UIC World Security Congress
Bratislava 2012

INTERNATIONAL UNION OF RAILWAYS

Project of expert and training system for extreme situations on railways

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Content:

1. Introduction of UNIZA
2. New project PETSES
3. Solved projects

- **1953** – University of railway transport, Prague
- 1959 – University of transport, Prague
- **1960** – moving to Žilina
- 1978 – University of transport and communications, Žilina
- **1996** – University of Žilina (next UNIZA)

UNIZA has 7 faculties:

- of operation and economics of transport and communications
- of mechanical engineering
- of electrical engineering
- of civil engineering
- of management science and informatics
- of special engineering
- of humanit science

People on UNIZA:

- 660 Academics
- 145 Research workers
- 10 500 Students /102 Foreign /652 PhD.
- 260 Accredited study programs

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Faculty of operation and economics of transport and communications

Departments of:

- Road and Urban Transport,
- Railway Transport,
- Air Transport,
- Water Transport,
- Communications,
- Economics,
- Quantitative Methods and Economic Informatics

Faculty's mission:

High quality education, science and research in the field of engineering, operational, technological and commercial-economic disciplines of transport and communications for prospective careers of our students.

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Faculty of special engineering

Departments of:

- Crisis Management,
- Fire Engineering,
- Security Management,
- Technical Sciences and Informatics,
- Research Department of Crisis Management.

Faculty's mission:

To prepare university educated managers and experts for solution of crisis situations in all spheres of human life.

The main aim of the **Project of expert and training system for extreme situations on railways** (next PETSES) was to design and to develop of expert and training system for managing railway transportation in extreme infrastructure situations. Designed parts were oriented on:

1. operating before and during extreme extraordinary situations - such as technical faults, fires, floods, explosions and terrorist attacts,

2. supporting protection of critical transportation infrastructure.

Planned results were oriented on:

1. To design a behavioral model of people in narrowed spaces, with focus on internal and external factors

2. To project the most probable scenarios of various extreme and emergent situations (explosions, fires, floods)

3. To develop a software training tool and specific training methodology

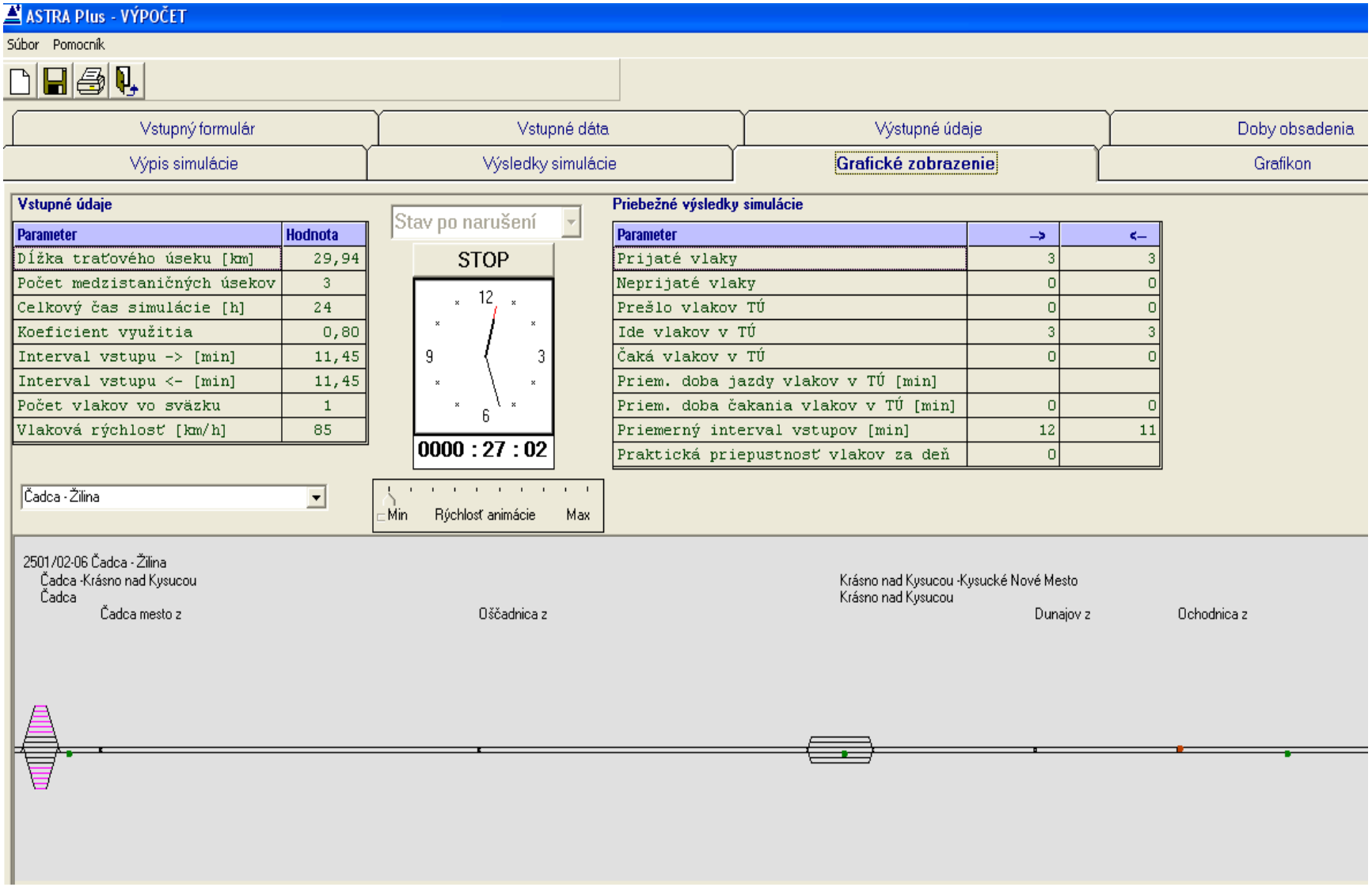
4. To propose recommendations of real decision support system in daily practical use

Short history of our similar railway projects:

1. Simulation of railway transport in crisis situations - project ASTRA
2. Risk identification in railway transport of dangerous goods
3. Critical infrastructure protection in transport sector

