EUROPEAN COMMISSION
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Joint Research Centre

European Technology Platform on
Industrial Safety
Safety for Sustainable European Industry Growth

Joint Research Centre

Towards fewer and less severe accidents: Research needs for the Seveso legislation

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ipsc

Chemical Process Industry

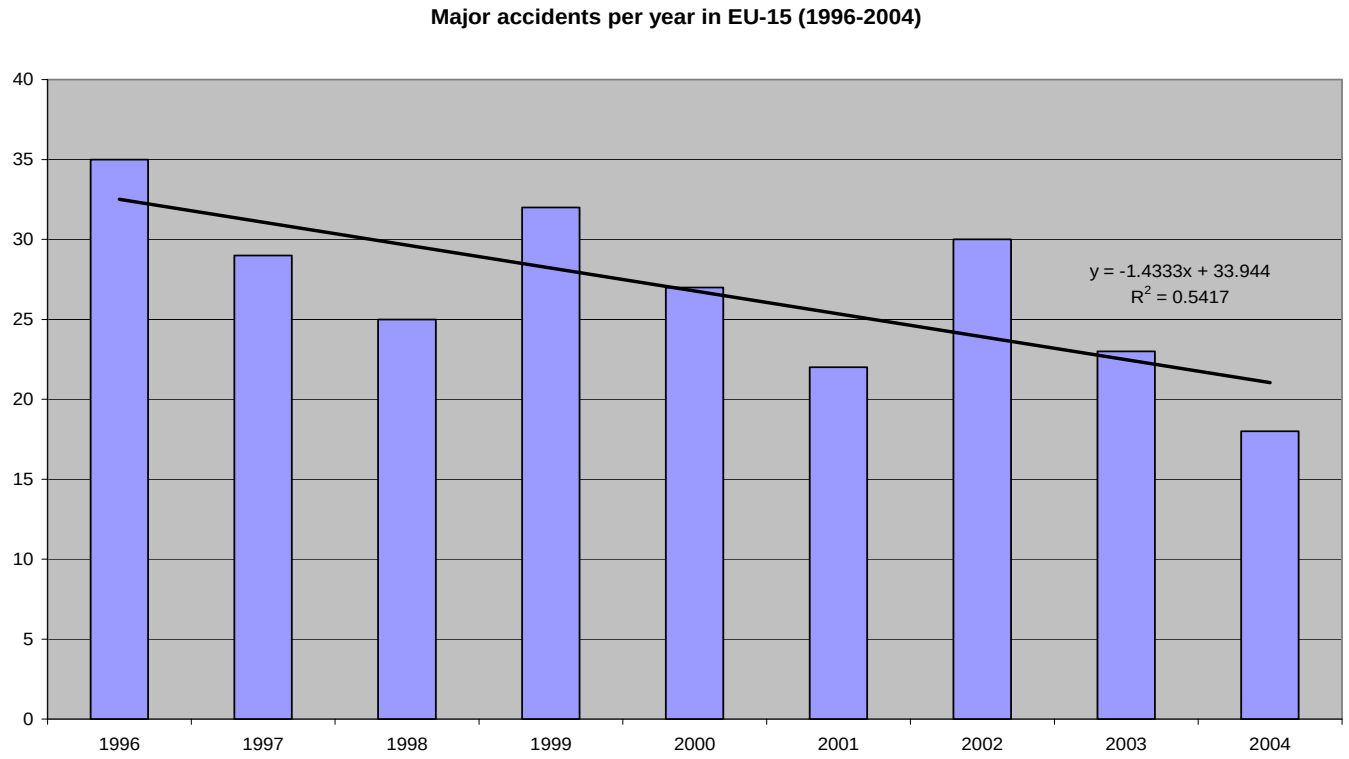
Seveso II Directive (96/82/EC) and Amendment (2003/105/EC)

- ✓ prevention of major accidents involving dangerous substances
- ✓ limitation of the consequences of accidents on man and the environment

► Aim: high level of protection for man and the environment throughout the European Union

