

## **Industrial Needs for Harmonization of Risk Management**

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## **Introduction**

- **Definition of the scope**
- **How process industry performs risk management**
- **Regulations in place**
- **Regulations in the planning phase**
- **Self-responsibility**
- **Needs for harmonization: pro and con?**

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## Definition of the Scope

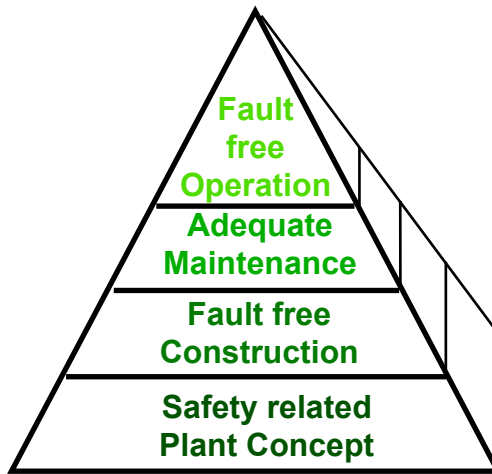
- **Chemical process industry**
- **European and global view**
- **Risk management concerning process activities**

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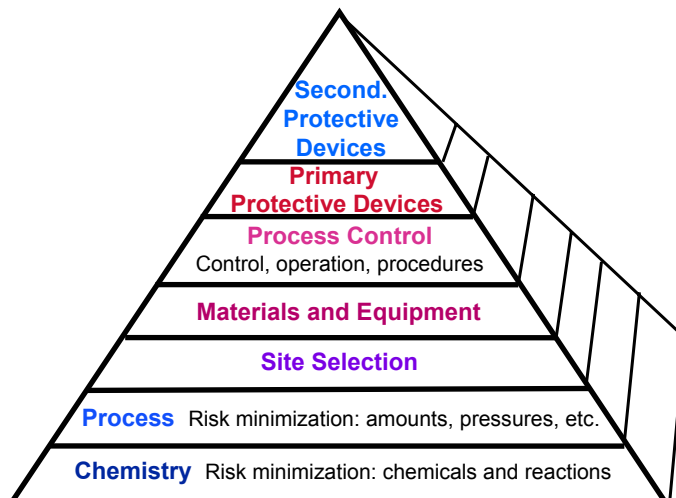
## How Process Industry Performs Risk Management

- **Risk management in process industries has a long history**
- **Formal safety review system**

**Influencing Factors**



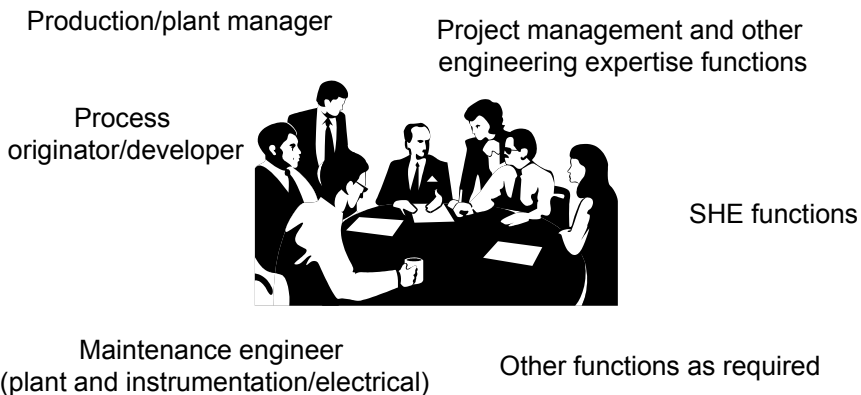
**Components of the Process Safety Concept**



**The BASF 5-Step Review System for new Plants**

- **Step 0** Conceptual review; identification of basic risks before starting the planning procedure
- **Step 1** Identification of hazards; basics of safety concept; development of environmental protection concept
- **Step 2** Check of safety concept and environmental protection concept
- **Step 3** Check of implementation of safety concept during detailed design using the final P&ID's
- **Step 4** Check of implementation of safety and environmental protection concept before start-up

**Participants**



## Principles of Safety Reviews

- **Striving for inherently safer, low-risk processes**
- **Ensure operability**
- **Give priority to primary safety measures**
- **Single faults must not have severe consequences**
- **Damage-limiting measures must be adequate**
  
- **Hazard evaluation**
  - The basis of risk management
- **Risk assessment**
  - Severity plays the important part (deterministic approach)
  - Accident probability is considered (probabilistic approach)
    - More qualitative or semi- quantitative estimate is used
    - Risk matrix

