



FEDERCHIMICA
CONFINDUSTRIA

Legislazione "Seveso" e contesto internazionale.

Giuseppe Astarita
Federchimica

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**La normativa sui rischi
di incidente rilevante (RIR)
derivanti dalle attività industriali**

La normativa (RIR)

- ✓ La normativa sui rischi di incidente rilevante ha lo scopo di sottoporre a specifica disciplina le attività industriali con maggiore potenziale di **pericolo**, allo scopo di assicurare la riduzione del relativo **rischio** a livelli il più possibile ridotti e comunque accettabili;
- ✓ Si tratta in linea di principio di una normativa **speciale**, che definisce una disciplina particolare per una **minoranza** di attività industriali, meritevoli di particolare attenzione;
- ✓ Un equivoco molto diffuso porta ad ignorare che il controllo dei rischi di tutte le attività industriali (con le relative garanzie per la comunità) è affidato alla legislazione generale, e che estendere impropriamente il campo di applicazione della normativa RIR sarebbe **controproducente** .
- ✓ Sviluppo della normativa "innescato" dall'impatto di alcuni incidenti industriali, a partire dagli anni '70

Ammonium Nitrate Explosion

Oppau, Germany – Sept. 21, 1921



Photo shows crater and destruction at plant following explosion. At 7:30 a.m. on September 21, 1921, two powerful explosions occurred at the BASF plant in Oppau, Germany.

Hazardous material: Ammonium sulfate & ammonium nitrate (50/50)

Facility type: fertilizer manufacturing

Deaths: 430-530 (differing numbers on reported fatalities)

Ammonium Nitrate Explosion

Texas City, Texas – April 16, 1947

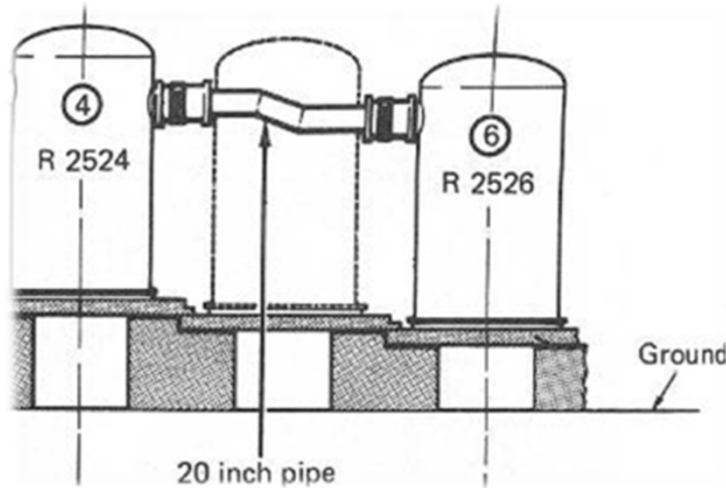


This aerial photograph, looking south over Monsanto Chemical Co., was taken about 30 minutes following the blast of the ship S. S. GRANDCAMP during loading of ammonium nitrate. The accident damaged more than 90% of the city's buildings and killed nearly 600 people.

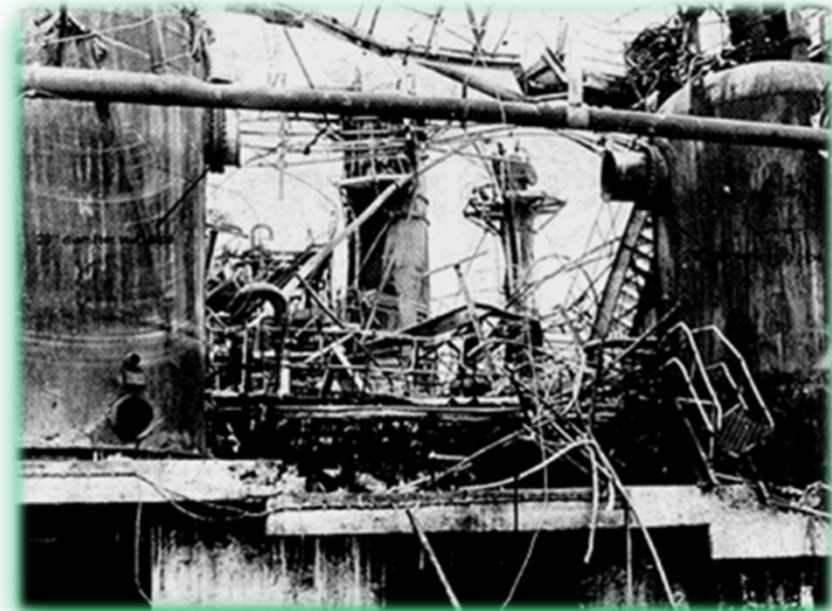


Gli incidenti industriali legati allo sviluppo della legislazione

Cyclohexane Release & Explosion Flixborough, England – June 1, 1974



20" bypass piping fabricated on-site from shop stock. This pipe ruptured and released cyclohexane which exploded.



Source: UK Health and Safety Executive, Hazardous Installations Directorate

On June 1, 1974 the Nypro Co. site at Flixborough, England was severely damaged by a large explosion. Twenty-eight workers were killed and a further 36 suffered injuries. It is recognized that the number of casualties would have been more if the incident had occurred on a weekday, as the main office block was not occupied. Offsite consequences resulted in fifty-three reported injuries. Property in the surrounding area was damaged to a varying degree.

Seveso, Italy - 1976



The Seveso accident happened in 1976 at a chemical plant manufacturing pesticides and herbicides. A dense vapor cloud containing tetrachlorodibenzoparadioxin (Dioxin) was released from a reactor, used for the production of trichlorofenol.

Commonly known as dioxin, this was a poisonous and carcinogenic by-product of an uncontrolled exothermic reaction. Although no immediate fatalities were reported, kilogram quantities of the substance lethal to man even in microgram doses were widely dispersed which resulted in an immediate contamination of some ten square miles of land and vegetation.

More than 600 people had to be evacuated from their homes and as many as 2,000 were treated for dioxin poisoning. This led to the European “Seveso Directive” to try to prevent similar incidents.

Methyl Isocyanate Tank Rupture and Release Bhopal, India – Dec. 2-3, 1984



Source: United Nations Environment Programme



Photo Source: Indian state government of Madhya Pradesh

On the night of December 2-3, 1984, a sudden release of about 30 metric tons of methyl isocyanate (MIC) occurred at the Union Carbide pesticide plant at Bhopal, India. The accident was a result of poor safety management practices, poor early warning systems, and the lack of community preparedness. The accident led to the death of over 2,800 people (other estimates put the immediate death toll as high as 8000) living in the vicinity and caused respiratory damage and eye damage to over 20,000 others. At least 200,000 people fled Bhopal during the week after the accident. Estimates of the damage vary widely between \$350 million to as high as \$3 billion.