Donor: ŽSR

1. Simulation of railway transport in crisis situations - project ASTRA



2. Risk identification in railway transport of dangerous goods

Donor: ZSR

Threats identification

Human influence

Maintenance

Law system and people

Natural influence

Means and infrastructure

Transport technology

Threats identification

↓

Initiation event

↓

Threat

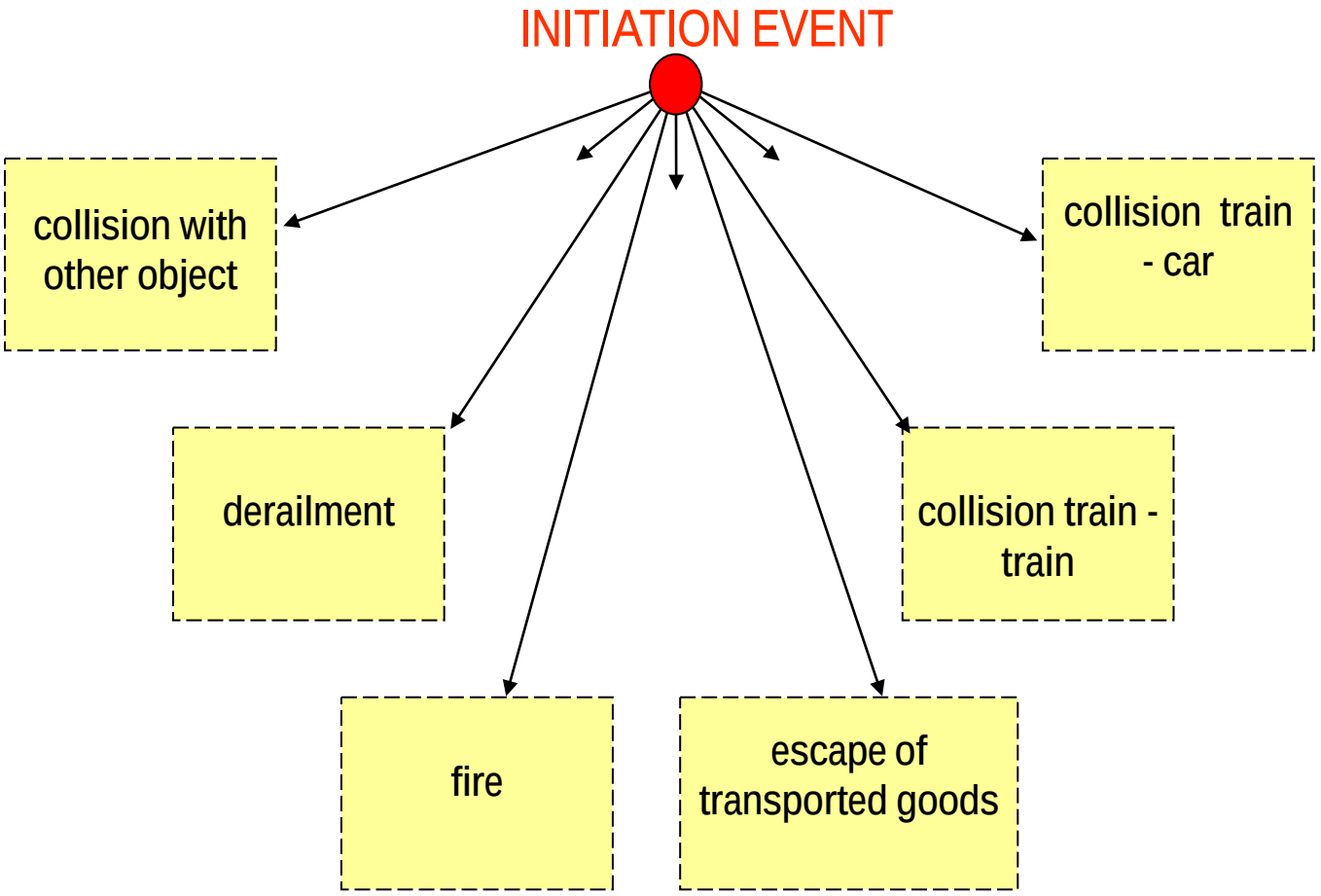
↓

Measures for reducing the threat

↓

