

Challenges in Deep Mine Rescue within the European I²Mine Project

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■ Introduction

→ I²Mine and Deep Mine Rescue

■ European Mine Rescue today

■ Major Hazards in UG Mining

→ Literature Review

→ International Survey

→ Selection

■ Challenges at Great Depths

→ Classification System

→ Transfer

→ Examples

■ Outlook & Conclusion





Innovative Technologies and Concepts for the Intelligent Deep Mine of the Future

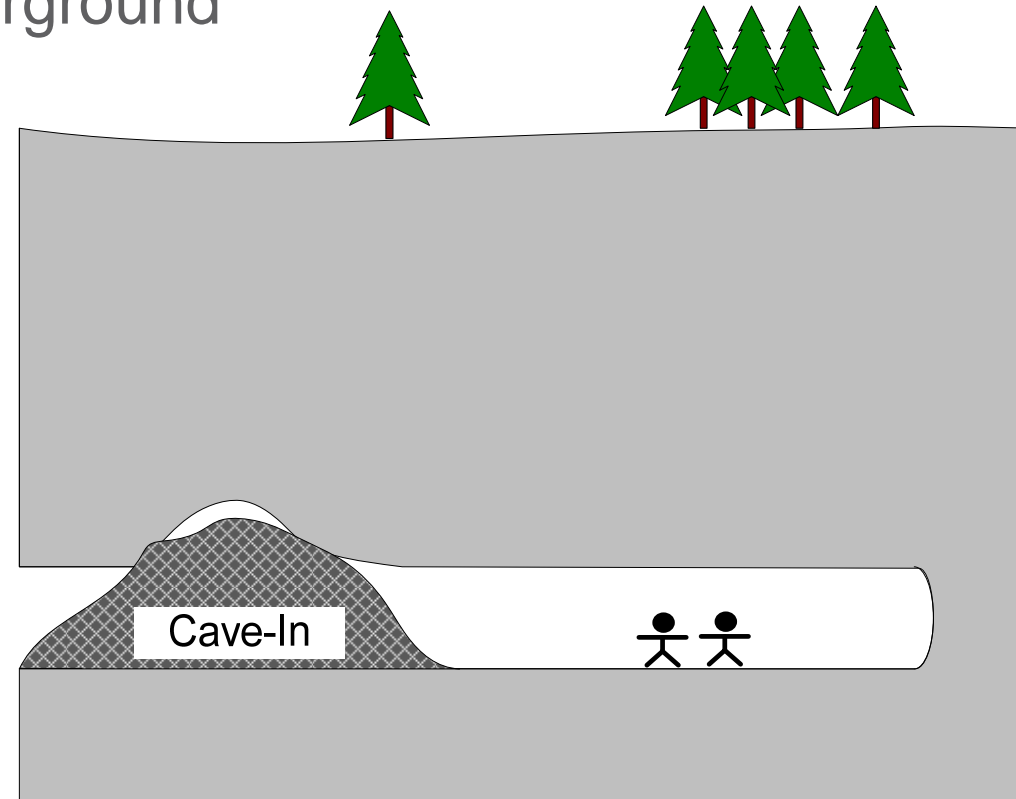


- European Mining at Great Depths
- 4 Year Project, 26 Million Euro Budget
- 26 Partners from 10 EU-Countries e.g.:

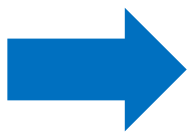
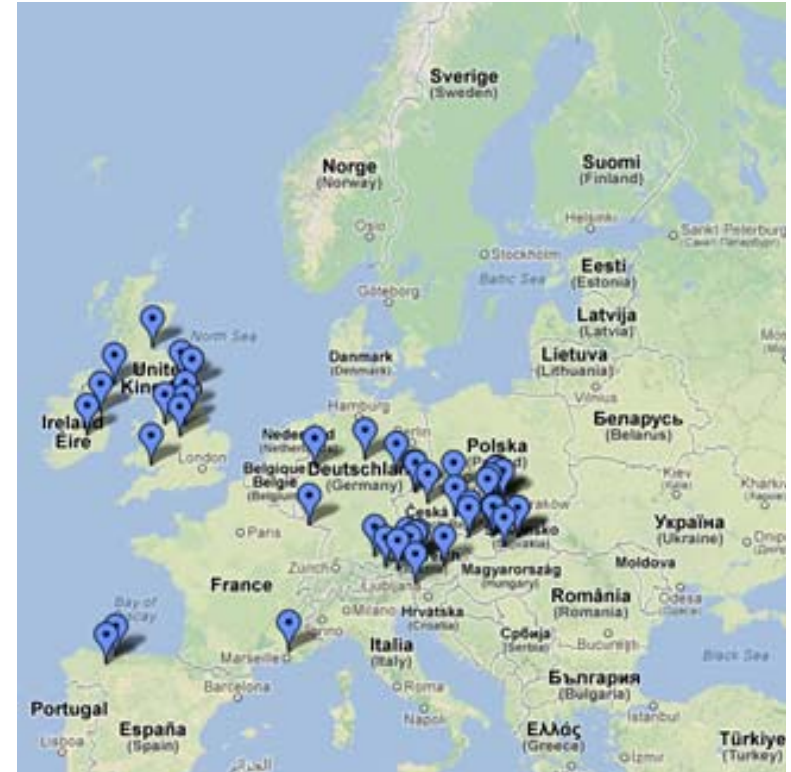


- Work Package 6: “Health and safety and environmental aspects in future deep mining”
- Task 6.6: “Deep Mine Rescue”
- Scenario: „Miners trapped underground“

- ➔ Increase Preparedness!
- ➔ Concepts & Guidelines
- ➔ Technological Studies
- ➔ ...