[Report – The Accident in Bhopal: Observations 20 years later](#)

Phillips 66 Houston Chemical Complex

Pasadena, Texas – Oct. 23, 1989



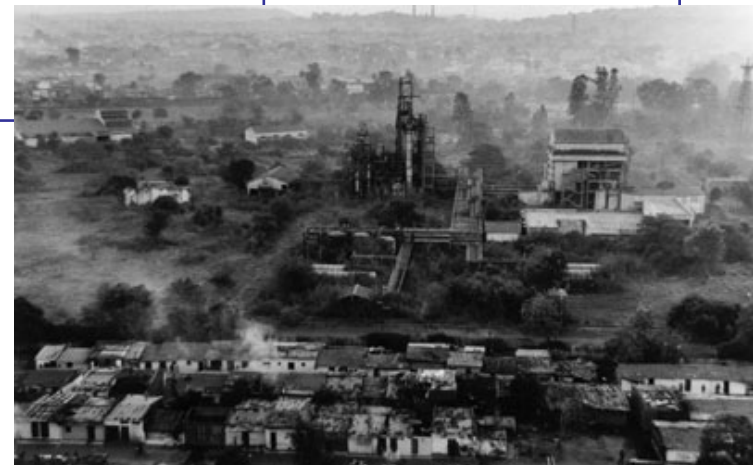
On October 23, 1989, at approximately 1:00 p.m., an explosion and fire ripped through the Phillips 66 Company Houston Chemical Complex in Pasadena, Texas. Twenty-three workers were killed and more than 130 were injured. Property damage was nearly three-quarters of a billion dollars. The accident resulted from a release of extremely flammable process gases that occurred during regular maintenance operations on one of the plant's polyethylene reactors. The evidence showed that more than 85,000 pounds of highly flammable gases were released through an open valve. A vapor cloud formed and traveled rapidly through the polyethylene plant. Within 90 to 120 seconds, the vapor cloud came into contact with an ignition source and exploded with the force of 2.4 tons of TNT.

This event and the Bhopal disaster triggered the development of the PSM standard

Rischi di Incidente Rilevante

Legislazione nata a seguito di incidenti particolarmente gravi

Incidente	Data	Area Geografica	Legislazione
Flixborough	Giugno 1974	UK, Europa	UK
Seveso	Luglio 1976	Italia, Europa	UE
Bhopal	Dicembre 1984	Madhya Pradesh India	USA



Major PSM related incidents 1974 - 2001

<u>Location of Accident</u>	<u>Date</u>	<u>Type of Event</u>	<u>Some Resulting Consequences</u>	<u>Regulatory Response</u>
Flixborough, UK	1974	Explosion and fire	28 killed, over 100 injured	COMAH 1984
Seveso, Italy	1976	Runaway reaction	Large Dioxin environment contamination massive evacuations, Large animal kill	Initial Seveso Directive
Bhopal, India	1984	Runaway MIC reaction	~ 2500 people killed and 100,000 injured, high litigation costs	USA Emerg. Planning & Community Right to know Act- CMA CAER Program
Basel, Switzerland	1986	Warehouse Fire	Massive contamination of Rhine and very large fish kill	Changes in Seveso Directive
Pasadena, USA	1989	Explosion and fire	23 deaths, ~ 100 injured Over \$1 billion in losses	Triggered 1990 USA CAAct & RMP & PSM process Stds
Longford, Victoria, Australia	1998	Explosions and fires	Two deaths, gas supply to Melbourne cut for 19 days. Losses over \$1.3 Billion	Process Regulatory initiatives Victoria
Enschede, The Netherlands	2000	Explosion and fire	22 deaths, ~ 1000 injured, 350 houses and factories destroyed	Changes in Seveso Directive
Toulouse, France (Oppau ^c & Texas City ^d)	2001	Explosion and fire	30 deaths, ~ 2000 injured, 600 homes destroyed, 2 schools demolished	Changes in Seveso Directive

Source: Wharton Risk Management and Decision Processes Center of the University of Pennsylvania.

Le basi della legislazione.

L'esperienza e l'analisi dei (gravi) incidenti industriali ha portato allo sviluppo formalizzato di tecniche gestionali, scientifiche, e ingegneristiche. Ricordiamo

- Gestione del cambiamento
- Permessi di lavoro
- Preparazione all'emergenza
- Protezione sala controllo: posizione, pressurizzazione
- Vicinanza insediamenti civili
- Studio delle reazioni "runaway"

Le basi della legislazione.

Ma, soprattutto, emerge l'importanza di un approccio sistematico nelle attività di prevenzione. Si parla di "Process Safety" (Sicurezza di Processo) e Process Safety Management (PSM).

PSM: applicazione di sistemi di gestione all'identificazione, comprensione e controllo dei pericoli di processo, per prevenire incidenti, con conseguenti danni alle persone, alla proprietà, e interruzioni di produzione.

C'è accordo sul fatto che quello che oggi si intende per PSM, abbia cominciato ad essere praticato dopo Flixborough (1974); il termine ebbe ampia diffusione con lo Standard OSHA 29 CFR 1910.119 (PSM of Highly Hazardous Chemicals, 1992)

Occupational Health and Safety

- Workplace rules
- Worker training
 - Supervision
- Individual behaviors
- Safety equipment
- Focus on individual well being

Process Safety

- Collective commitment
- Addresses events over which the individual worker has little or no control
- Focus on systems
 - Broader impact – events that could affect groups of workers or general public

Process Safety: a definition.

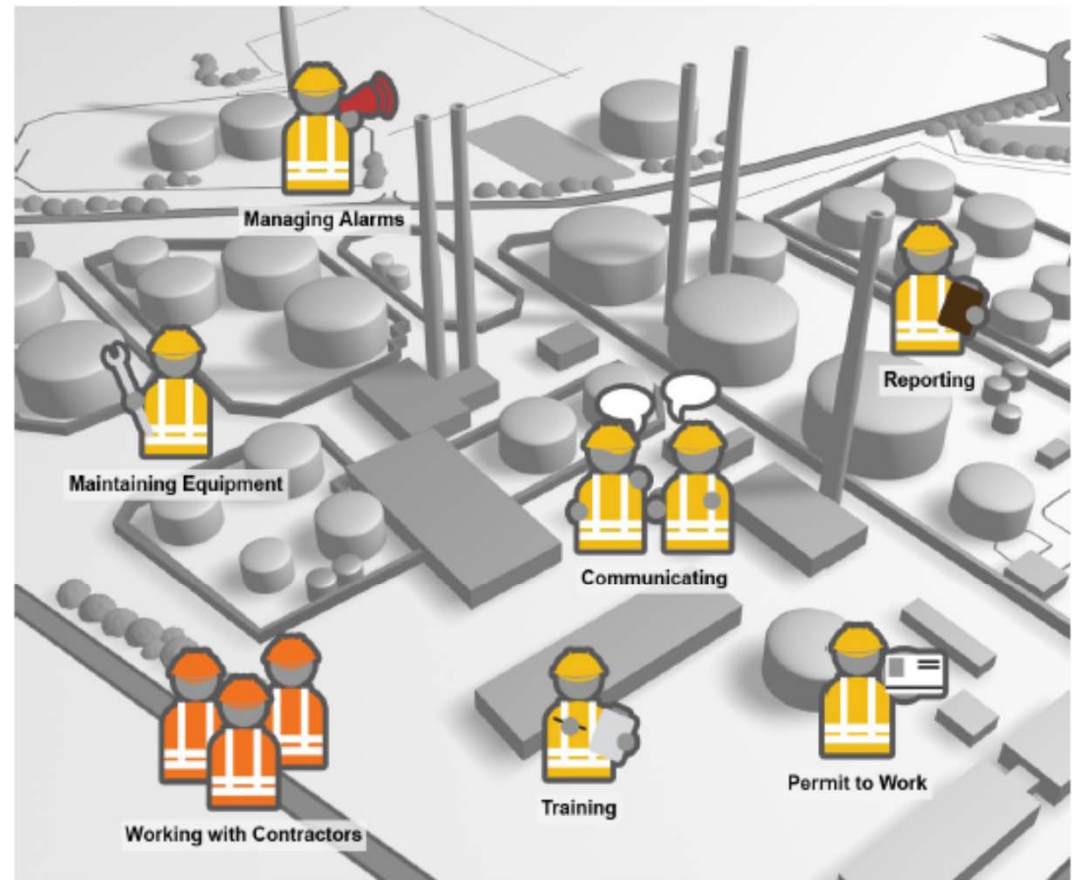
- Process safety: the prevention of leaks, spills, equipment malfunction, overpressures, overtemperatures, corrosion, metal fatigue and other similar conditions.