Damage of health, property and environment

2. Risk identification in railway transport of dangerous goods



Threats identification

Initiation event

Threat

Damage of health, property and environment

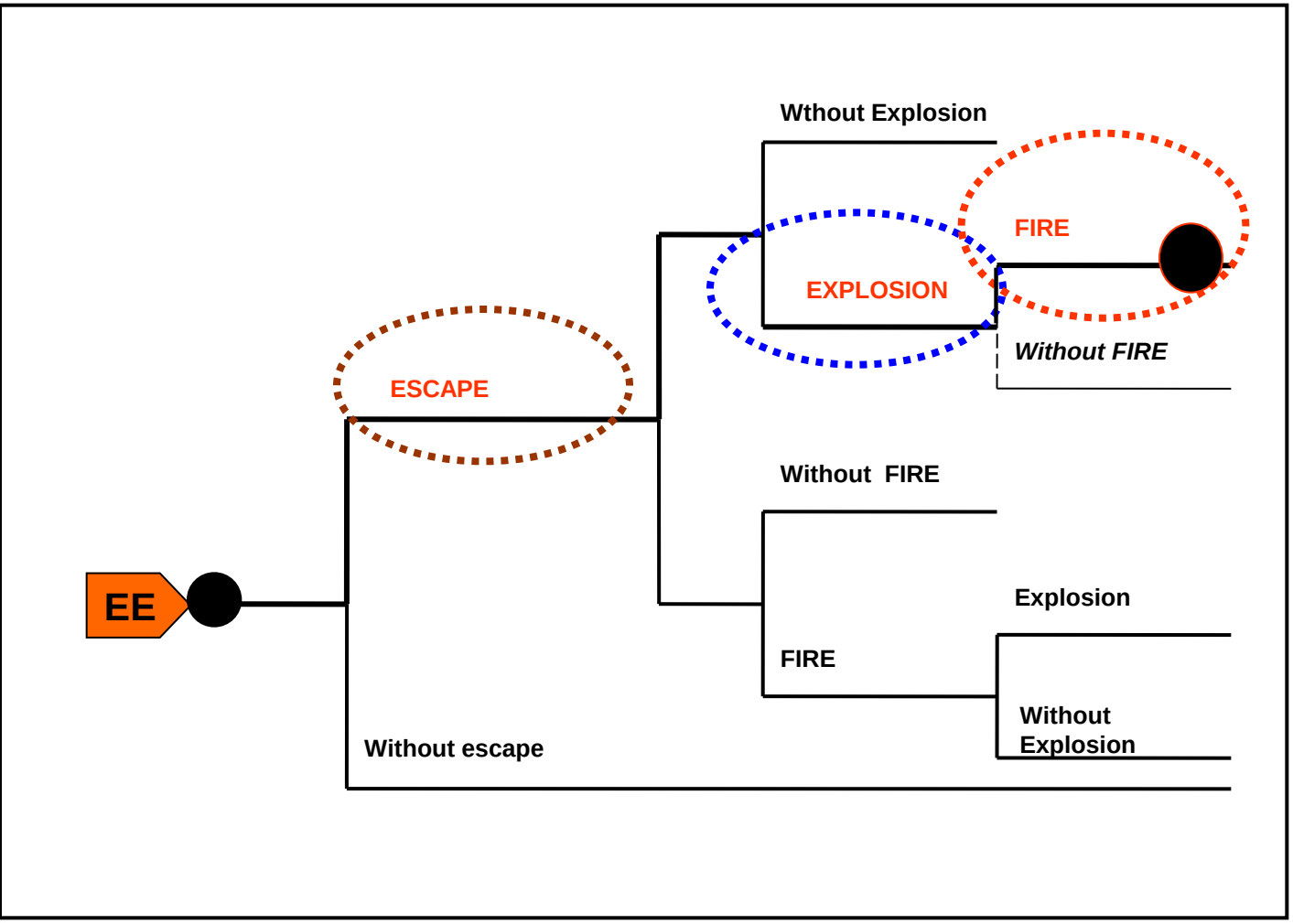
Measures for reducing the threat

As results:

List of possible initial events

2. Risk identification in railway transport of dangerous goods

Method used before Threat – Hazards Tree Analysis (HTA)