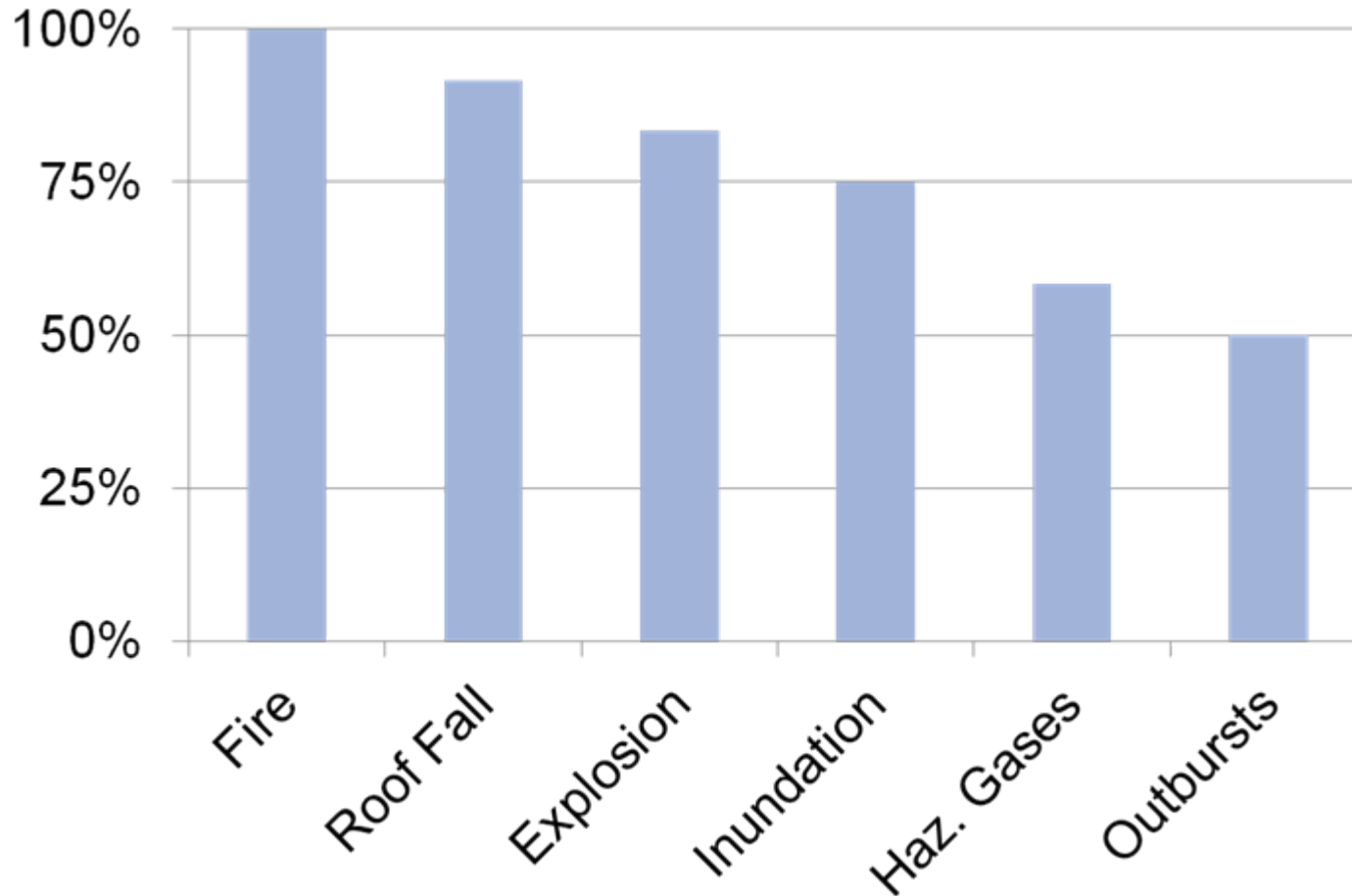


- Private vs. Governmental Structures
- Company-owned Mine Rescue Teams vs. civil Fire-Fighters
- Database of central Mine Rescue Stations
- Bilateral Cooperation instead of International Networks
- European Directives vs. National Mining Laws and Standards