(Baker *et al.*, 2007)



Process Safety: another definition

- Process Safety is a blend of engineering and management skills focused on preventing catastrophic accidents, particularly explosions, fires and toxic releases associated with the use of chemicals and petroleum products (CCPS, 2010).



Le direttive “Seveso”

Direttiva Seveso I: dir. 82/501/CEE
(recepita con D.P.R. 17 maggio 1988, n. 175)

Direttiva Seveso II: dir. 96/82/CE
(recepita con D.Lgs. 17 agosto 1999, n.334)

Revisione Seveso II: dir.105/2003/CE
(recepita con D.Lgs. 21 settembre 2005 n. 238)



21 dicembre 2010

La Commissione europea propone il testo della nuova direttiva **SEVESO III** (COM/2010/0781)

Fundamentals of current Seveso II

- Focus is prevention of major accidents and limitation of their consequences.
- Hazard-based: Quantity of dangerous substances present (listed in Annex I; part 1: named substances; part 2 substances under certain EU hazard classifications)
- Requirements proportionate to the risk: 2 tier approach
- Covers mainly chemical and petrochemical industry, storage, big industrial production and energy installations. ~ 10,000 establishments, 45 % upper tier
- Goal-setting - no specific requirements regarding physical measures nor detailed procedures for risk assessment/management

Philosophy of Seveso II Directive

INSPECTIONS



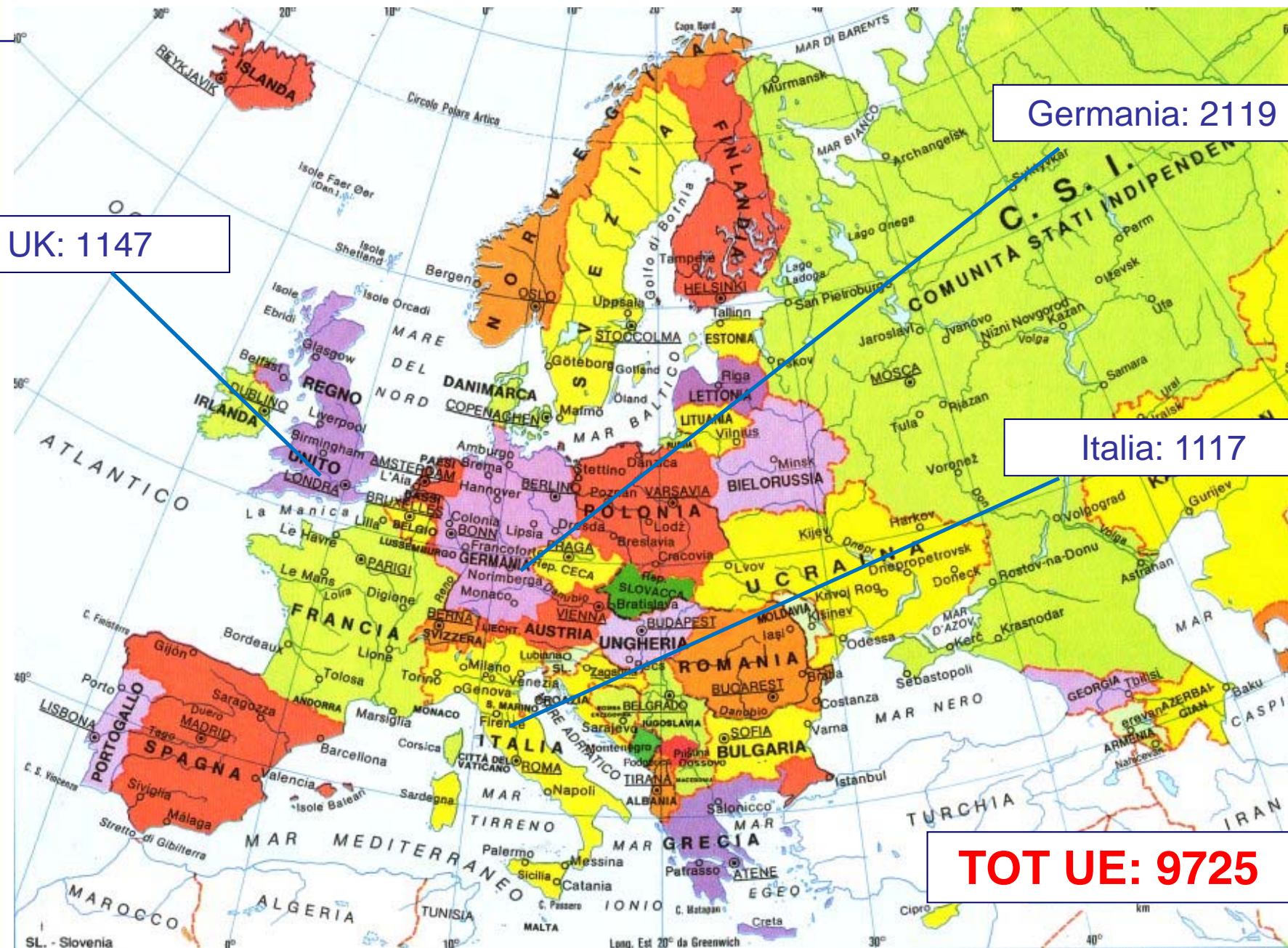
UE: Stabilimenti in Seveso

UK: 1147

Germania: 2119

Italia: 1117

TOT UE: 9725



UE: Stabilimenti Seveso

Paese	Upper Tier	Lower Tier	N° Totale
	4496	5227	9725
Germania	1071	1048	2119
UK	411	736	1147
Italia	519	598	1117
Francia	553	553	1106
Spagna	267	406	673
Olanda	221	163	384

Il giudizio sullo stato della normativa

- ❑ La normativa è in uno stadio di maturità, con risultati soddisfacenti (vedi anche Stakeholder consultation, 10 novembre 2009).
- ❑ Si tratta di una legislazione “speciale”, destinata alle attività (industriali) meritevoli di particolare attenzione
- ❑ Per la sua efficacia, la sua applicazione deve rimanere “limitata”: una sua eventuale applicazione estesa non è né desiderabile, né funzionale agli scopi;
- ❑ La legislazione di sicurezza “ordinaria” è una risposta adeguata per la generalità delle attività industriali.

I motivi della revisione della direttiva

- ❑ L'attuale campo di applicazione è basato sulla classificazione di sostanze e miscele, che è in via di sostituzione con l'adozione del GHS (Global Harmonised System).
- ❑ Direttive 1967/548/CE e 1999/45/CE sostituite da Reg. "CLP" (Reg. 1272/2008, in vigore a regime dal **1° giugno 2015**).
- ❑ Le difficoltà della "traduzione" da vecchia a nuova classificazione (per le sostanze con **effetti sulla salute**) producono il rischio di un allargamento del campo di applicazione, che deve essere minimizzato.
- ❑ Il nuovo campo di applicazione è stato il tema critico del dossier.