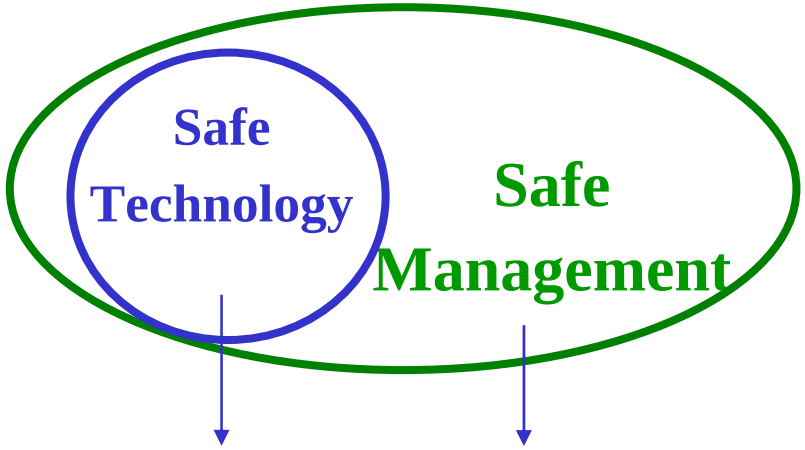
Trend of Major Accidents in EU-15 (1996-2004)

Reporting in EU's Major Accident Reporting System (MARS)



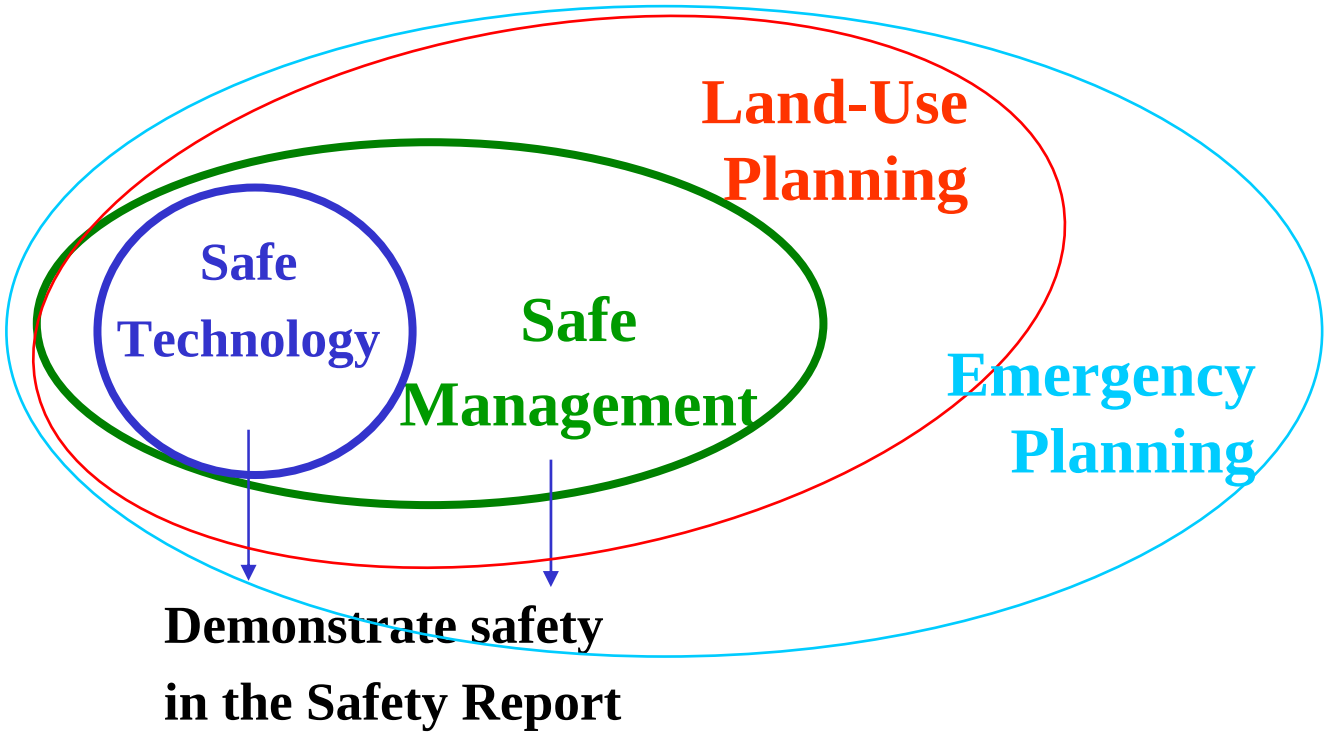
- *Slowly declining rate (acc/year), though with significant spread*
- *Average: ca. 3 accidents per 1000 establishments per year*