### Plant Safety Concept

### Site Safety Concept

### Measures for Control

of the Plant

Operability

**Primary  
Safety Measures**

*Avoidance of Releases*

of Failures  
with serious results

Protective  
Installations

of Releases

Limiting  
Damage

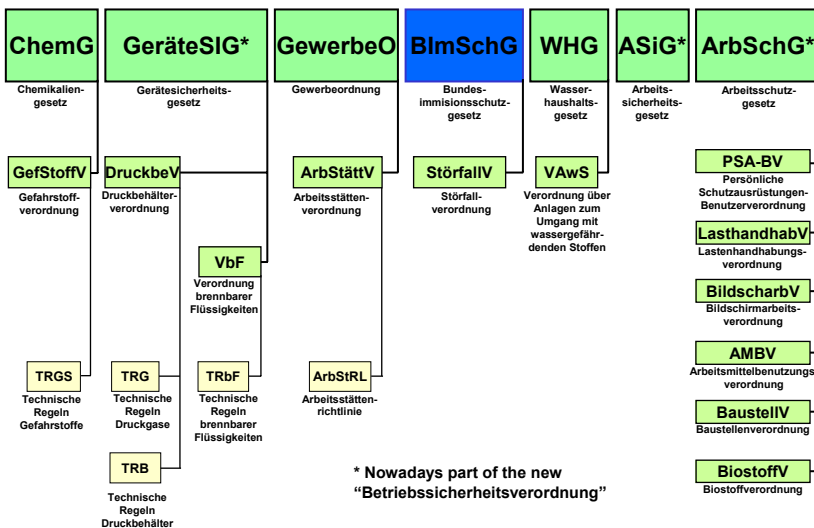
**Secondary  
Safety  
Measures**

Limiting the  
Consequences  
outside of the  
Site Boundaries

**Catastrophe  
Protection**

**Regulations in Place**

- **Permission to run a plant**
  - Country-specific systems
  - Germany:
    - Bundes-Immissions-Schutz-Gesetz (BImSchG)
    - Large number of regulations for special aspects of process industries



## Regulations in Place

- Nowadays more and more European legislation must be transferred into national law of the member states
- Harmonization on a European level quite often creates additional workload on the local level
- In cases where the European regulations will provide more flexibility to the companies, existing German regulations will not always be canceled
- Sometimes European regulations are implemented in Germany by adding more stringent rules
- An example: The European Directives Article 95 and 137
  - The European regulation did not fit with some of the German regulations
  - **Result: Safety is not improved, but a lot of additional paperwork**

## Regulations in Place

- **The Seveso Directive is the central law for risk management of process industries in Europe**
- **The main items are:**
  - Amount and hazard of the stored or handled substances are criteria that specified regulations must be fulfilled; thresholds are defined for all kinds of hazardous substances
  - A major accident is defined as an incident which has severe consequences for human life and/or the environment
  - Due to the potential hazards, the plant owner must fulfill requirements to prevent major accidents
    - Hazard evaluation; risk assessment; installation of safety measures
    - An internal alarm plan for emergency cases must be established
    - Offer adequate information concerning potential hazards to the authority

## Regulations in Place

- **The Seveso Directive regulates what must be done to get the permit to run a plant**
- **The Seveso Directive is a framework for harmonization of risk management offering some flexibility to the company and to the authorities**
- **The tools in practice for risk management in process industries fit well with the requirements of the Directive**

## New Regulations in Preparation

- **There are current trends by the EU to incorporate more and more details into the Seveso Directive!**
- **Example I: Introduce quantitative probabilistic risk assessment (QRA)**
  - A few European countries have established a kind of QRA
  - It is based on defined scenarios
  - The calculated risk must be lower than some threshold
  - BASF has some experience in Europe and Asia concerning QRA
    - **As a result, it could be demonstrated that the review system performed by experts using an adequate risk assessment is the way to plan and construct safe plants**

## New Regulations in Preparation

- **Example II: Land-use planning (Seveso Directive, Article 12)**
  - Requires member states to ensure that preventing major accidents and limiting the consequences are taken into consideration in their land-use planning policies
- **Current situation:**
  - No detailed suggestions how this should be done
  - Each member state has its own practices
- **As a result of the recent accidents in Toulouse and Enschede, the EP initiated a review of policies on regional planning in the vicinity of risk sites**
  - Distances between facilities and the community can be important in mitigating the effects of major accidents.
  - These two explosions did not happen due to a deficiency in regulations, they happened due to the fact that existing regulations were not observed.

## Example II: Land-use planning (continue)

- **A European working group was established**
- **The objectives of the work to be carried out are:**
  - Principles of good practice and underlying risk assessment
  - Develop a technical data base of scenarios that may be used in risk assessment
- **Positive**
  - It is planned to achieve compatibility with the existing methods and to leave flexibility in making the relevant decisions
- **Negative**
  - It will bring additional requirements
  - It could be used to introduce QRA

## Self-Responsibility

- It is the process industries' very own entrepreneurial interest to operate plants efficiently and without incidents!
- A German example is the NAMUR regulation
  - A regulation how to design I/E equipment for safeguards
    - Safeguards are not allowed to be realized in the DCS
    - Safeguards must be checked periodically etc.
  - All I/E safeguards in the major German chemical companies are designed according these rules
  - As a result, accidents due to malfunctions of I/E safeguards never happened in these companies
  - The NAMUR standard will become the international standard in the IEC 61 511
- **If based on proven and practiced expertise, harmonization can be a powerful tool**

## Learning from Incidents

- **Detailed investigation of incidents are an important factor for continuously improving the safety of chemical plants**
  - Mostly of low severity
  - Basis for the probability of incident scenarios
  - Communication with other companies and institutions

## Harmonization: Pro and Con?

### Current status in harmonization of risk management

- **Safety reviews are an important tool for risk management**
- **Seveso Directive is a positive example of harmonization**
  - Defines the major points
  - Enough flexibility for using established practices on local level
- **Self-responsibility is a strong driving force to improve safety**
- **Harmonization of risk management in process industries is sufficient**
  - In particular that is true for Europe and the USA
  - More and more countries are adopting the regulations
  - Harmonization on a global scale is an ongoing process.

## Harmonization: Pro and Con?

### Further harmonization activities should be observed carefully:

- **In most cases harmonization creates additional regulations**
- **More regulations must not establish more safety**
- **Instead of implementing additional regulations in the developed countries, it seems more important that existing regulations are fulfilled by all enterprises worldwide**
- **Additional requirements are planned by the EP concerning the Seveso Directive**
  - The land-use planning initiative is one of them
  - If necessary, it is important to do this on the basis of existing structures and safety concepts
  - Harmonization on a European level quite often creates only additional workload on the local level, without a positive effect on risk management