Seveso and GHS - Interface of Classification Systems

Systems are not identical !!!

Seveso refers to
DSD and DPD

DSD
67/548/EEC
DPD
1999/45/EC

DSD and DPD
repealed
by 1 June 2015

Health Hazards

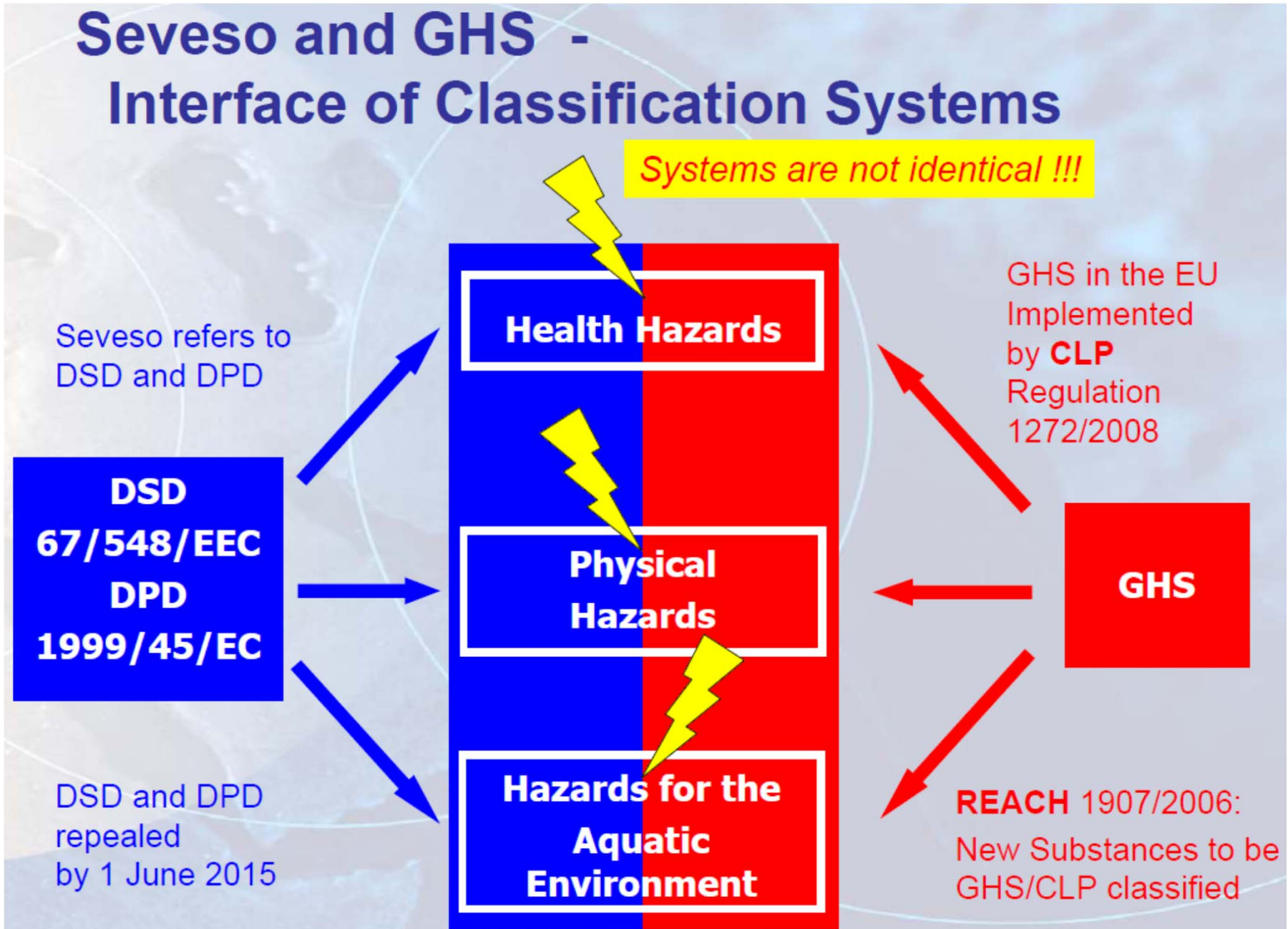
**Physical
Hazards**

**Hazards for the
Aquatic
Environment**

GHS in the EU
Implemented
by **CLP**
Regulation
1272/2008

GHS

REACH 1907/2006:
New Substances to be
GHS/CLP classified



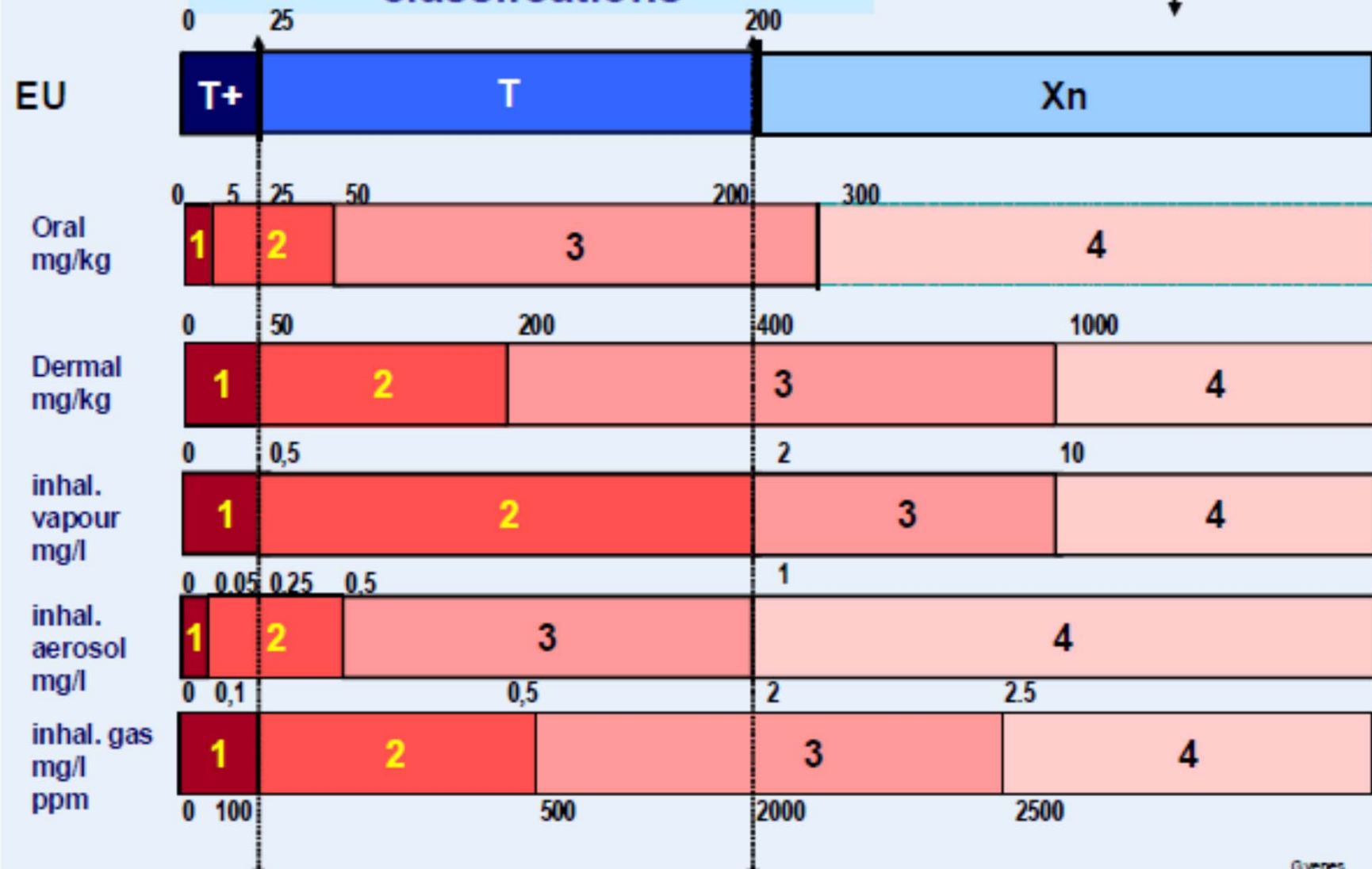
Seveso (Direttiva 96/82/CE)

