

Major Accidents in the Federal Republic of Germany: Central Collecting, Evaluating and Disseminating of Lessons Learned

*Sabine Sur; Hans-Joachim Uth,
Federal Environmental Agency, Germany*

-ZEMA- **Z**entrale Störfall**m**elde- und -**A**uswertestelle

(Central Body for Major Accidents Notification and
Evaluation)

Essential Tasks of **ZEMA**

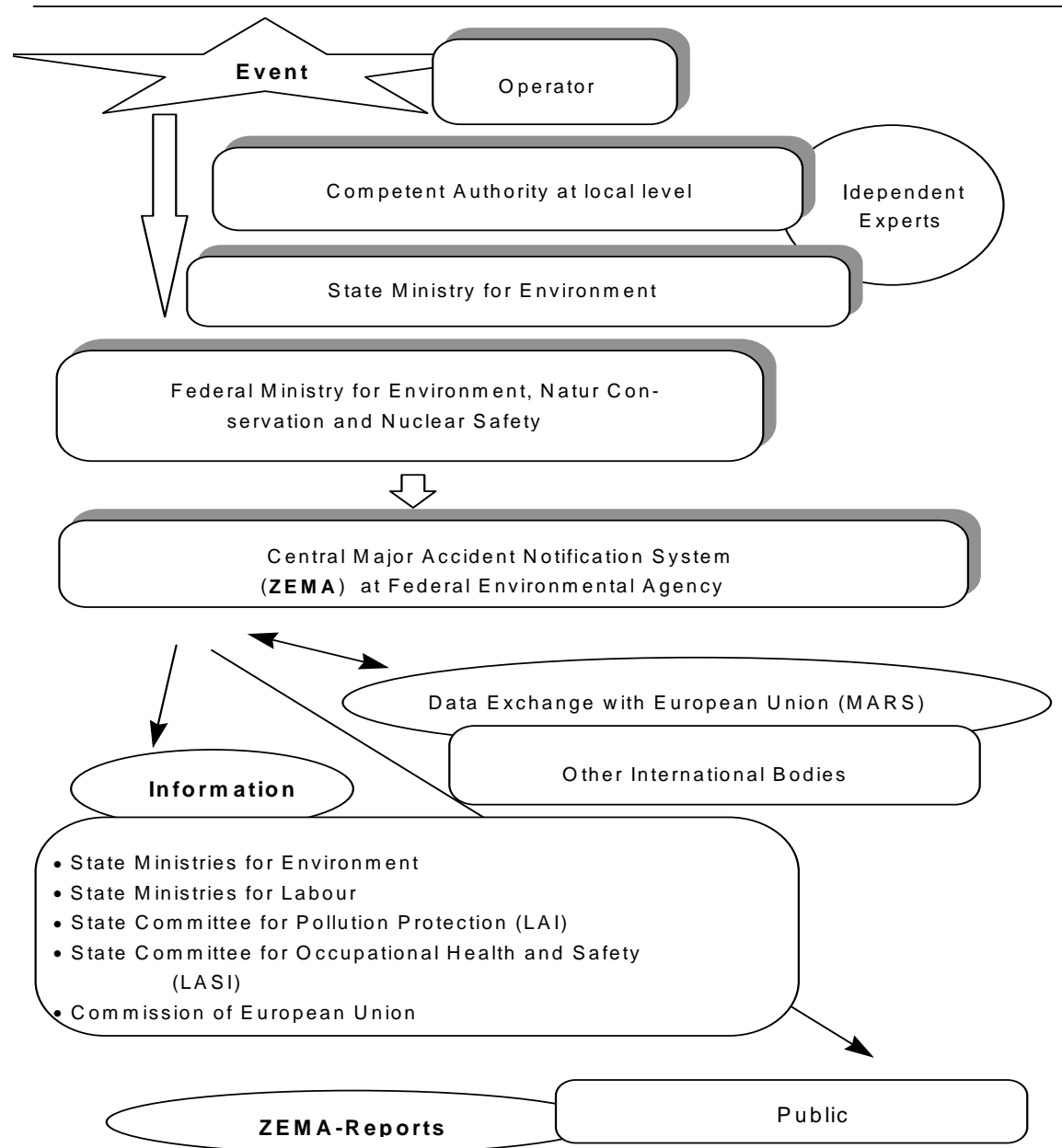
- **Collection, evaluation and forwarding of lessons learned**
- **Preparation of the reports to the European Union after SEVESO II Directive**
- **Collection and evaluation of other international events**
- **Editing annual reports and instant INTERNET publishing**
- **Exchange of lessons learned with other respective organisations.**
- **Advanced Information Management**