Philosophy of Seveso II Directive



Demonstrate safety
in the Safety Report

Philosophy of Seveso II Directive



Philosophy of Seveso II Directive

EU legislation for the Control of Major Accident Hazards

- DG ENV: Conception, Formulation and Monitoring of Implementation
- National Competent Authorities: Implementation
- DG JRC/MAHB: Research-based technical support
  (Guidelines, databases, tools, methods, exchange of good practices)

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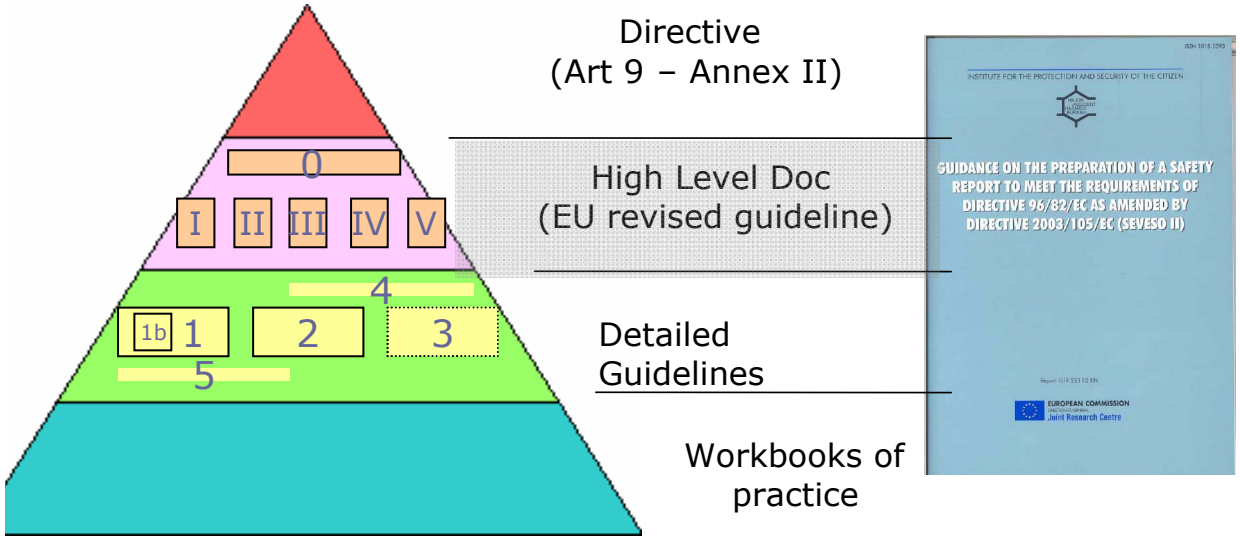
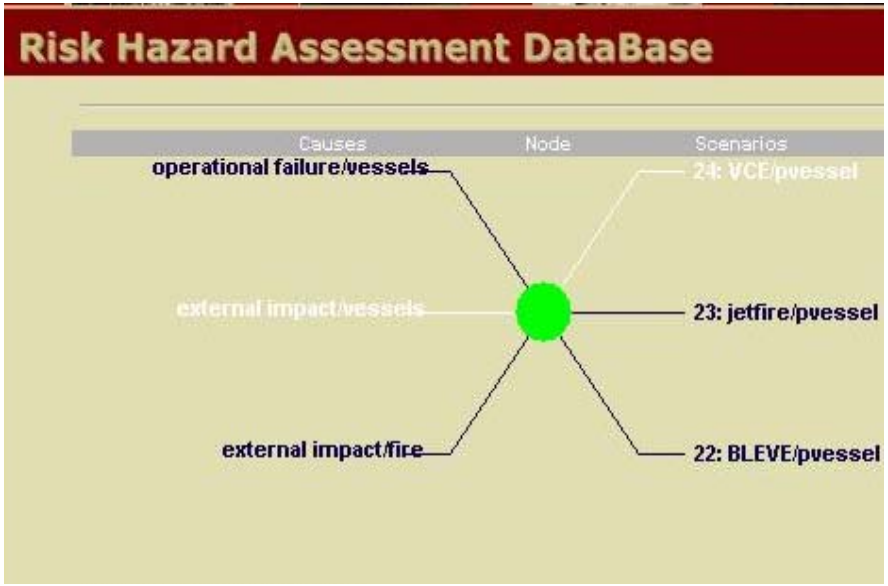
Support to the implementation

