LIQUIDS	50	230,000
DANGEROUS FOR THE ENVIRONMENT R50	500	10
DANGEROUS FOR THE ENVIRONMENT R51 R53	2000	300
ANY CLASSIFICATION NOT COVERED R14	500	43
ANY CLASSIFICATION NOT COVERED R29	200	0



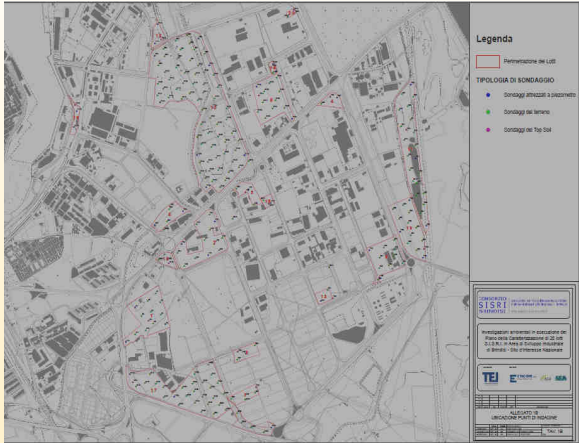
# Case Study: Brindisi Industrial Park 4

A severe soil pollution from the activities in past Decades.  
 A partial remediation has been carried out in recent years,  
 but a few pollutants are yet present

Arsenic

at a few positions  
 Mercury, Hydrocarbons, PCB, Pesticides.

In groundwaters  
 Chlororganic substances,  
 heavy metals, ammines



Inquinante	Num. superamenti CLA D.Lgs. 471/99	Num. superamenti CSC D.Lgs. 152/06	Distribuzione all'interno dei 19 lotti																			
			1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	19	20	
Arsenico	16	12	1			1	3					2						9				
Benzene	1	1				1	2						1					8				
clordano	3	2										1						2				
DDD	2	2		1									1									
DDE	3	3		1								1	1									
dieldrin	1	1										1	1					1				
Numero superamenti totali	26	21	1	2		1	3					4	3				1	11				
Num. Totale campioni superanti i limiti	24	19	1	2		1	2					2	3				1	9				

Nel Lotto 5, sond. P34 sono presenti due superamenti di ARSENICO a due differenti profondità, sia ai sensi del D.Lgs 471/99 e sia D.Lgs. 152/06

Nel Lotto 17, sond. 206 sono presenti due superamenti, rispettivamente di ARSENICO e di CLORDANO a due differenti profondità, sia ai sensi del D.Lgs 471/99 e sia D.Lgs. 152/06

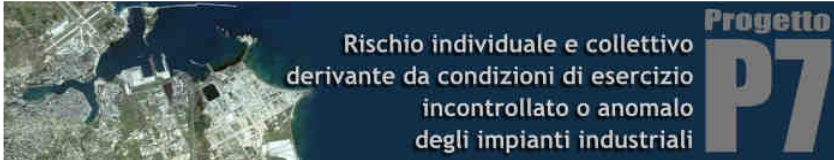
Tabella 3.1: Superamenti nei campioni di terreno secondo le due normative D.Lgs 471/99 e D.Lgs. 152/06

- Target Safety & Health Managers
- Prevention Occupational Safety +Control of Major Accident Hazard
- Interview based
- Quantitative values, or Yes/No
- Five Sections:
  - I. General
  - II. Materials
  - III. Machines
  - IV. Community
  - V. Persons

- 2.201 employee; 1.212 contractors (small firms).
- Duty Holder, HSE, Occupational Physician
- Major Establishments:

1.	AVIO	Revisione motori aeronautici
2.	SANOFI AVENTIS	Produzione chimico-farmaceutica
3.	EXXON-MOBIL	Produzione film polipropilene
4.	ENIPOWER	Produzione energia
5.	IPEM	Deposito GPL
6.	CHEMGAS	Produzione gas tecnici
7.	ENEL	Produzione energia
8.	BASELL	Produzione Poliolefine
9.	POLIMERI	Petrolchimico