Threat identification

Initial event

THREAT

Damage of health, property and environment

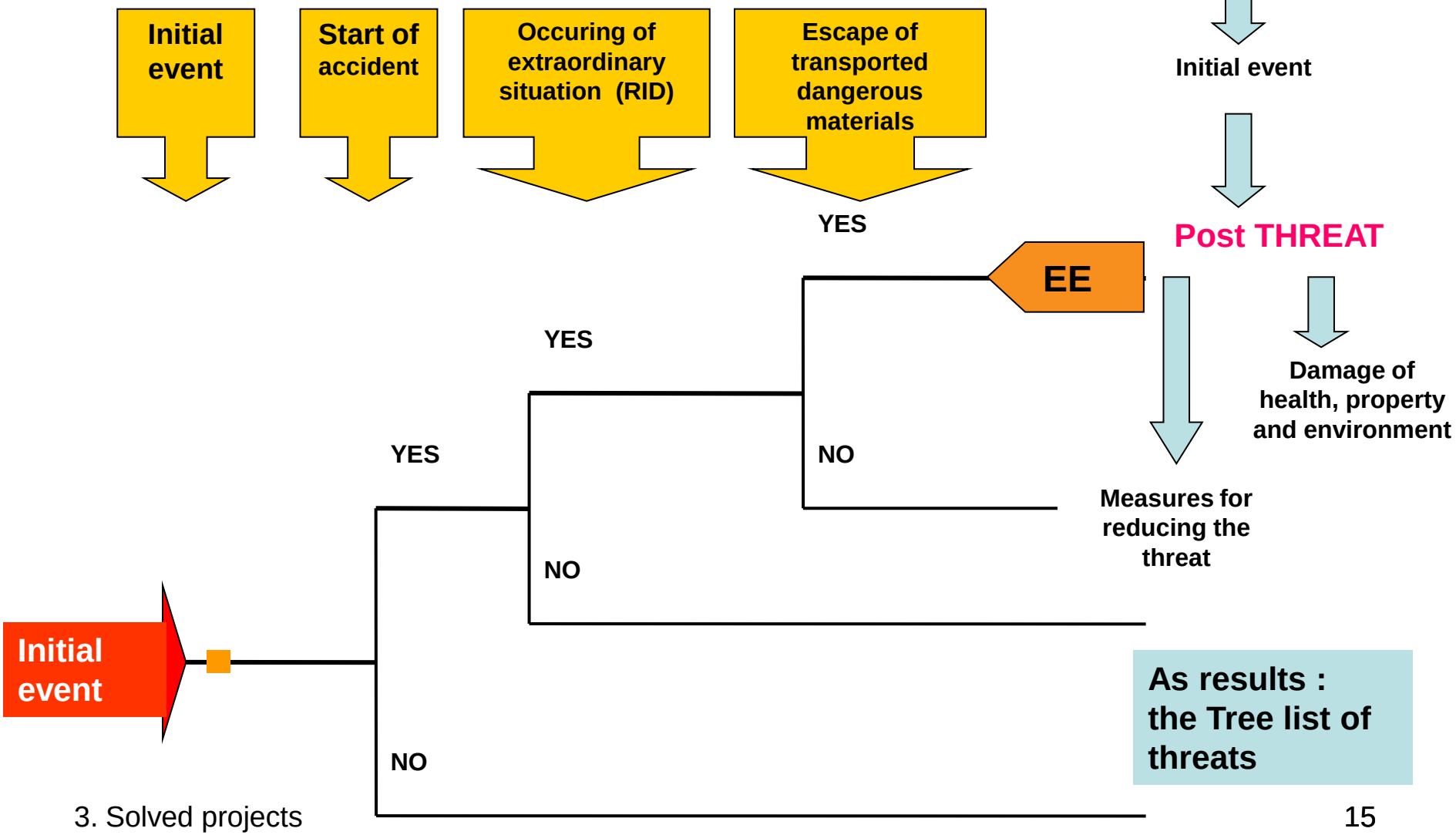
Measures for reducing the threat

As results : the List of threats

2. Risk identification in railway transport of dangerous goods

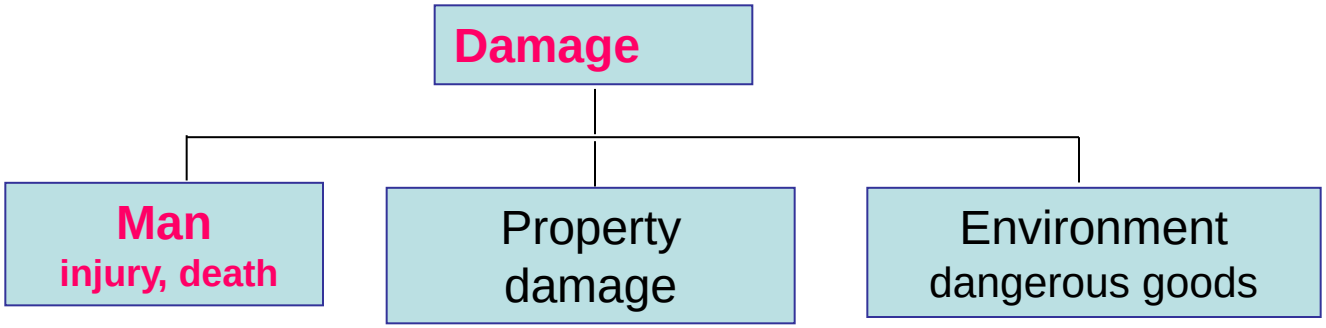
Threat identification

Method used post Threat – Event tree analysis (ETA)