Nella revisione della Direttiva 96/82/CE preparazione del documento è emerso che:

- ✓ i pericoli chimico-fisici e ambiente sono sostanzialmente confrontabili;
- ✓ le problematiche per i pericoli riguardanti la salute sono più complesse e sono state oggetto di varie proposte.

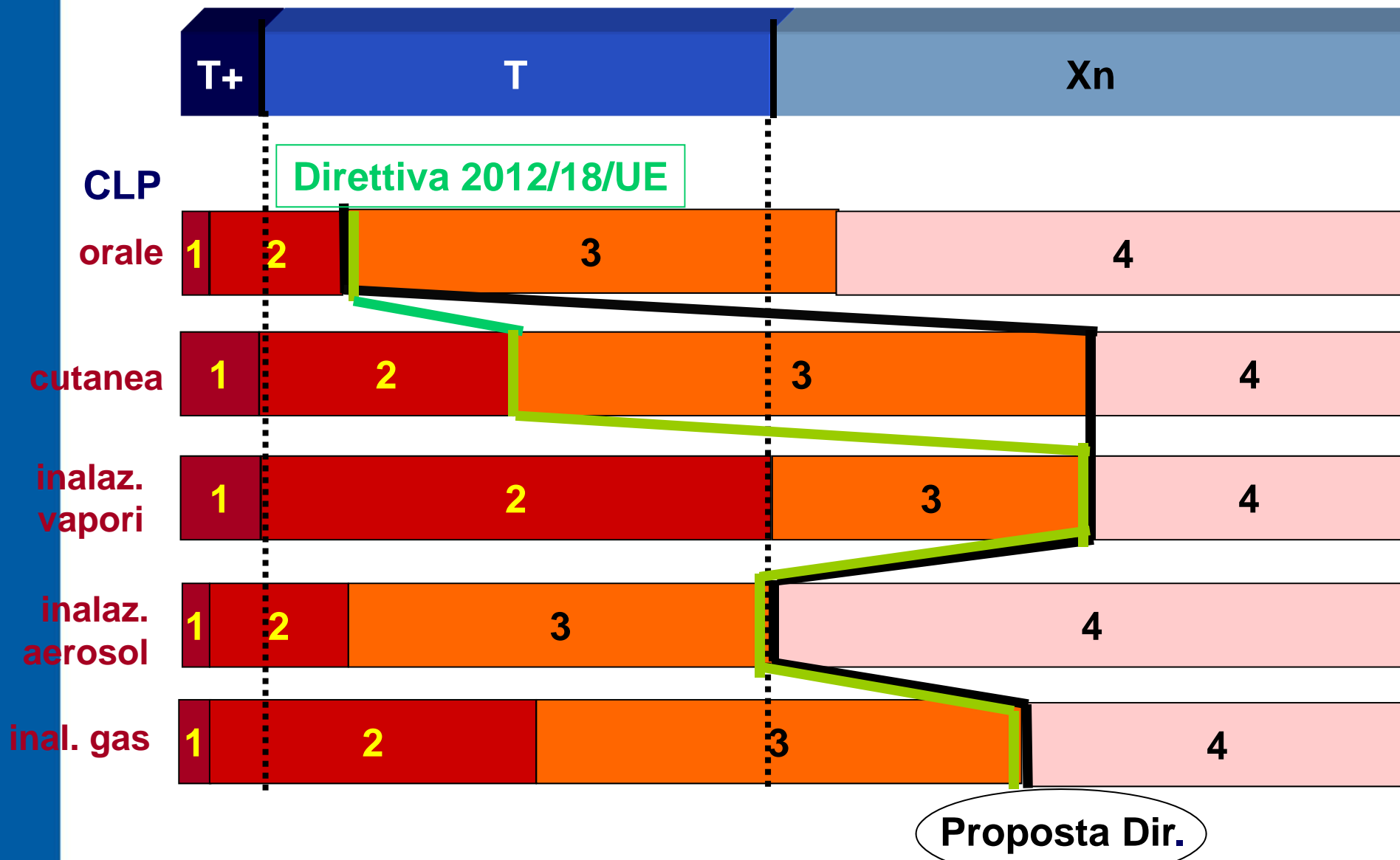
Comparison of toxicity classifications

Boundary for old legislation



Nuovo Campo di applicazione per i pericoli per la salute

Dir. 96/82/CE



Il campo di applicazione è destinato ad ampliarsi.

Ragioni per l'ampliamento

- **Aumento delle sostanze/miscele classificate come Pericolose per l'Ambiente Acquatico**
- **Pericoli fisici (*esempi*):**
 - aumento soglia T (da 55°C a 60°C) per il flash point dei liquidi infiammabili (P5a – P5b)
 - inclusione dei solidi piroforici (P7)
- **Possibile inclusione di sostanze/miscele che oggi non sono molto tossiche (T+), nè tossiche (T) (*Health hazards, H2, acute toxic*).**

Allegato I: i Prodotti petroliferi

La voce 34, ora denominata “Prodotti petroliferi”, è integrata con le lettere *“d) oli combustibili densi”* ed *“e) combustibili alternativi”* (soglie 2500/25000).

Ai sensi dell’art. 30 della Direttiva 2012/18/UE, la lettera d) è aggiunta alla Parte I dell’Allegato I della vecchia Direttiva 96/82/CEE e quindi tale disposizione deve essere adottata dagli Stati membri **entro il 14 febbraio 2014** (e non dal 1 giugno 2015, data entro la quale la nuova Direttiva deve essere implementata).



BP American Refinery Explosion – Texas City, Texas

March 23, 2005



At approximately 1:20 p.m. on March 23, 2005, a series of explosions occurred at the BP Texas City refinery during the restarting of a hydrocarbon isomerization unit. Fifteen workers were killed and 180 others were injured. Many of the victims were in or around work trailers located near an atmospheric vent stack. The explosions occurred when a distillation tower flooded with hydrocarbons and was overpressurized, causing a geyser-like release from the vent stack.

THE REPORT OF

THE BP U.S. REFINERIES INDEPENDENT SAFETY REVIEW PANEL



The recommendations of **BAKER REPORT**

(BP Texas City Refinery incident, March 2005)

RECOMMENDATION #7 – LEADING AND LAGGING PERFORMANCE INDICATORS FOR PROCESS SAFETY

BP should develop, implement, maintain, and periodically update an integrated set of leading and lagging performance indicators for more effectively monitoring the process safety performance of the U.S. refineries by BP's refining line management, executive management (including the Group Chief Executive), and Board of Directors. In addition, BP should work with the U.S. Chemical Safety and Hazard Investigation Board and with industry, labor organizations, other governmental agencies, and other organizations to develop a consensus set of leading and lagging indicators for process safety performance for use in the refining and chemical processing industries.