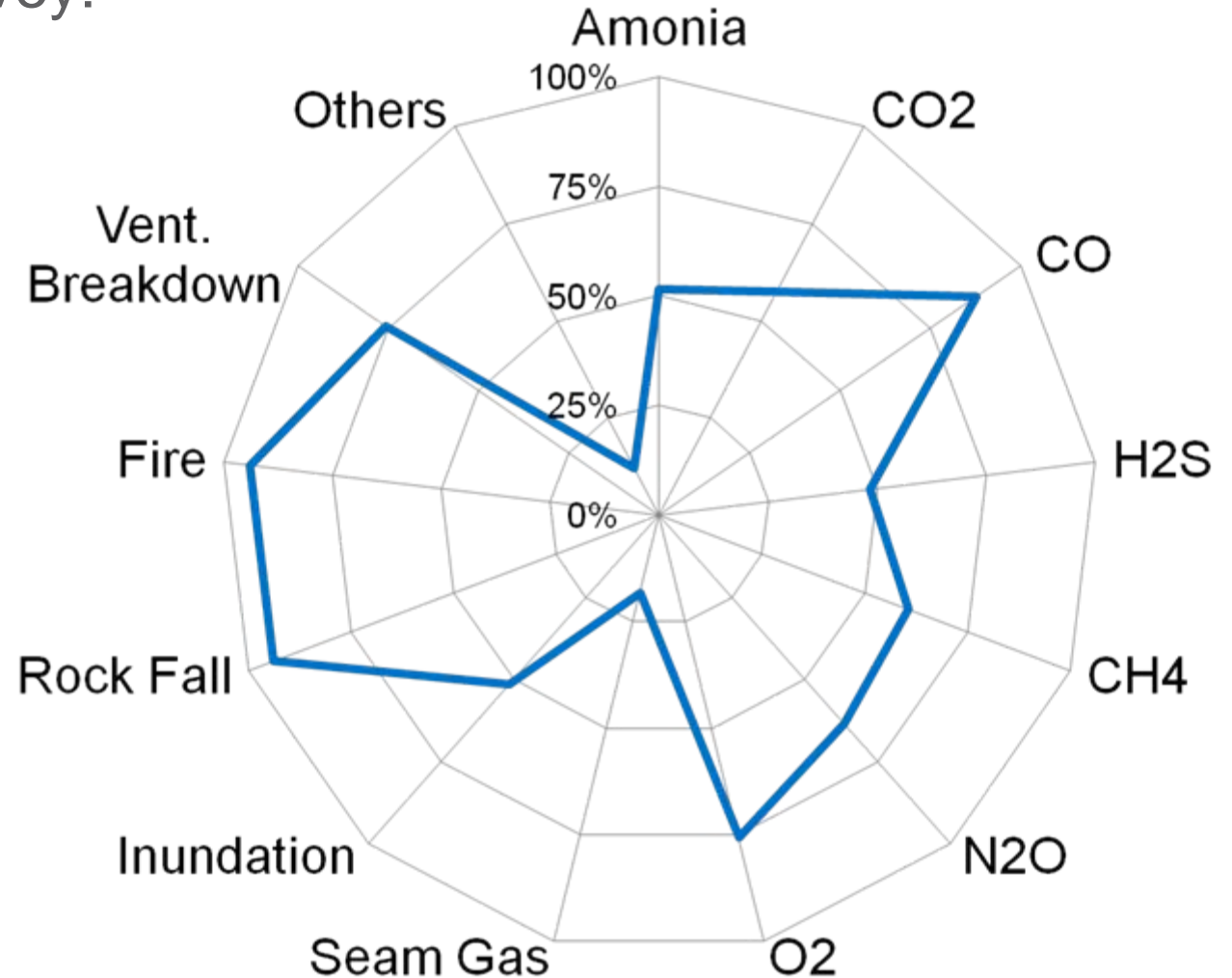
- more collaborative Approach
- European Mine Rescue Platform

A Literature Review:



■ An International Survey:

- ➔ 36 Mines
- ➔ 8 Commodities
- ➔ 4 Continents



Integrated Selection:



Fire

Haz. Gas

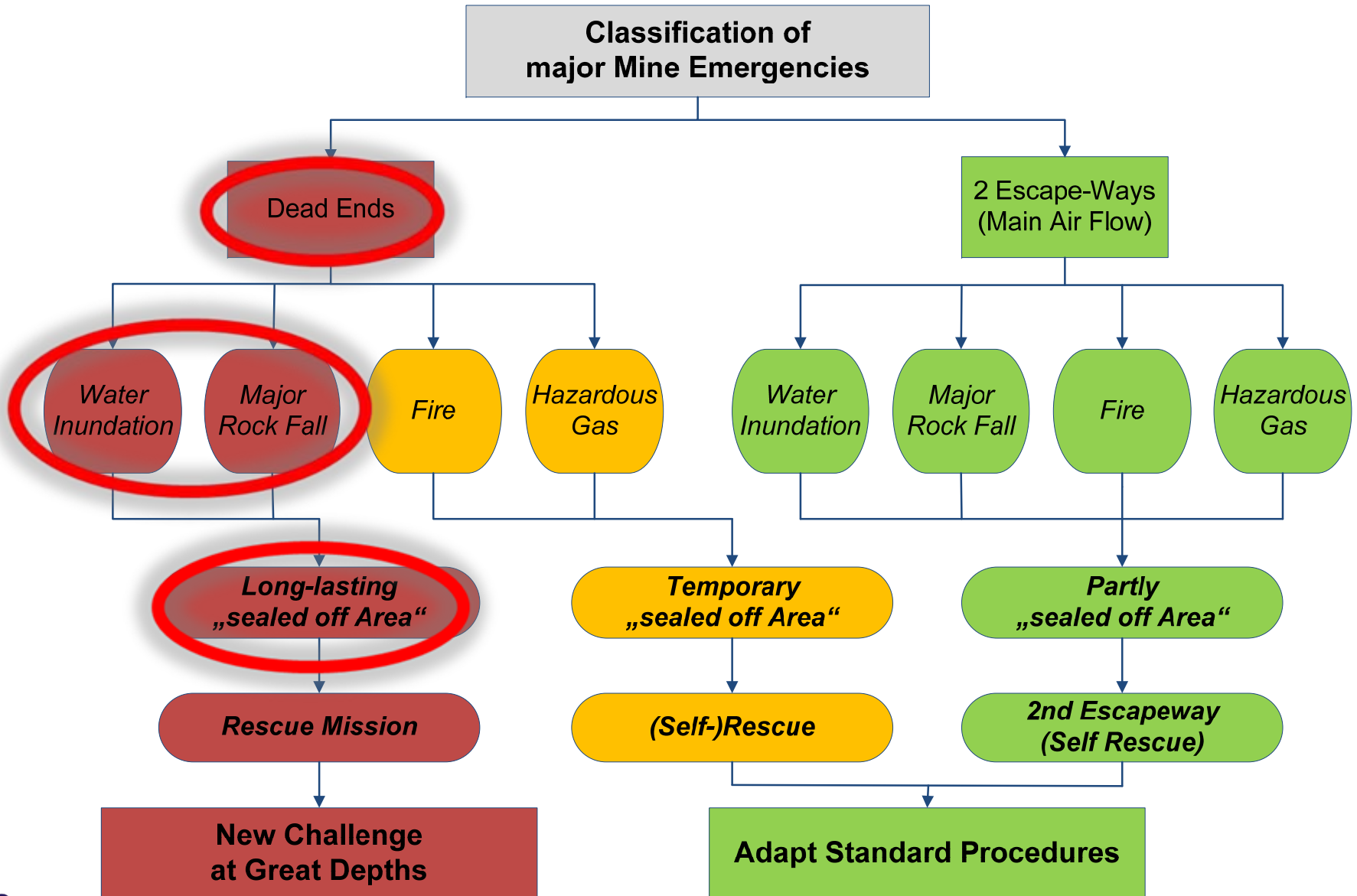


Inundation

Rock Fall

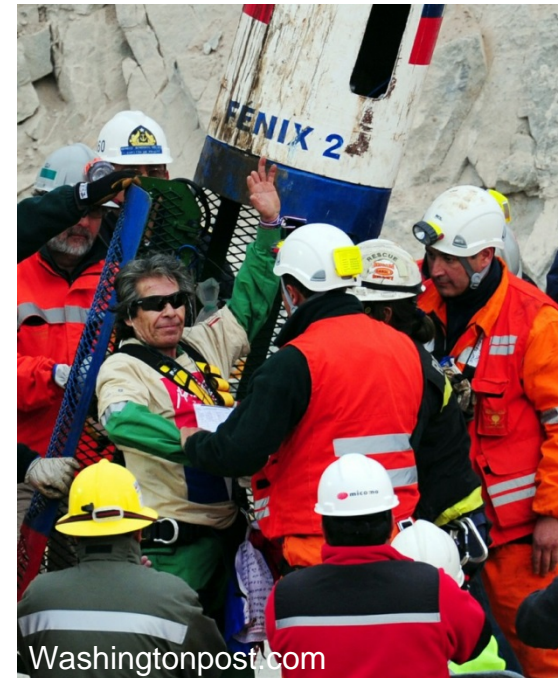


Explosions & Outbursts



- Length of Escape-Ways
 - ➔ Self-Rescuer Application
 - ➔ Refuge Chambers
- Travel Time for Mine Rescue Teams
- Use (second) Escape-Ways whenever possible!

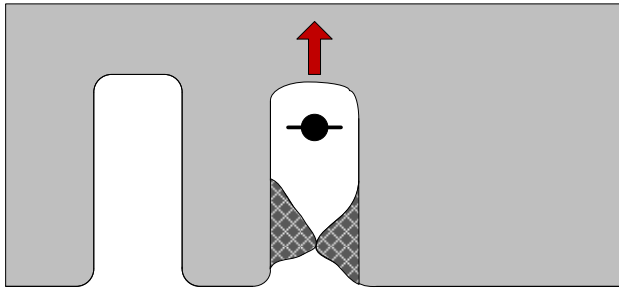
- Scenario: „Miners trapped underground“
- Rescue Drilling Time
 - ➔ San Jose, Chile 2010: 700 m → 3 Months
 - ➔ Europe's Future Mining: 2000 m → ???