What must be reported ?

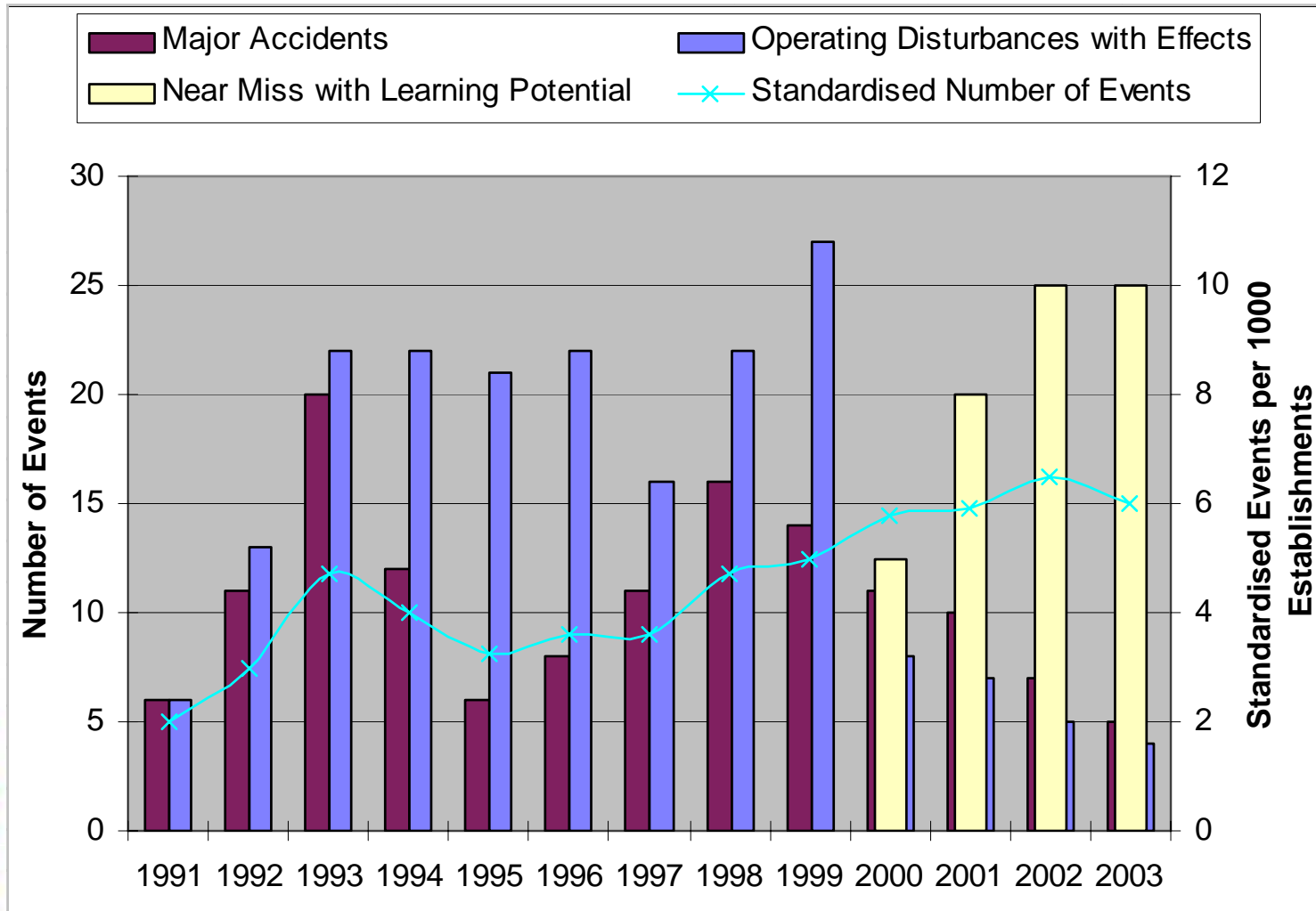
Definition is given in **German Hazardous Incident Ordinance (2000)**