Guidelines for the Preparation of a **Safety Report**



Guidelines and scenarios database for **Land-Use Planning**



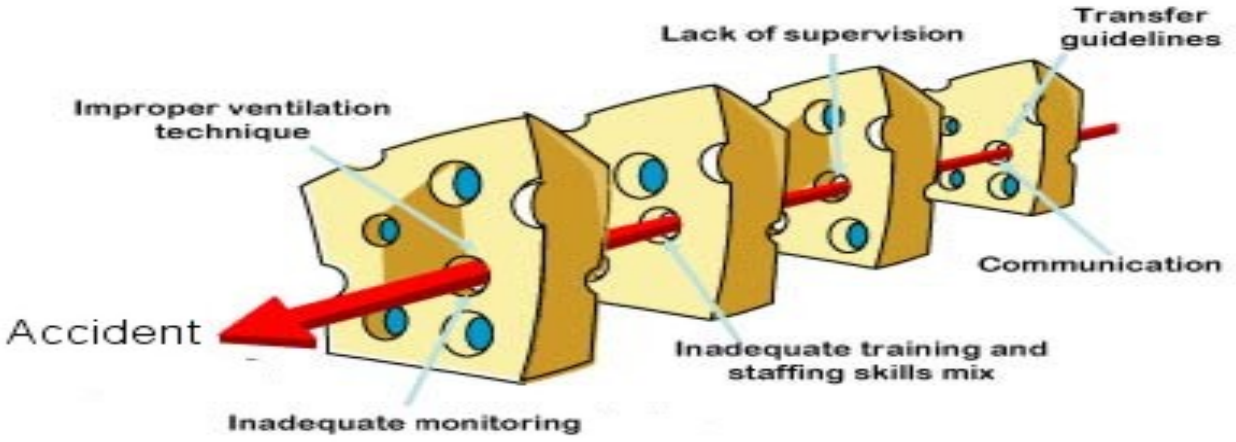
Seveso Inspections

- Exchange of Good practices amongst Inspectors (Mutual Joint Visits Programme)
- Recommendations of Good Practice

Research needs: Identification of hazards

"Hazards need to be effectively identified, understood and minimised"

- Research on the causes of major accidents
- Understanding of the underlying causes (root-causes)
- From "Swiss cheese model" to "Normal accidents" and to "Rasmussen's drift"
- What is the role of the "human factor"?
- Do we consider *ALL* hazards? What about natural hazards (natech)?



Understanding the potential dangerous phenomena

- UVCE: Under which conditions can a Vapor Cloud Explosion occur in an open (Unconfined) space
- How can we model VCEs and other explosions?
- How can we model the Rapid Phase Transition phenomena?
- How accurate are our consequence assessments?

Emergency planning

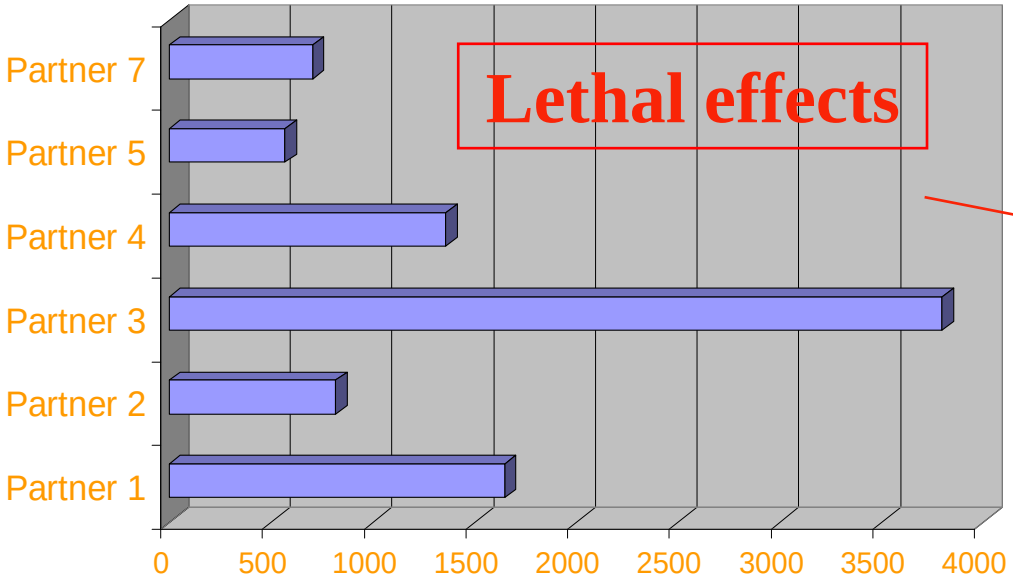
- Research on Acute Exposure Values
  - ACUTEX project generated interest in future collaborative work
  - Needs for evaluating and improving current **derivation methods** (e.g., uncertainty factors, dose-response, acute carcinogenicity)
  - Establishment of an **international collaboration** and exchange network on derivation of acute exposure values
  - Development of **guidance/tools** for better integrating acute exposure values into emergency response planning