RECOMMENDATION #8 – PROCESS SAFETY AUDITING

BP should establish and implement an effective system to audit process safety performance at its U.S. refineries.

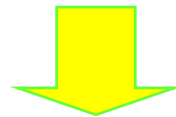


Process Safety Management: best practices

Process Safety Management

Objective and duty of the Operator: adequate performance and its improvement which requires:

- Performance measurement, trend analysis
- reporting (internal to the site)
- driving a continuous improvement process



Implementation of State-of-the art Process Safety performance monitoring and reporting, internal of each company.

General Requirements

Simple to understand and to communicate

Promoting trust

Ambitious

Challenging

Long lasting value

...

Allow visionary objectives like :

„No unintended substance or energy release“

„ZERO Accidents“

Primary Goal of Process Safety Management

Handle **inevitable** hazard potentials professionally, so that the **likelihood** of their **activation** and **adverse effects** to environment, people and assets is **as low as practicable**

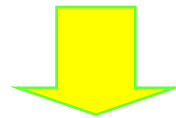


Source: www.circus-krone.de

Simplified:
keep the hazard potentials contained.

Practices in Process Safety Management

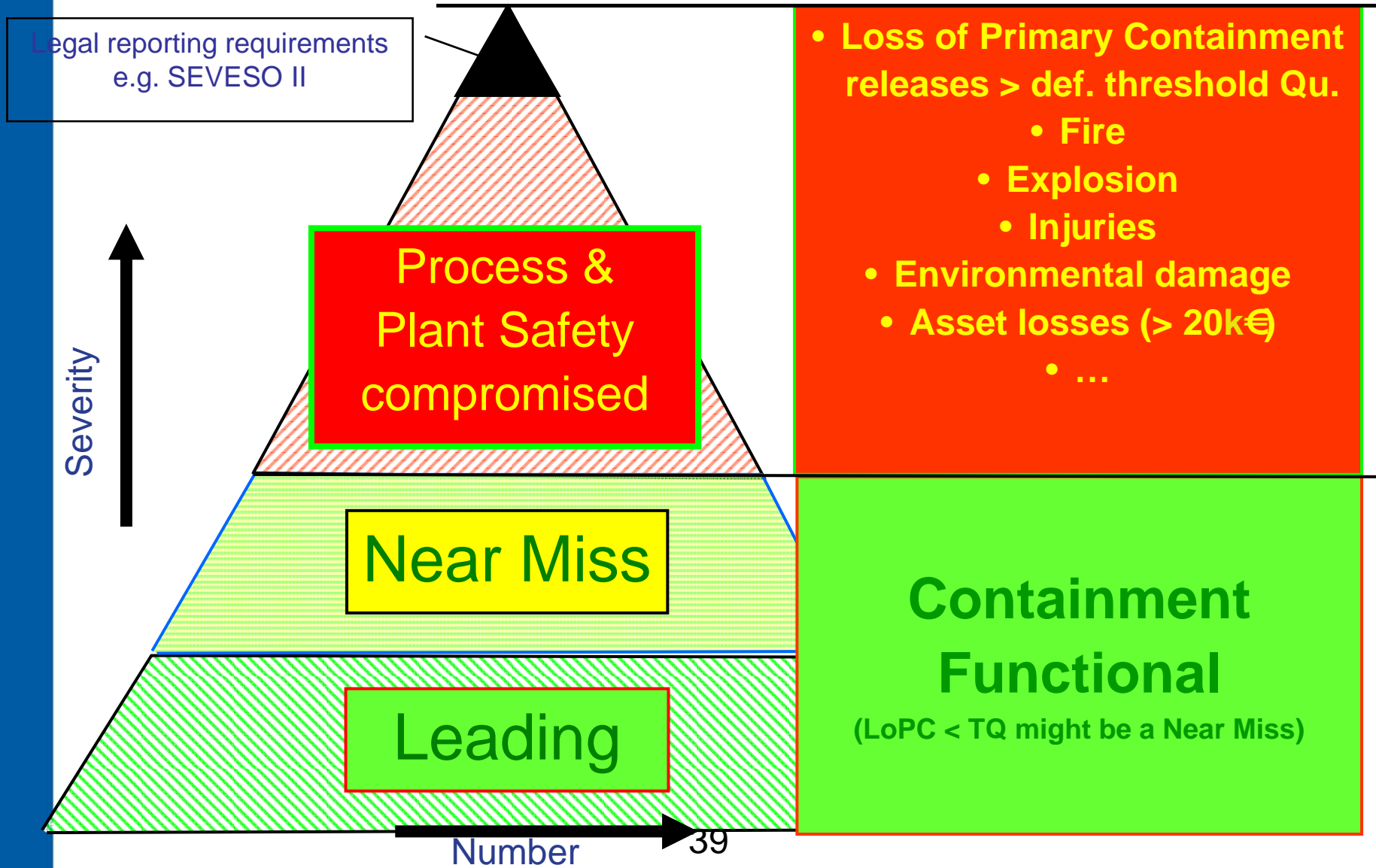
- Near misses (reporting and analysis)
- Leading Indicators (typically site specific)



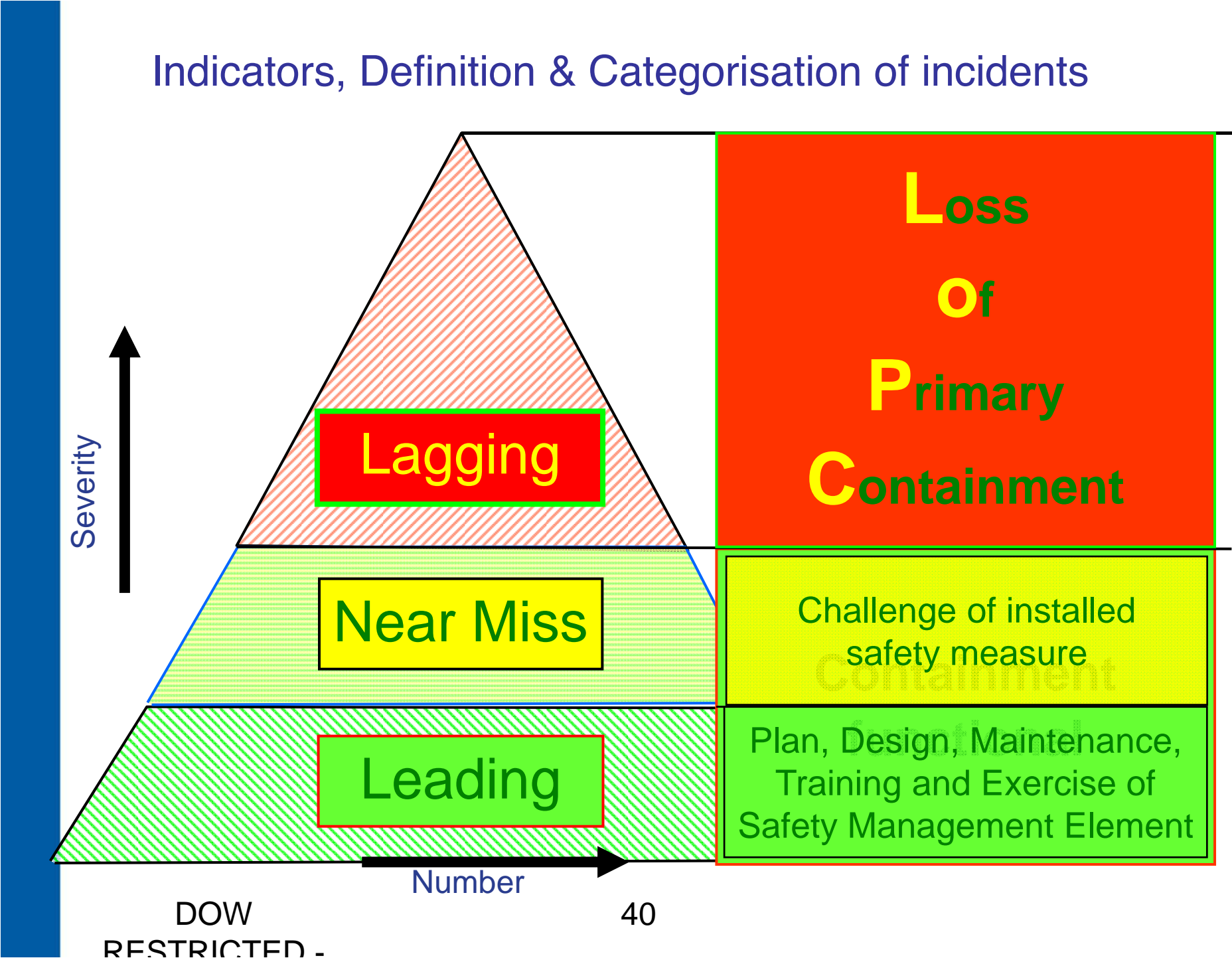
Limited value in comparison among sites and benchmarking.