- **Major Accidents (with damage to man or environment to certain extend)**
- **Events with the potential of damage in the neighbourhood**
- **Events with a significant learning potential**

Major Accident Reporting System in Germany

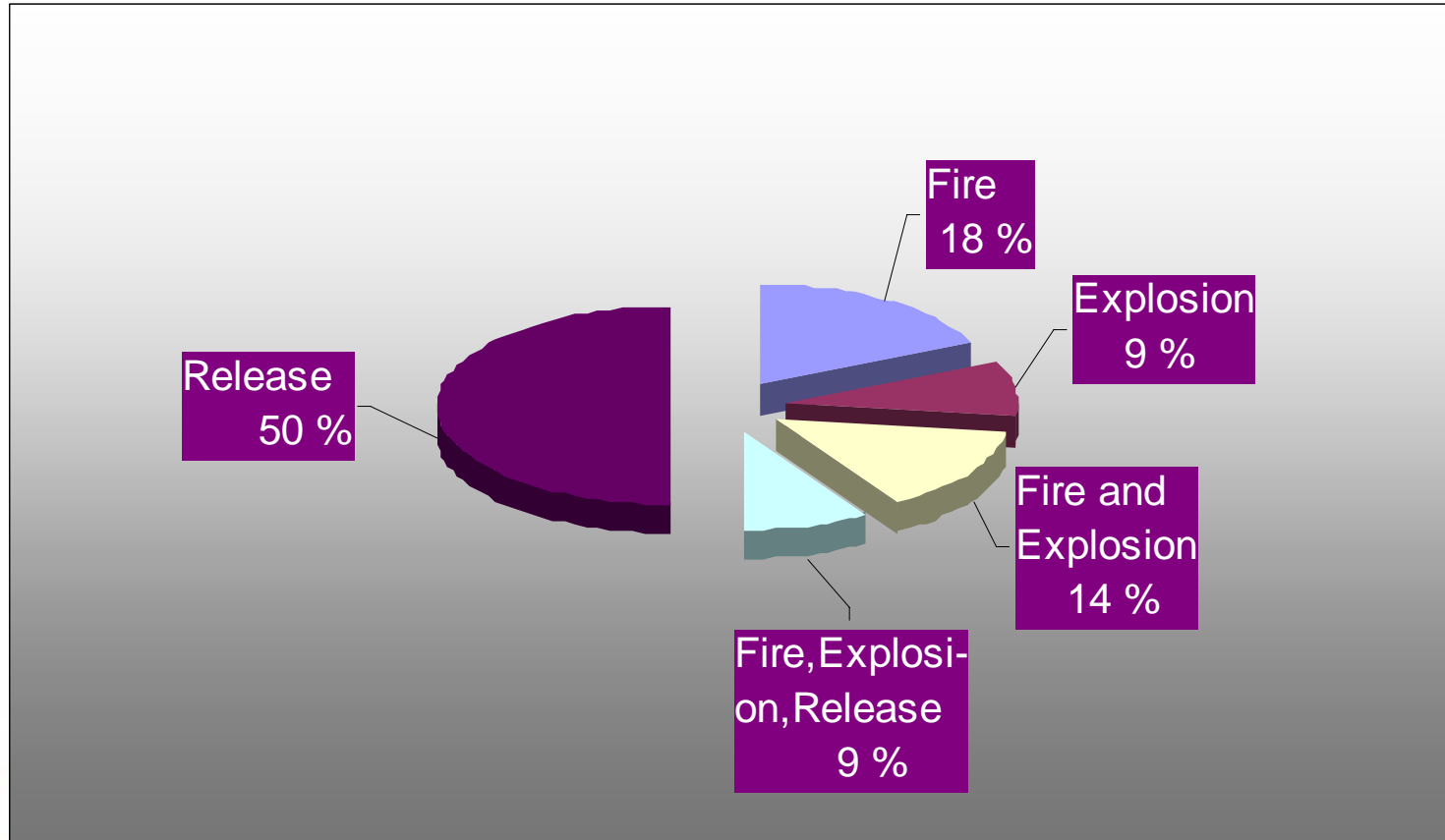


Trend of development of Events



Umweltbundesamt FG Anlagensicherheit & Störfallvorsorge

Event Types



Operating Conditions

Operating processes	Relative part in %
Process	47
Loading/Unloading	10
Maintenance/repair	14
Start-off and shut-down process	10
On site transport	2
Storage	16
Unknown	1

Findings

Evaluation of events 1993-2002 (N=313)

Event Type: **Release of Substances**

In Process Industry :

- Main cause is equipment failure during normal operating
- Human failure restricted to start-off/shut down and maintenance

In other Industry:

- Findings vice versa

Findings

Evaluation of events 1993-2002 (N=313)

Event Type: **Explosion and Fire**

In Process Industry :