Land-Use Planning

- How to address existing situations of concern?
  - Need for methods and tools for **monitoring and prioritization** of existing situations of concern
  - Need for definition of strategies for improvement
  - Investigation of **opportunities** for funding for change

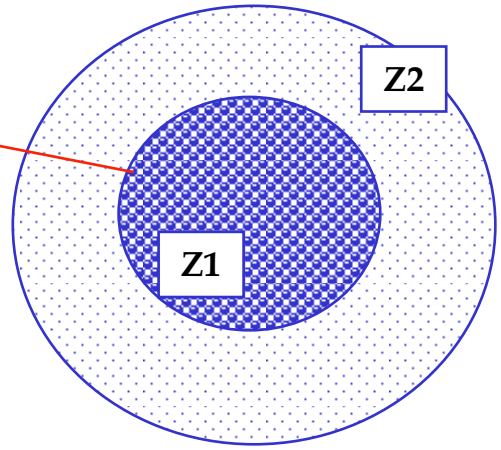
Quality of Risk Analysis

Scattering of results (From a EU Benchmark Exercise – Common Data)



Average = 1484 m

Variation = -61% … +156%



- Need for increased **convergence** amongst the methods.
- Need for increased **quality** in methods, tools and data.
- Understanding of **uncertainties** linked with RA and how different assumptions affect the level of risk assessed
- Can we develop a **reliable** and continuously updated set of failure frequency data?

Inspecting and monitoring safety performance

Research Needs for the Seveso Inspections:

- Inventory of good Safety Management practices in Seveso establishments, including performance measurement tools
- Inventory of good practices in Process Risk Assessments carried out by Operators
- Inventory of technical safety measures by sector (across EU)
- Risk-based inspections: applying risk-based techniques to inspections
- Lessons learned from accidents and Accident investigation
- SMS for SMEs

Performance measurement:

- The set of indicators needs to be simpler, easy to evaluate and verifiable

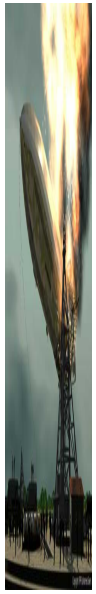
Prevention of accidents: Barriers and systems of increased resilience

- **Resilience**: The capacity of a system (or community, or society) potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure

- Need to design systems with increased resilience
- Need to design, install and maintain sufficient **barriers**
- Need to invest more on **inherent safety**

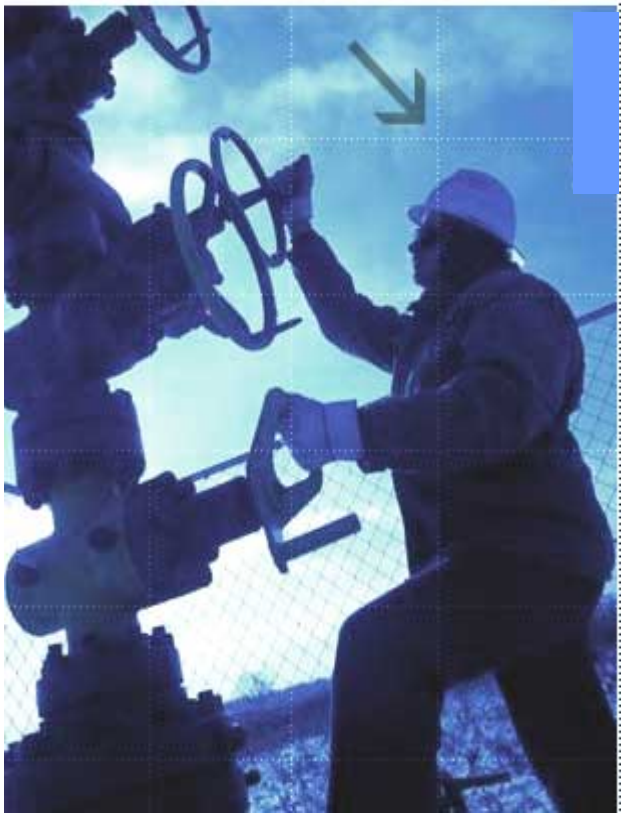
New and emerging technologies: Threats and opportunities