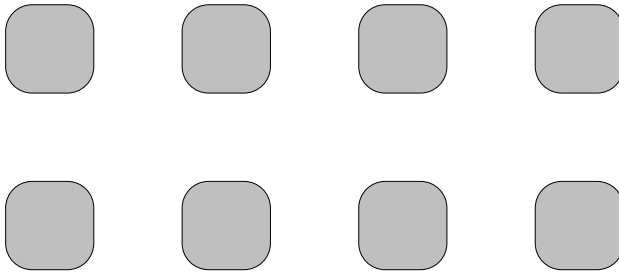
Washingtonpost.com

Example 1: Room & Pillar

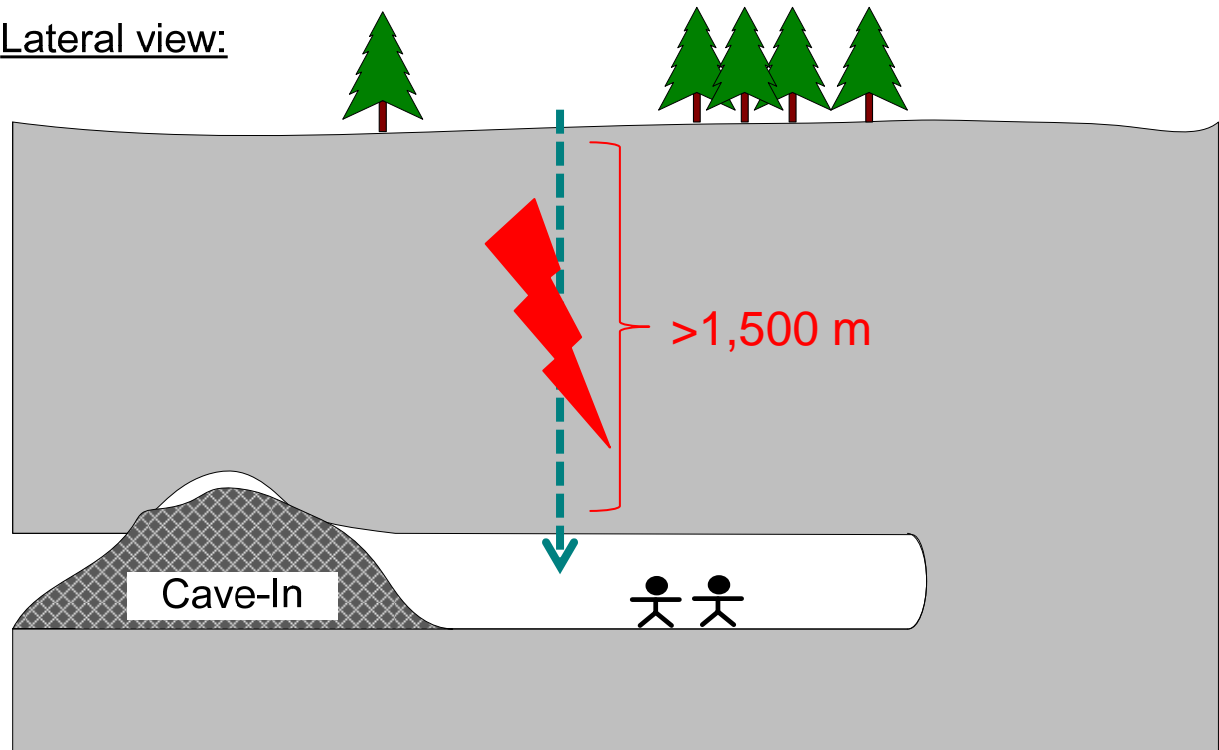
Top View:

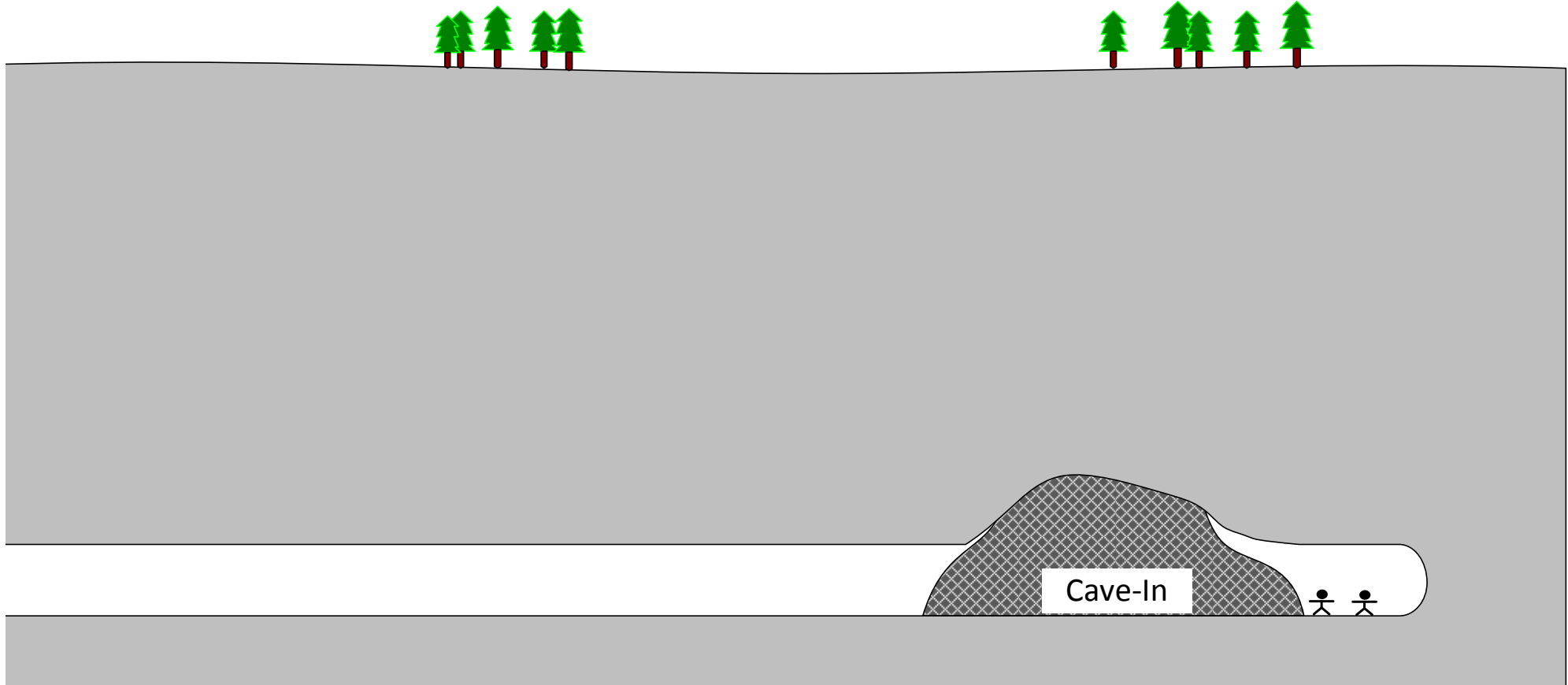


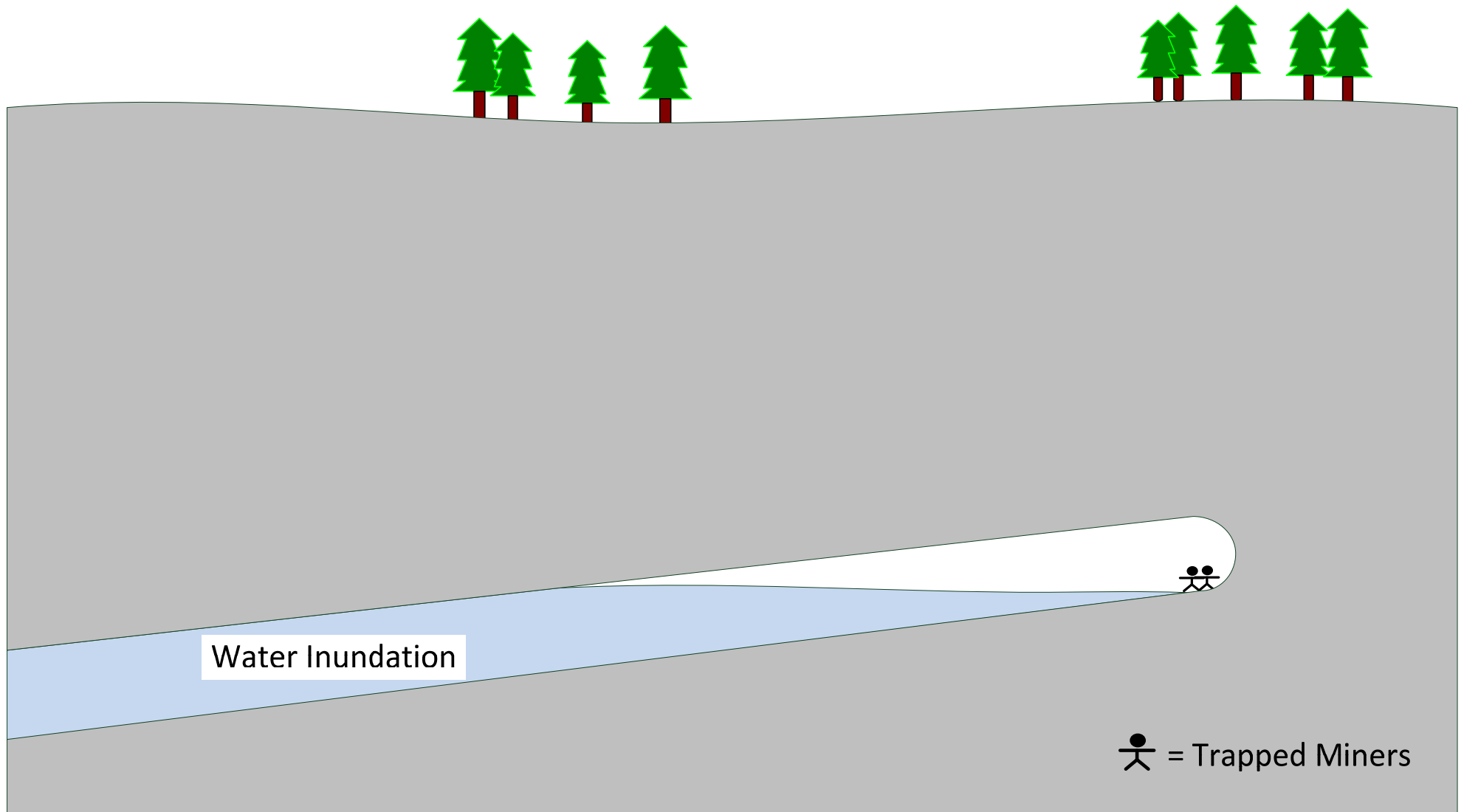