Nevertheless, these practices are strongly recommended as crucial tools in Process Safety Management.

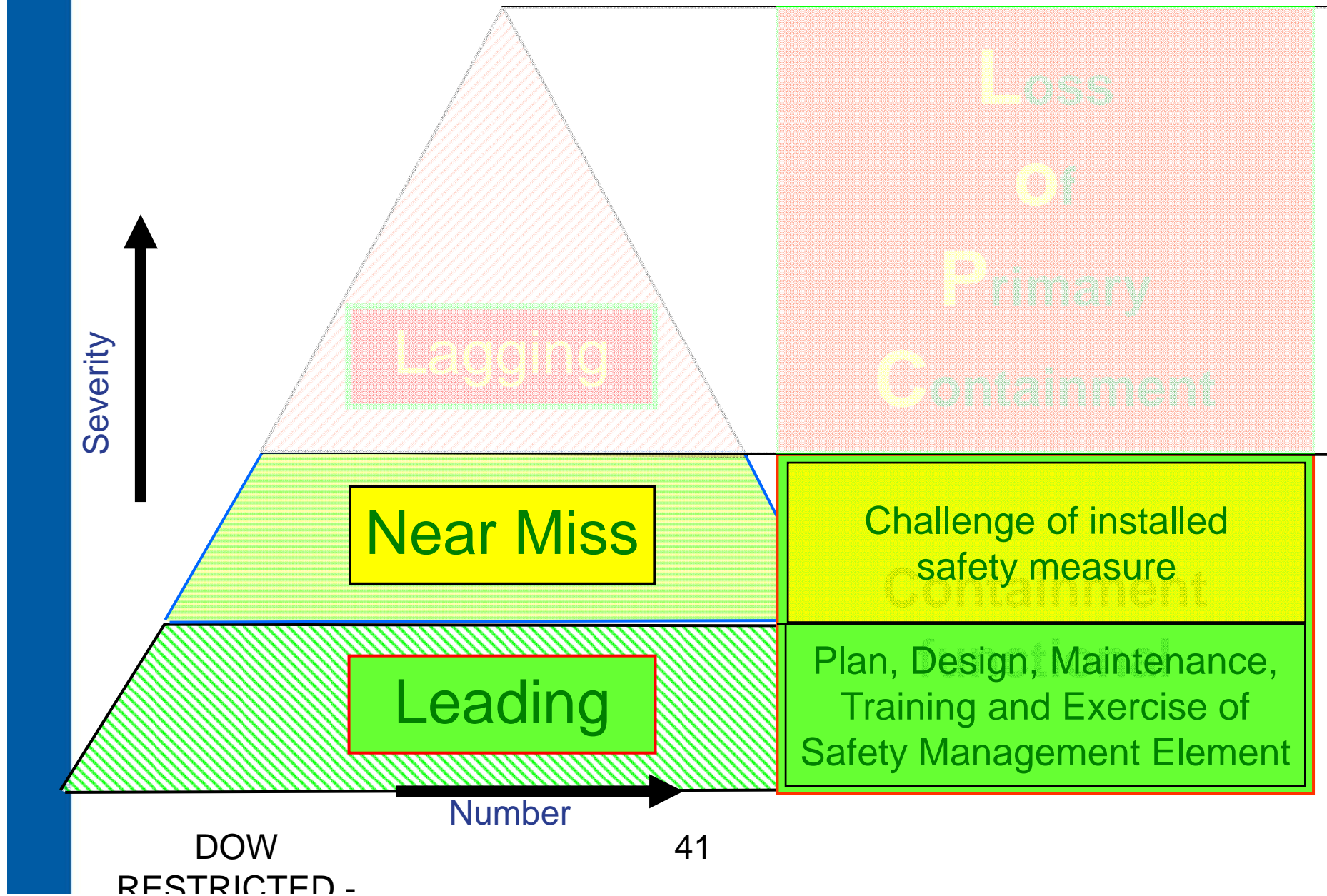
Indicators, Definition & Categorisation of incidents