## Questionnaire 3: Health Surveillance program

Employees who are subject to health surveillance are being 78% of the workforce,

exposure to carcinogens 17%,

to chemical agents 22%

to biological agents 3%

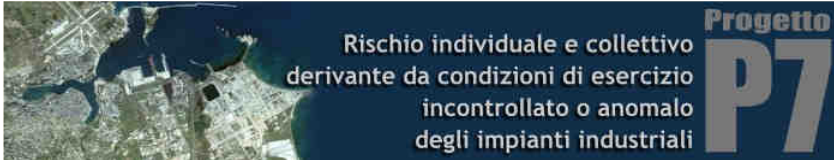
to other factors (e.g. powders) 12%

The health protocols adopted are basically consistent with risks found in the Risk Assessment Documents, but a frequent overestimation of risk was noted, in terms of type and frequency of medical examinations.

It has to be noted that for some exposures (e.g. radiation, microclimate, manual handling, acrylic lacquers, etc..) a three-year program of radiographic examinations of chest and spine are provided.

For chemical risk, routine blood tests are provided, such as CBC with formula and platelet count, cholesterol, GOT / GPT, bilirubin, BUN, alkaline phosphatase and only in some cases, the biological monitoring of chemical agents: Al, Cr, Ni, Mg, Va.

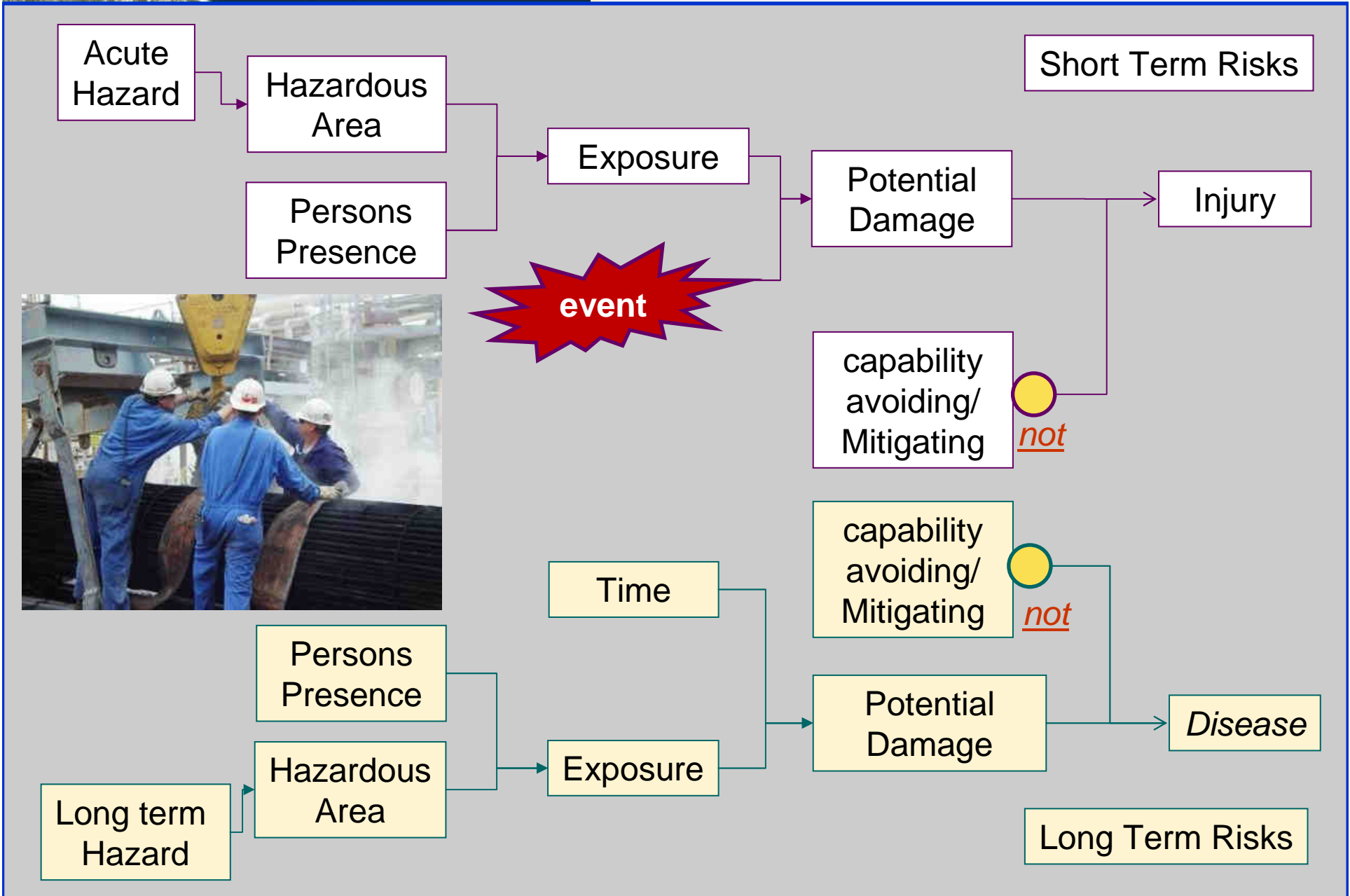
Biological monitoring for carcinogens, such as benzene and chromium, are made in a more consistent way.