- Nanotechnology
- LNG
- Hydrogen
- New threats but also new opportunities: A challenge for safe handling



Networking: Reaching the safety practitioners

- In order to reduce the number of major accidents it is necessary the results of safety-related research to reach the operators and safety managers in their everyday business
- Tools for Risk Communication to the general public is also very important

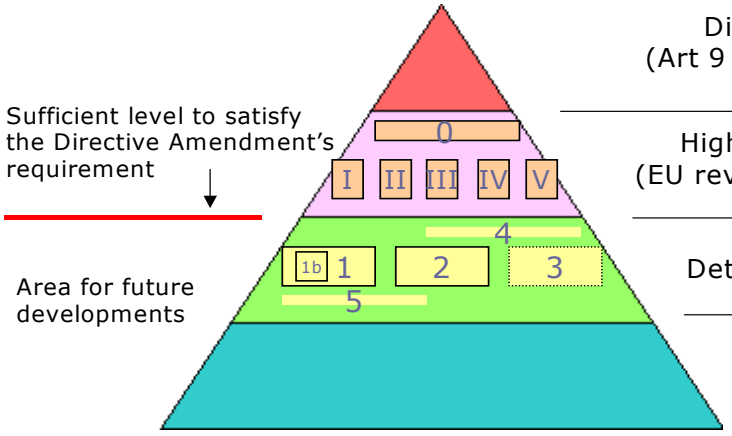


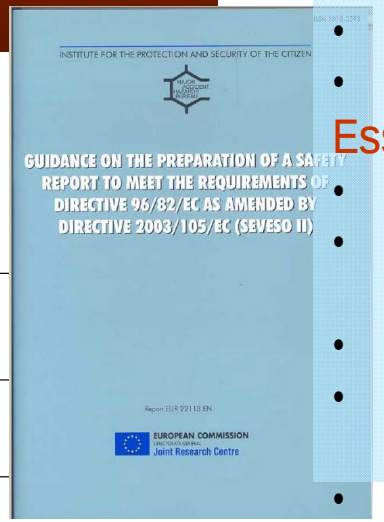
Thank you for your attention!

The Amendment of the Seveso II Directive

gave the Commission the mandate "to review by 31 December 2006 in close cooperation with the Member States, the existing Guidance on the Preparation of a Safety Report (EUR 17690)

- Survey on Safety Reports practices within the MS, 2004
- Workshop on Safety Reports (Dublin, on 12 May 2004)
- First meeting of the editing group (November 2004)
- Publication of the guidance document (December, 2005)





General Principles and Definitions

- Purpose
- Practical considerations
- "accident scenarios"

Essential Elements of a Safety Report

- Info on the Manag. Sys. and Org.
- Present. of the Envir. of the Establish.
- Description of the Installations
- Acciden. Risks Anal. and Prev. methods
- Measures of Protection and Intervention

Research Needs for Seveso Inspections

The EU TWG on Seveso Inspections has identified several opportunities for research to improve Seveso inspections, e.g.:

- Inventory of technical standards and scenarios by sector (across EU)
- Analysis of effective inspection programme management (including inspector competence, co-operation between authorities, resource management, inspection frequency and life cycle, enforcement strategy)
- Safety management systems verification: performance measurement tools and training for regulators
- Risk-based inspections: applying risk-based techniques to inspections
- Evaluating operator risk assessments (in safety reports, at lower tier sites and SMEs, domino effects)
- Accident investigation
  - Accident investigation techniques for regulators
  - Recording and applying lessons learned from accidents
  - Recording and applying lessons learned from inspections