As results : the Tree list of threats

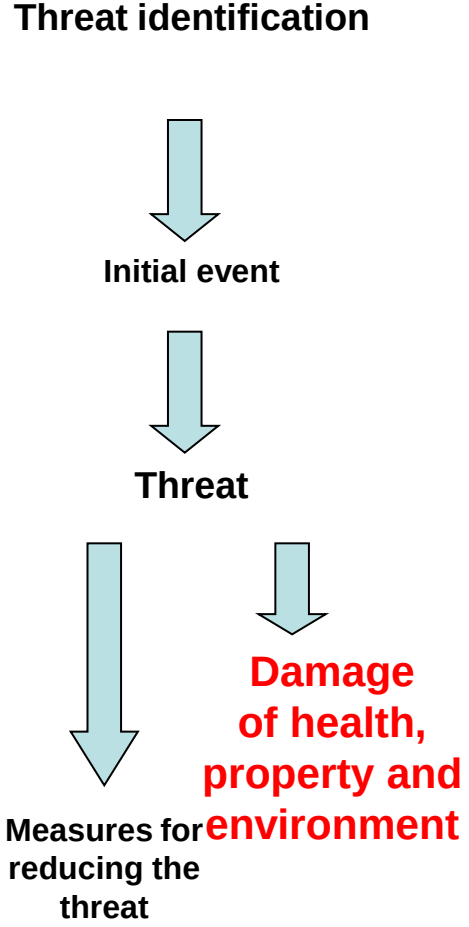
2. Risk identification in railway transport of dangerous goods



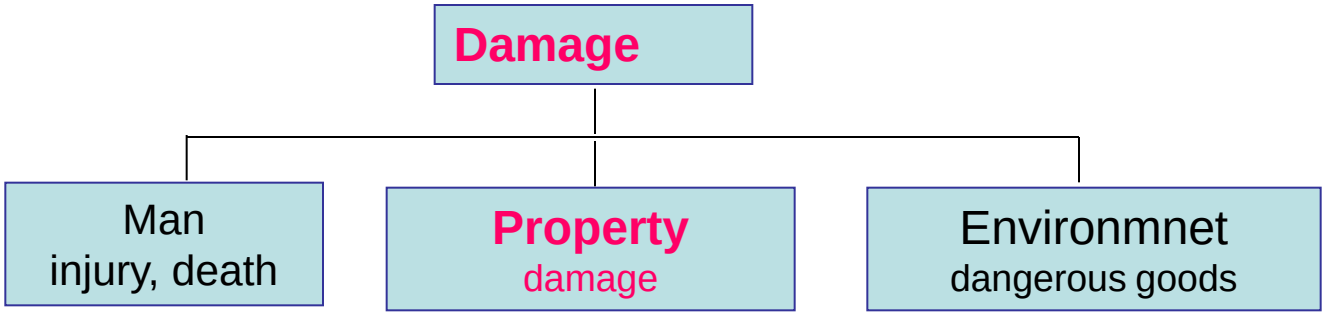
Individual risk - IR
= number of death injuries per one passenger and km,
Society risk - SR
= number of death injuries in comparison to number of transported passengers

Transport	**IR** - number of death injuries per 100 milion passangers and km	**SR** - number of death injuries per 100 milion passanger hours
Bus	0,06	1,4
Train	**0,1**	**6,0**
Car	0,4	12,4
Ship	0,8	16,0
Plane	0,04	20,0