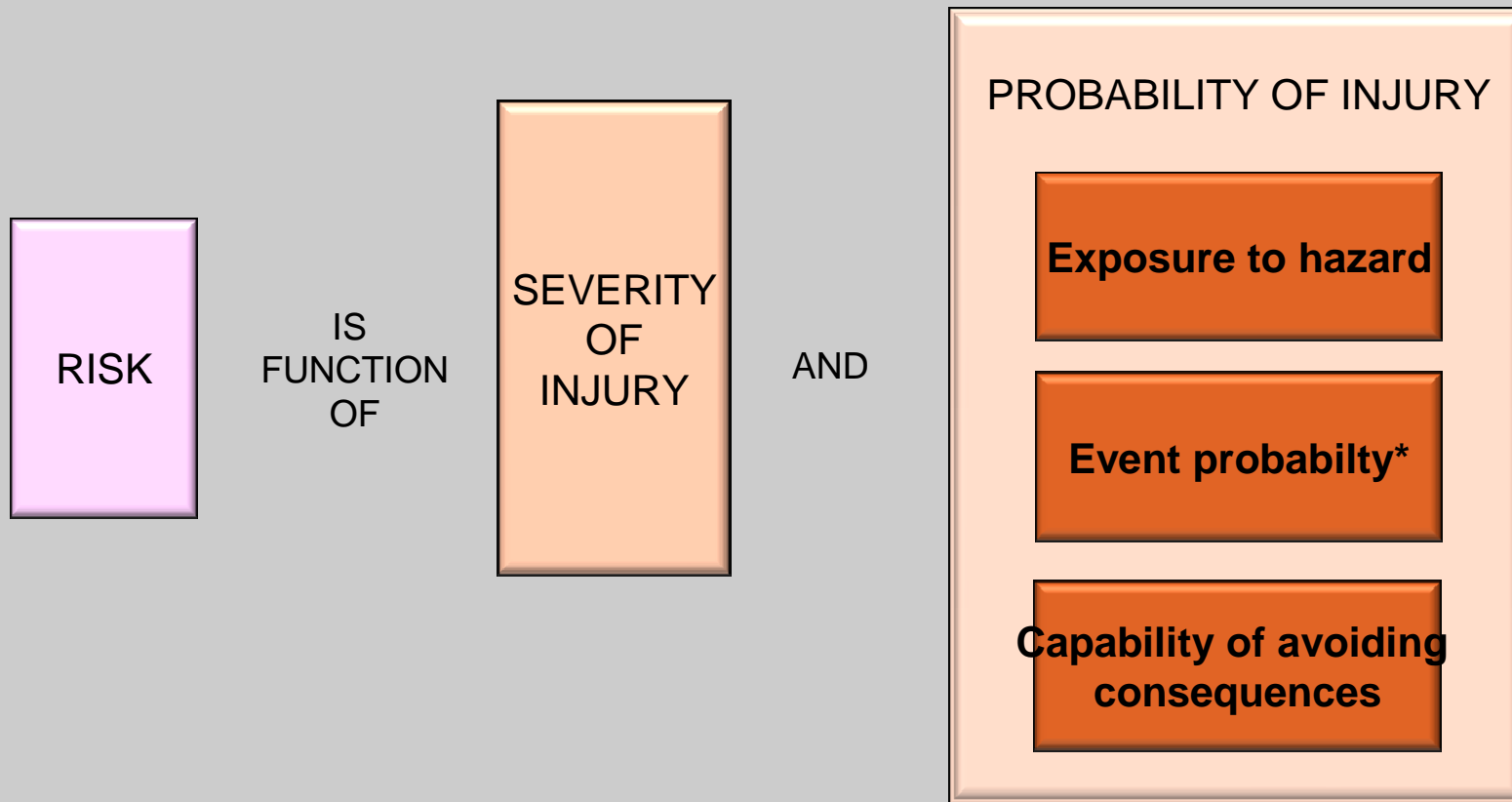
## Operating Proposals

- Unified methods for risk assessment
- Unified method for selecting protection equipment
- Harmonized Health surveillance protocol
- Shared safety culture

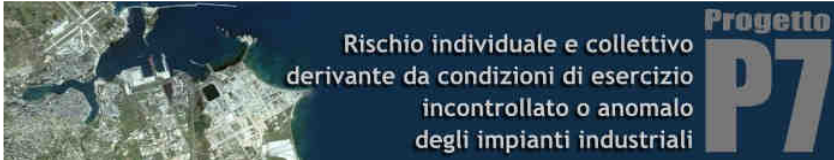
# Quantified Occupational Risk 1



## Quantified Occupational Risk 2



\* = 1 for long term hazard



## Quantified Occupational Risk 3

**Hazard exposure** = time spent within the area of potential damage:

Factors to be accounted

- Needs of accessing hazardous area (normal operations, anomalies, inspections, Maintenance,
- Time spent within hazardous areas
- Number of worker authorized to accessing dangerous areas
- Frequency of accesses

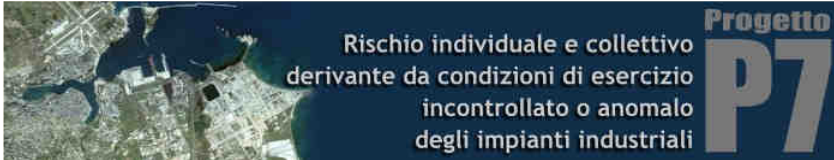
### **Hazardous events**

loss of containment (as considered in MAH studies)

but also machines failures - Potentially explosive atmosphere, falls, cuts,

...

- Events related to Equipment Reliability & Human Reliability



## Quantified Occupational Risk 4

### Capability of avoiding/ limiting consequences

#### Capability is related to

Collective – Personal Protection equipment

Information - Personal skill and behavior

#### Different types of worker

Employees (working in the unit)

Employees (working in other units /establishments)

Contractors – Inspectors – Truck drivers

Visitors

#### Time from event to damage

immediate (e.g. explosion)

fast (e.g. Fire - Machinery)

slow (e.g. Toxic)