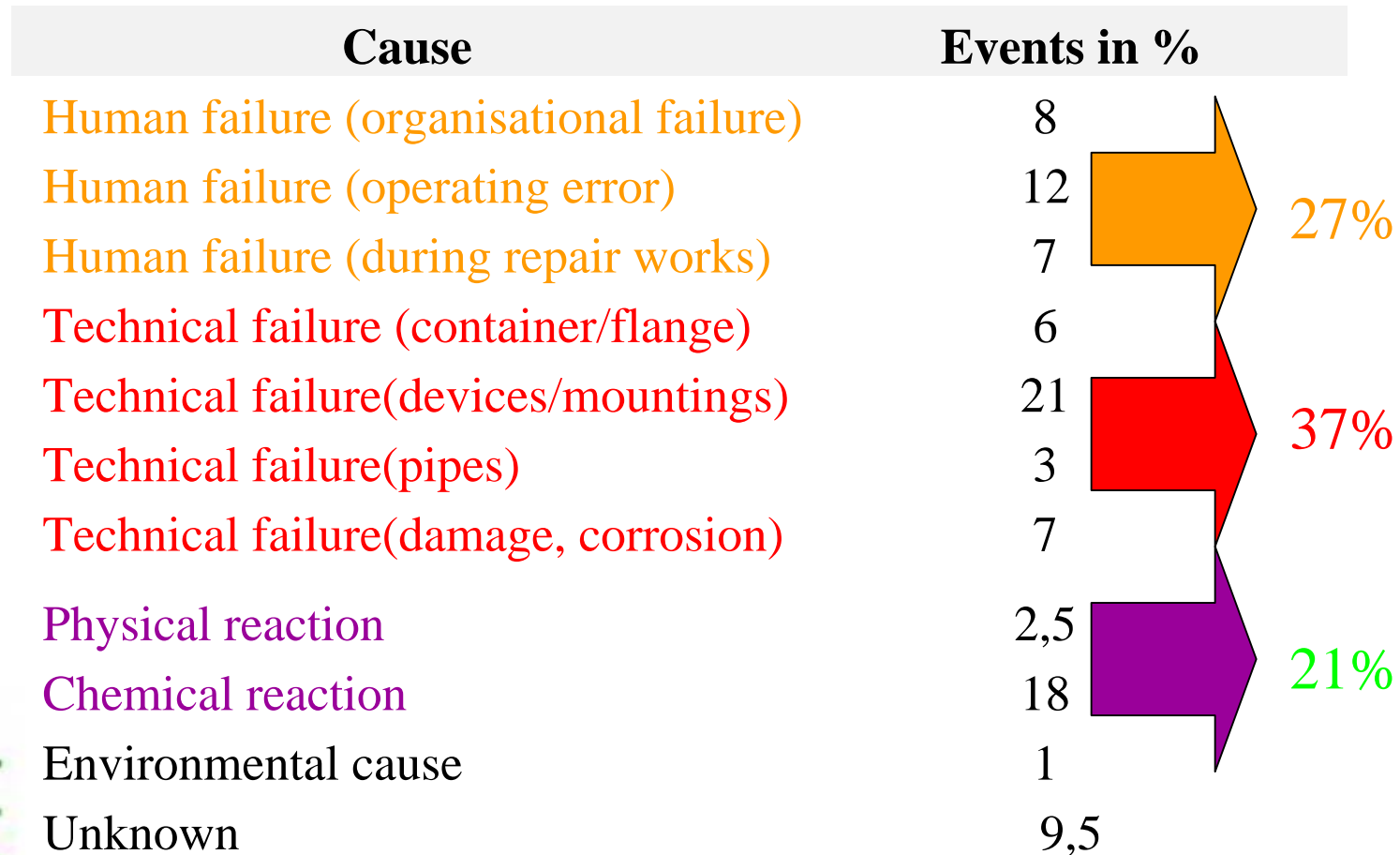
Main cause is human Failure

In other Industry:

Main cause is equipment failure

Primary Causes (1/3)

Statistical Overview



Primary Causes (2/3)

- **To avoid technical failures maintenance plays a key role in accident prevention.**
- **The high amount of the operating error stresses the needs of intensified qualification and training.**
- **Since an operating error always reflects the conditions in which the failure occurs, the safety management is also addressed.**

Primary Causes (3/3)

- **Clear characterisation of the basic chemical reactions is crucial. This applies particularly to areas which are not counted to the core region of chemical industry.**
- **Unknown chemical reactions in the area of chemical industry are observed mainly during maintenance/repair, at the other areas this is true during "normal operation".**
- **Unknown chemical reactions as a cause for events shows shortcomings in expert knowledge and qualification.**

General Conclusions

- **As primary causes you can identify errors in the complex system switching process units. These system connections are often fuzzy in the event and lead to imperfect reactions which often develop to disturbances or accidents.**
- **It was recognised that the operating rules were provided as imperfect or dated and often did not reflect critical operating states.**
- **During maintenance operations the personal had no sufficient information or knowledge. Maintenance/repair are carried out often by third parties, often with lack of experience and insufficient knowledge of the conditions in the installation.**
- **Lacking expert knowledge was observed not only during maintenance operations but also in some cases incompatible materials were stored or put together, which finally led to irregularities.**

Active Information Management

- **Actively driven additional information channel**
- **Registration with specific user profile via INTERNET**
- **Two step information procedure**
 - **Step 1:** Instant information about time, location, plant type, substance
 - **Step 2:** Registered user gets automatically detailed information as soon as available
- **Target:** Establishment of long term data exchange relationship

Summary and Outlook

- ZEMA has become a reliable switching board for accident information between German authorities at local and federal level and the EU Member States
- Public has full access to all ZEMA information via INTERNET www.umweltbundesamt.de/zema
- ZEMA database is fully available for on - line recherche at www.infosis.bam.de/zema
- Promotion of an active information management tool via INTERNET