Source: Přibyl, P.: Analýza a řízení rizik v dopravě



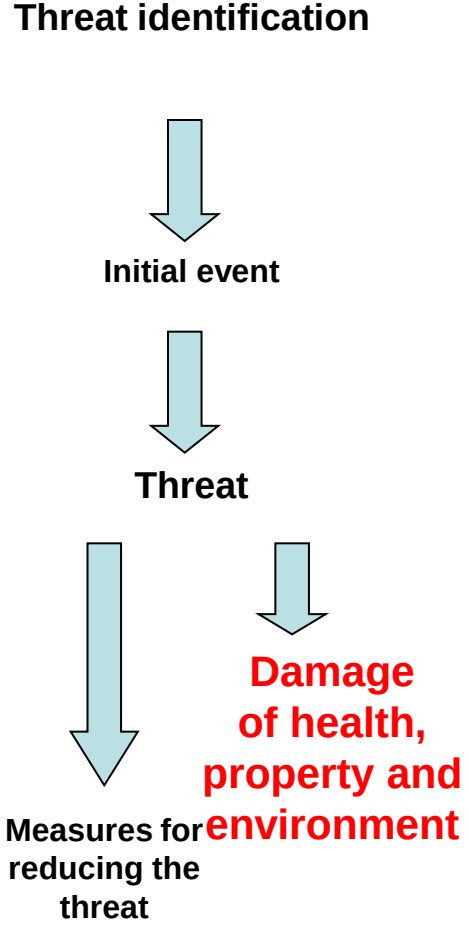
2. Risk identification in railway transport of dangerous goods



Possible damage of property at railway

Number of accidents and Train*Km	Počet nehôd a vlakových kilometrov
Type of accident	Typ nehody
Year	Rok
Collisions	Zrážky/kolízie
Derailments	Vykoľajenia
Level crossing accidents	Nehody na úrovňových križovatkách
Fires in RS	Požiare v dráhových vozidlách
Others	Iné/Iní
Total	Spolu
Train*Km (MLN)	Vlakové kilometre (v miliónoch)
N° of fatalities, train*Km and Passenger*Km	Počet usmrtených osôb, vlakových kilometrov a osobo-kilometrov

Source: Vocabulary to ERA tabs



2.Risk identification of railway dangerous goods transportation

Damage

- Man
  injury, death
- Property
  damage
- **Environment**
  dangerous goods

Index of toxic hazards
- surface water,
- underground water,
- soil,
- biotical part of environment

Index of vulnerability of environment
- surface water,
- underground water,
- soil,
- biotical part of environment

The result is sum of indexes

Source: Methodics of VŠB TU Ostrava

Threat identification

Initial event

Threat

Damage of health, property and environment

Conclusions

The identification of risk sources gives lists of:
- threats,
- initial events,
- possible damages.

3. Critical infrastructure protection in transport sector

- Donor: SLOVAK RESEARCH AND DEVELOPMENT AGENCY

- The main goal of the project is creation and development of broad basis of theoretical knowledge necessary for making optimal decisions in the process of creating strategic and conceptual documents in the field of the SR critical infrastructure protection with emphasis on critical infrastructure in transportation sector (next CIT). Important aims:
  - **Study 1** - Assessment of security environment in relation to critical infrastructure protection
  - **Study 2** - Public administration competences in protection of CIT

3. Critical infrastructure protection in transport sector

Project outputs:

- **Model 1** - General model of risk management in critical infrastructure protection
- **Model 2** - Model for objective risk management of the CIT elements
- **Model 3** - Model of rescue services activities in CIT critical points
- **Model 4** - Model for solving economic impacts of possible losses
- **Methodology** – Methodology of object protection of CIT elements
- **Methods** – updated statistical methods for evaluation the performance of selected CIT elements

Brainstorming - what do we need?

Political support

New regulations and standards

Suitable and actual methods and methodology

Implementation of expert information systems

Development and implementation of technology especially ICT

Improving the quality of employees

Document 1626 EU from 21st Dec 2010

The aim til 2014: „European strategy - five steps towards a more secure Europe"

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Thank you for your attention

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