# Quantified Occupational Risk 5

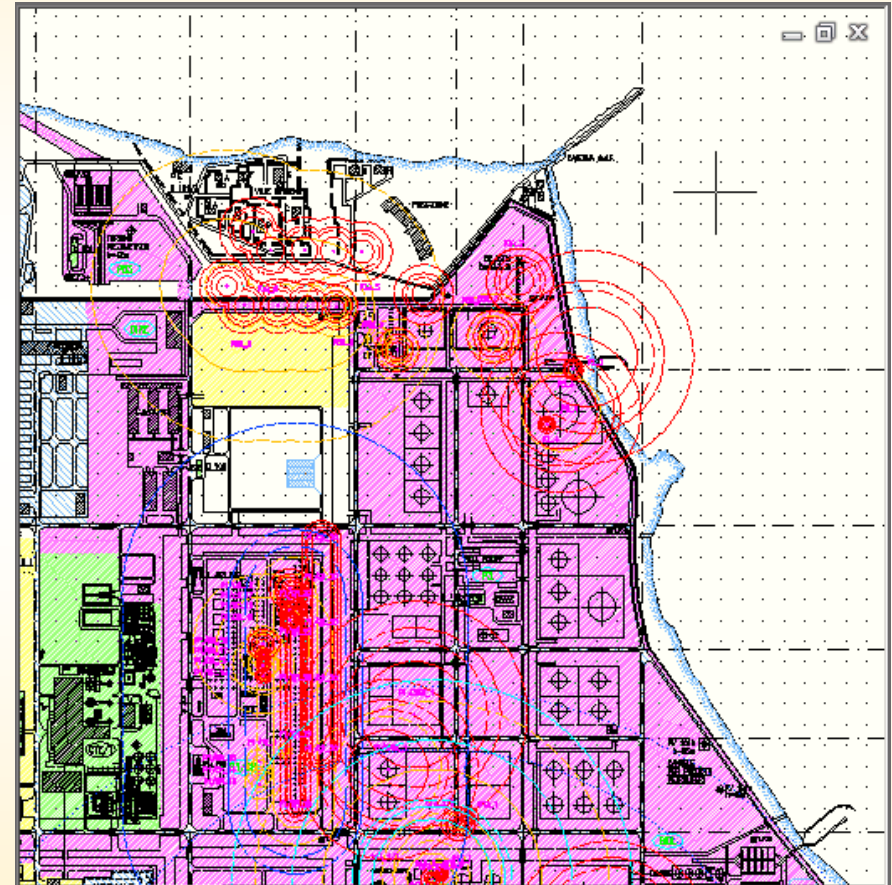
## Occupational

A detailed table for occupational risk assessment. It features a header with 'RISCHIO OCCUPAZIONALE' and 'RISCHIO AMBIENTALE/ACCIDENTALE'. The table has multiple columns for identifying hazards, their sources, and the associated risks. Below the table, there are several paragraphs of text providing additional context and instructions for the assessment process.

A second detailed table for occupational risk assessment, similar in structure to the first one. It includes a header, a main table with columns for hazard identification and risk evaluation, and a section of text at the bottom.

Based on JOB description

## Accidental/Env.



Based on affected areas

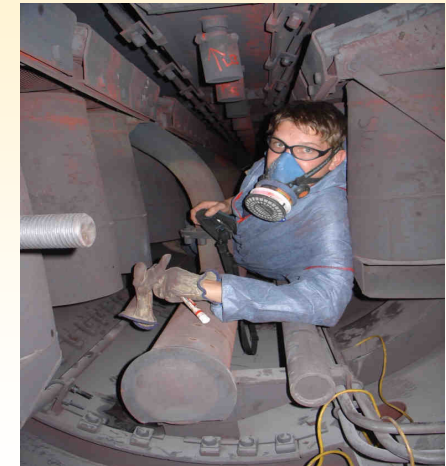
### Maintenance is essential for safety, but safety is essential for maintainers!

Job related risk (working in  
elevation, carrying weights,  
using devices)

Knowledge by inspection firms

Site related risks (noise,  
heath, weather, confined  
spaces, slippery surfaces,  
toxic substances, major  
accidents)

Knowledge by plant operators



**Occupational Risks To Be Covered (for Inspections)**

Physical | Chemical | Biological | Other... | RESET

Mechanical | Thermal | Electrical | Radiation | Noise

Caduta\_di\_oggetti  
Schiacciamento\_punta\_piede  
Pericolo\_di\_scivolamento\_suOli  
Abrasivi  
Rumore\_Continuo

**Environmental Risks**

Object Falling  
Toxic  
Dust  
Slip  
Noise  
Confined Space  
Fire  
Microclimate

Caduta\_di\_oggetti

RESET

**Hazard Selection**

OK  
CANCEL  
RESET

HEAD  
HEAR EYE EYE HEAR  
BREATHING  
HAND BODY HAND  
FOOT FOOT

**PPE's**

Elmetto\_EN397\_F  
Elmetto\_EN397\_bassaT\_440V\_noAccessori  
Elmetto\_per\_industria\_81  
Elmetto\_EN397\_LD