-  = Cave-in
-  = Trapped Miners

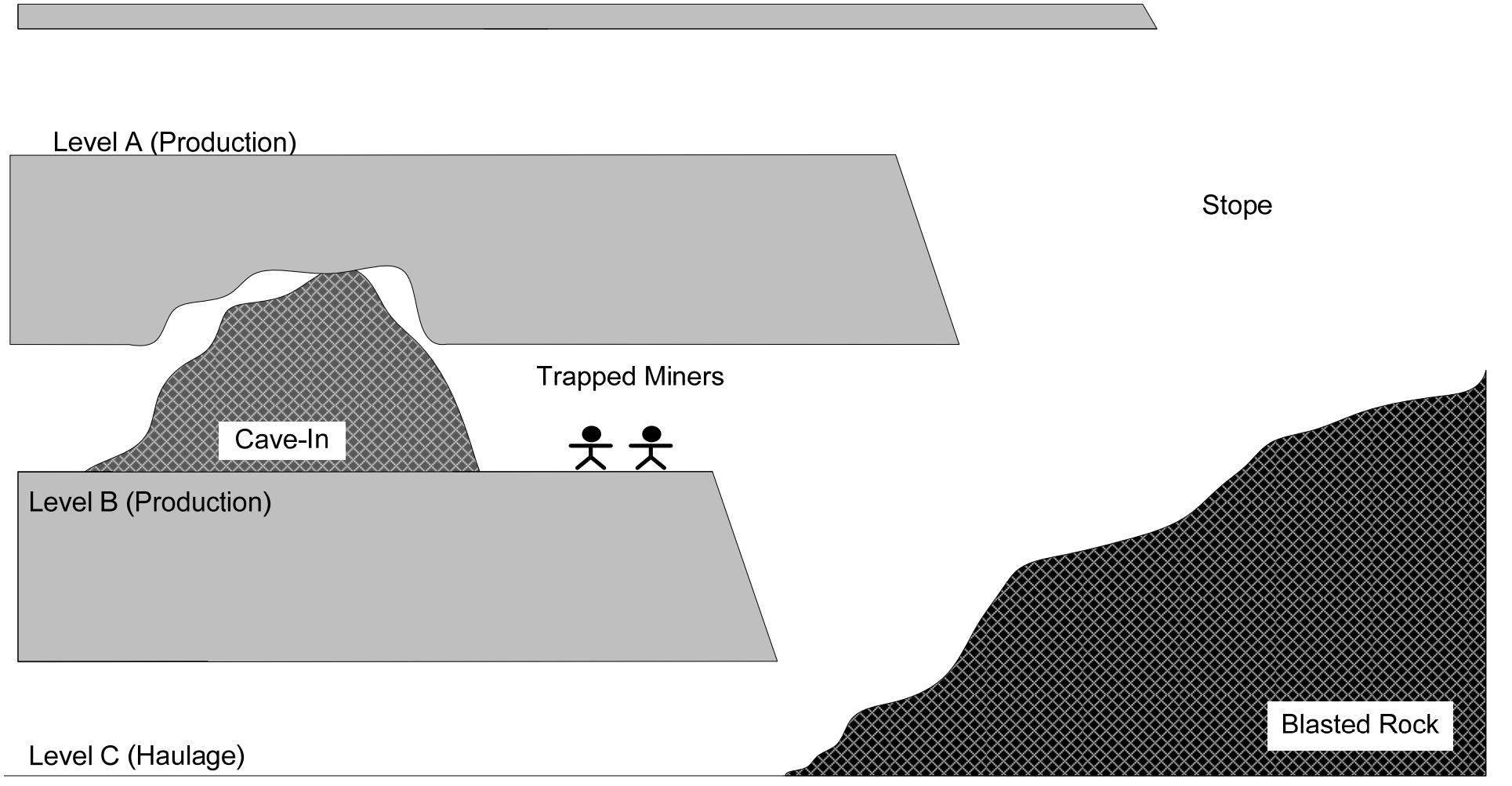


Lateral view:

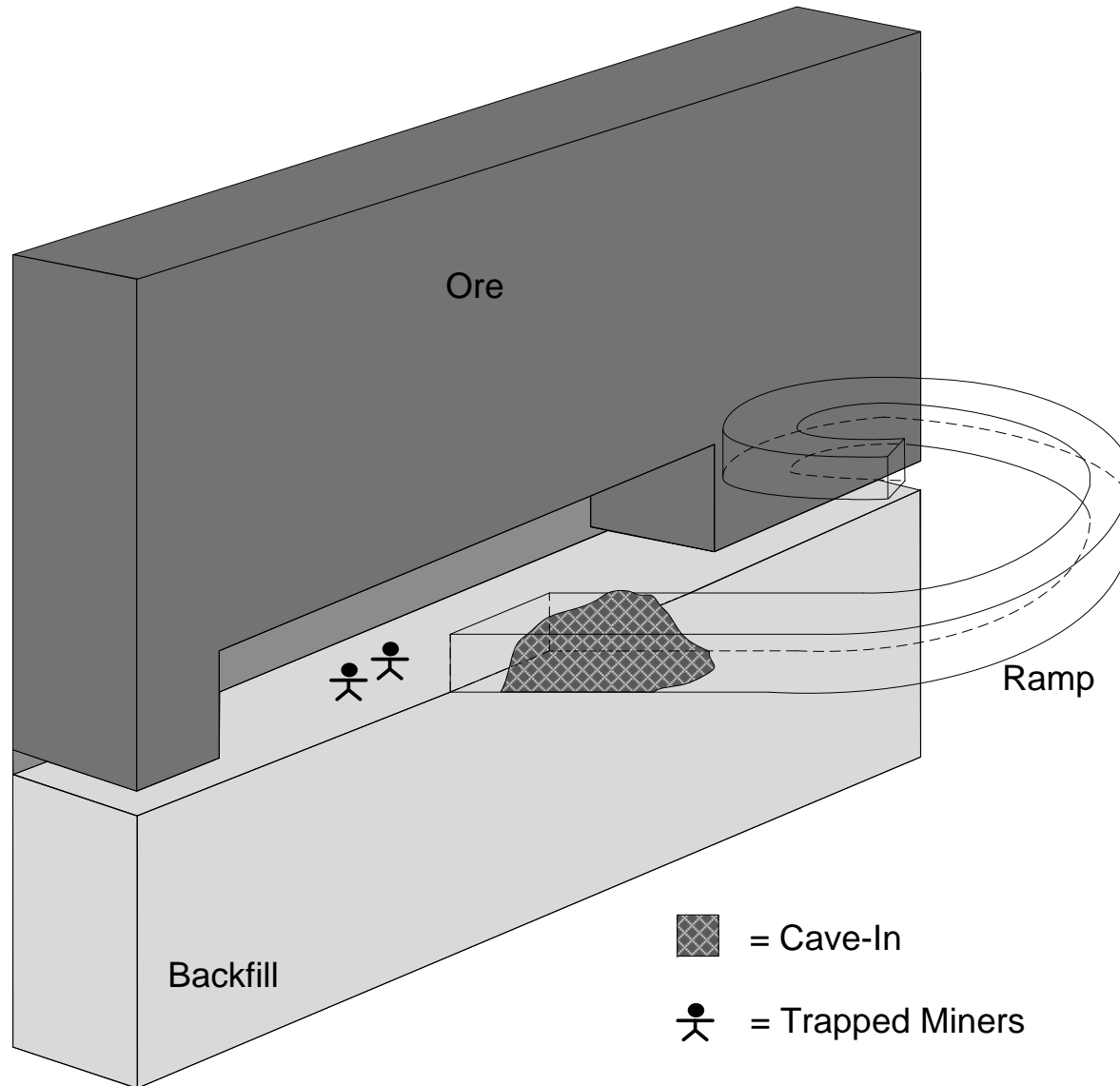




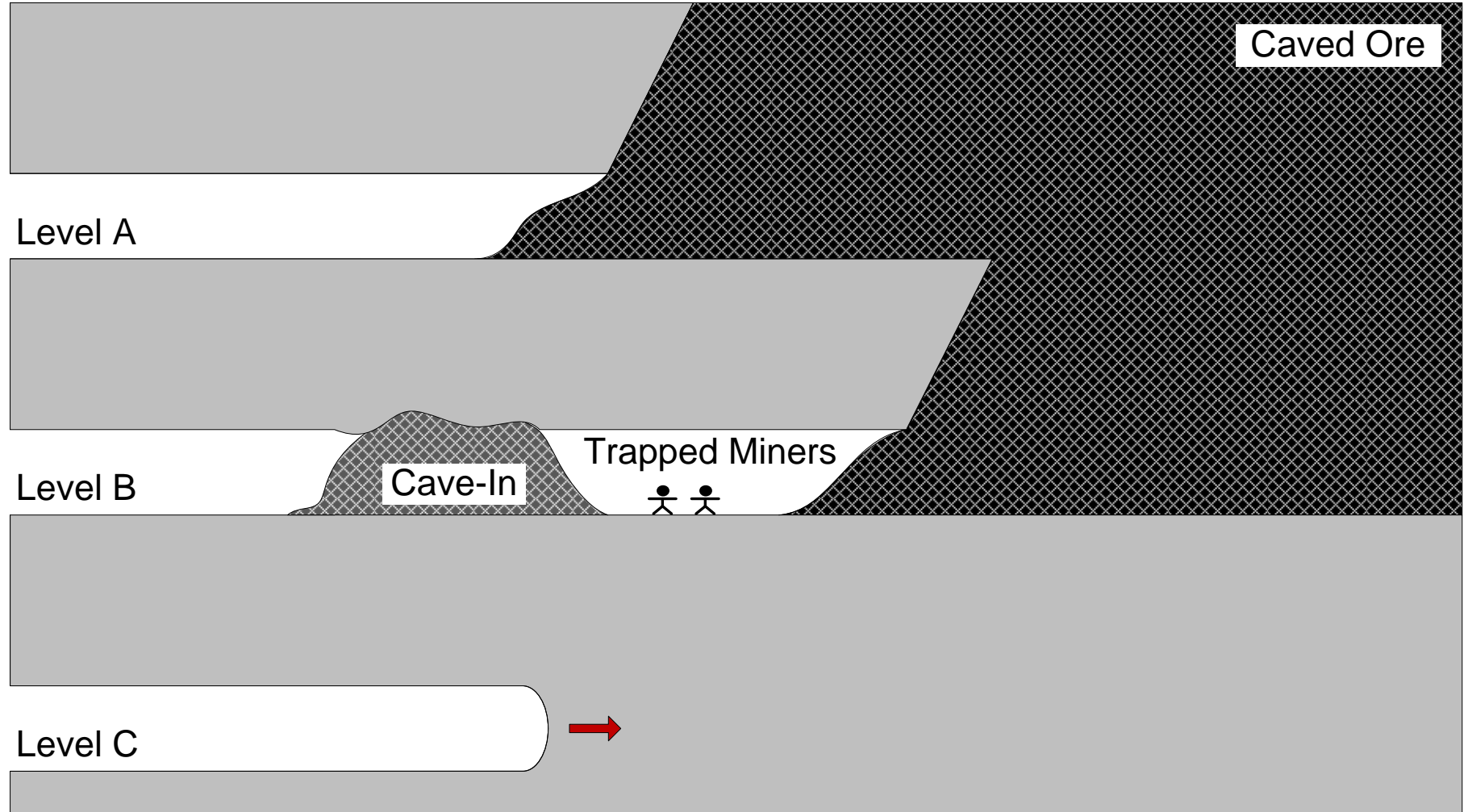




Example 4: Cut & Fill



Example 5: Sublevel Caving



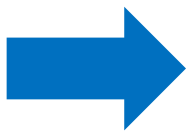
- I²Mine's Vision of fully automated, un-manned Mines
 - ➔ But: at least small number of UG Workers in foreseeable Future

- Possible Rescue Missions at Great Depths
 - ➔ of increasing Scope and Extent with increasing Depths

- Need for Research, I²Mine: Deep Mine Rescue
 - ➔ Fully equipped Rescue Chambers
 - ➔ Integrated Escape-Way Concepts
 - ➔ Communication, Tagging & Tracking
 - ➔ Emergency Management, Guidelines
 - ➔ Concept for a European Mine Rescue Platform



- I²Mine developing „Innovative Technologies and Concepts for the Intelligent Deep Mine of the Future”
- Variety of Mine Rescue Concepts and Philosophies in Europe
- Fire, Rock Fall, Inundations and haz. Gases as major Hazards
- Challenge of long-lasting Entrapments at Great Depths
- Ongoing I²Mine Research for „Deep Mine Rescue“



Collaborative and sustainable
future European Mine Rescue



Thank you and Glückauf!

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