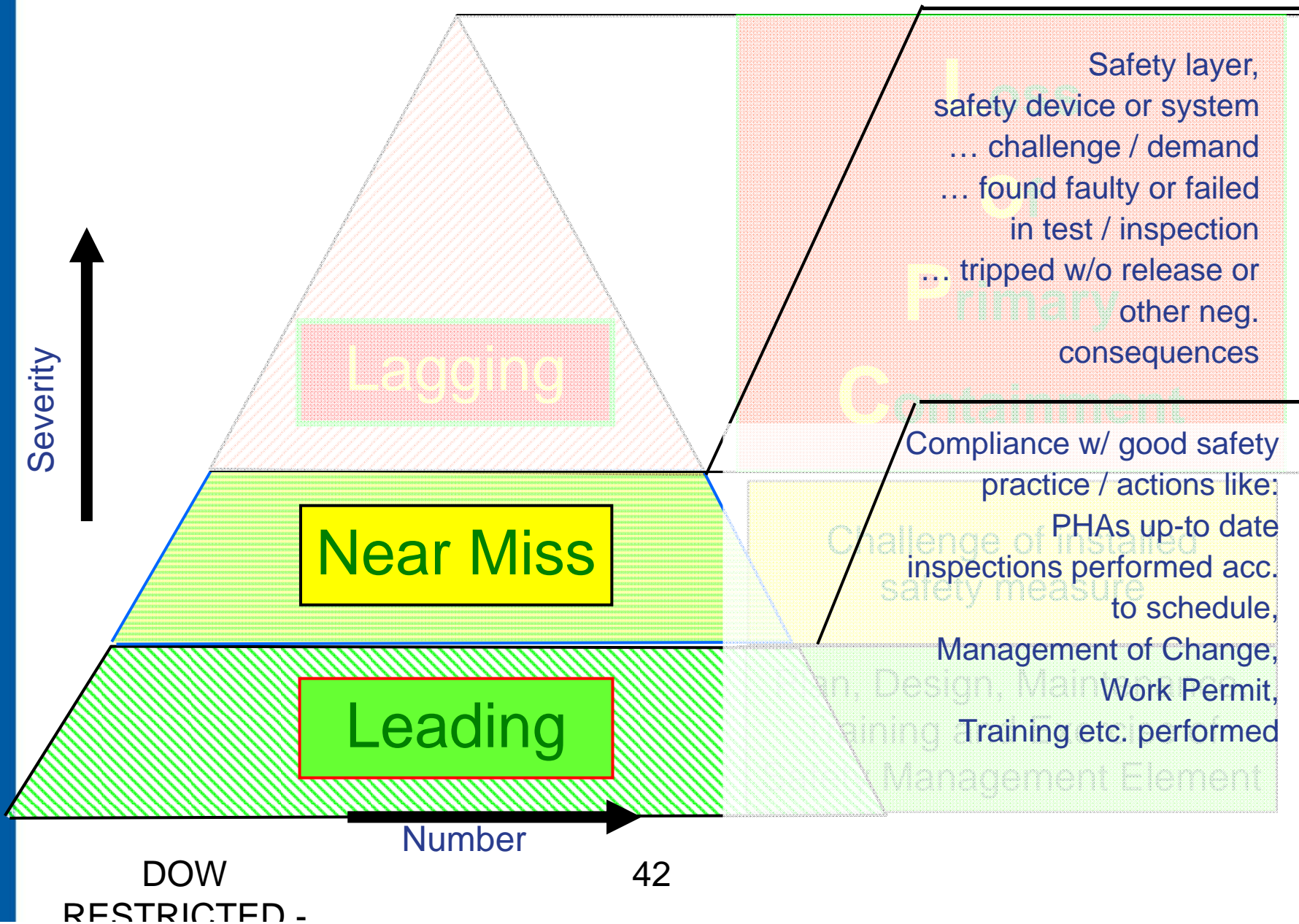
Indicators, Definition & Categorisation of incidents



Indicators, Definition & Categorisation of incidents



Indicators, Definition & Categorisation of incidents





Indicatori di Performance della Sicurezza di Processo.

La Guida CEFIC (2011)

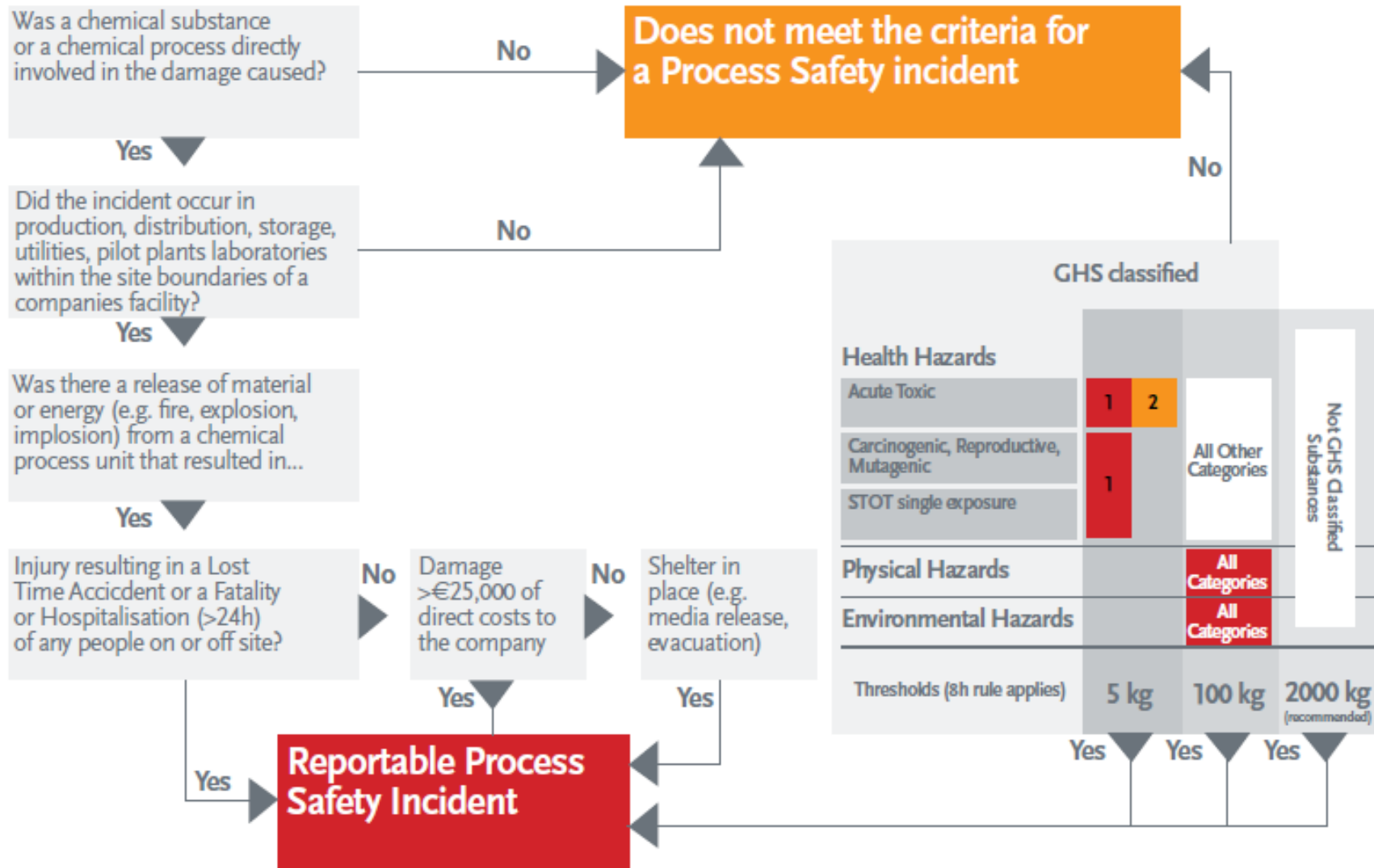


Le soglie per il reporting

Figure 2: GHS Thresholds

GHS classified			
Health Hazards			Not GHS Classified Substances
Acute Toxic	1	2	
Carcinogenic, Reproductive, Mutagenic	1	All Other Categories	
STOT single exposure	1	All Other Categories	
Physical Hazards		All Categories	
Environmental Hazards		All Categories	
Thresholds (8h rule applies)	5 kg	100 kg	2000 kg (recommended)

Figure 1: Determination of Process Safety Incident



ICCA PSI Taskforce - Mandate

- Develop a process safety metric for ICCA to use with its members on a worldwide basis.
- Be ready to launch a global standard and reporting process in 2015.
- Strive to have alignment with API RP 754 standard.
- Suggest a flexible approach that can work for all nations.





INTERNATIONAL
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Responsible Care®
OUR COMMITMENT TO SUSTAINABILITY

Guidance for Reporting on the ICCA Globally Harmonized Process Safety Metrics

The Responsible Care
Leadership Group

Indicatori di Performance

- Indice IP

$(N^{\circ} \text{ Incidenti di Processo}) / M \text{ di ore lavorate}$

- Indice QI

$(N^{\circ} \text{ Near Misses}) / M \text{ di ore lavorate}$



GRAZIE DELL' ATTENZIONE !