Otoprotettore

Guanti\_2342\_x34xxx  
Guanti\_454x  
Guanti\_1110  
Guanti\_2342\_42xxx

Scarpe\_tipoS1P\_antiscivolo\_oli

**Risks arising from Equipment & Criteria for Selection**

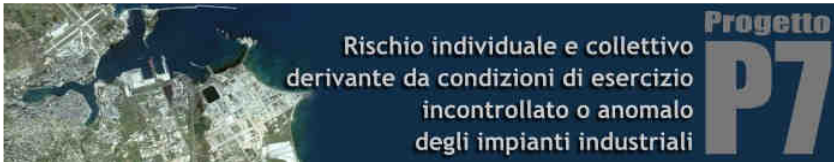
- Weight

Problemi\_di\_peso | Riduzione\_massa\_dispositivo | Buona\_distribuzione\_del\_peso

OK  
UNDO  
RESET

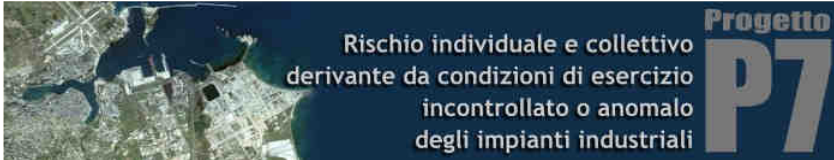
weight

PPE	Parameter
Elmetto_EN397_F	350
Elmetto_EN397_bassaT_440...	349
Elmetto_per_industria_81	null
Elmetto_EN397_LD	350



## Harmonized Health Protocol

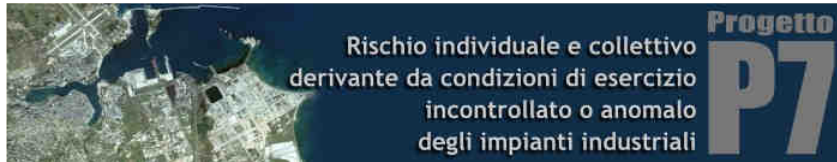
- By analyzing the health protocols of the visited firms, a basic consistency with internal hazards has been seen; but in a few protocols, type and schedule of examination are oversized.
- A stricter cooperation between physicians and local health authority could help to harmonize protocols. Environmental monitoring could help to find unknown residual risk, which should be considered in order to have a minimal shared protocol within the park.
- Furthermore risk related to the maintenance should be considered. Even though such an activity is fragmented in a number of firms, the risks are always the same, including musculoskeletal disorders (MSDs), skin and respiratory diseases due to contact with greases, solvents, corrosives and dusts; asphyxiation in confined spaces



## Shared safety culture 1

- The organizational structure of the park, with a number of SMEs is not an obstacle.
- The network of companies may be very helpful to develop and share evaluation criteria and educational programs. The higher safety culture in major companies may be transferred through the network to SMEs.
- The occupational physicians and other consultants who provide their services to several firms may act as mediators to promote an integrated risk assessment and management.



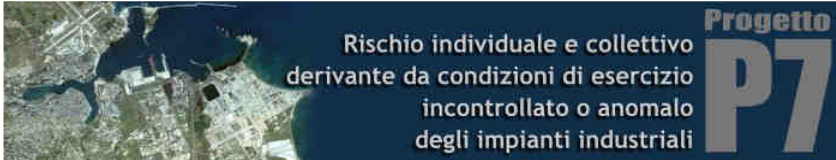


Rischio individuale e collettivo  
derivante da condizioni di esercizio  
incontrollato o anomalo  
degli impianti industriali

Progetto  
P7

## Conclusions

- the legislations on OSH, MAH and PPC are separate, a technical harmonization is possible.
- The consistency of assessment is an essential condition for the integrating of the Safety, Health and Environment management system.
- It's essential to have in the park an unified and harmonized occupational health protocol. It should allow to monitor all possible diseases resulting from exposures of individual employees in chemical and physical agents in the production cycle, as well as those resulting from previous activities or activities on other sites.



Rischio individuale e collettivo  
derivante da condizioni di esercizio  
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Progetto  
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## **Risk assessment for workers of SMEs within an industrial park**

**Thanks for your attention!**