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# **Training of Fire Fighters in convinced spaces**

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An aerial photograph of a landscape featuring a large forest with trees in various shades of brown, orange, and green, indicating autumn. A small, dark-roofed building is visible in the middle ground, surrounded by green grass. The text 'Research' is overlaid in the top left. The text 'A Trip Underground' is overlaid in the top right. The text 'Testing' is overlaid in the middle left. The text 'Development' is overlaid in the center. The text 'Training' is overlaid near a building complex in the bottom right. The overall scene is a mix of natural forest and developed areas.

**Research**

# **A Trip Underground**

**Testing**

**Development**

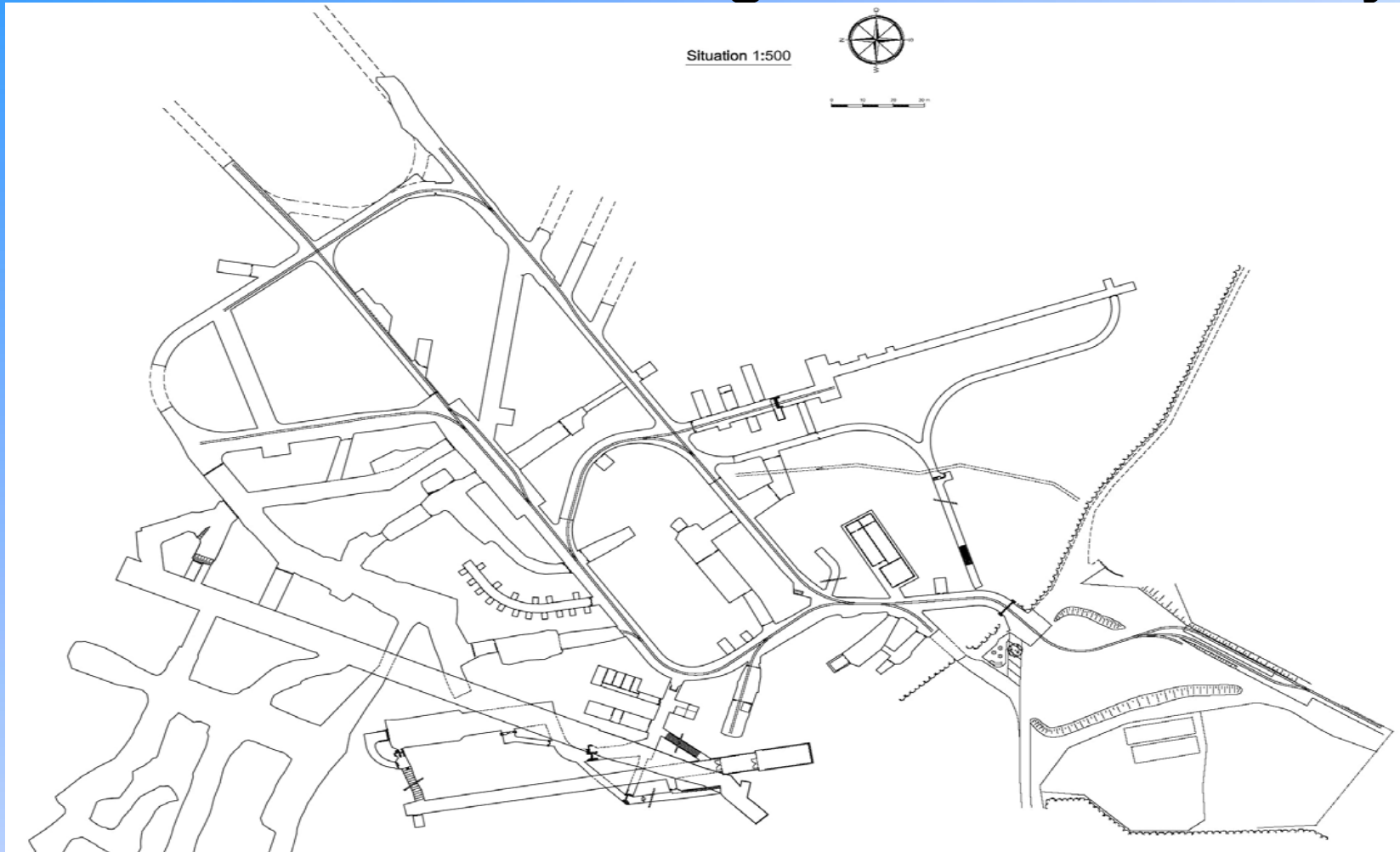
**Training**

# Since foundation

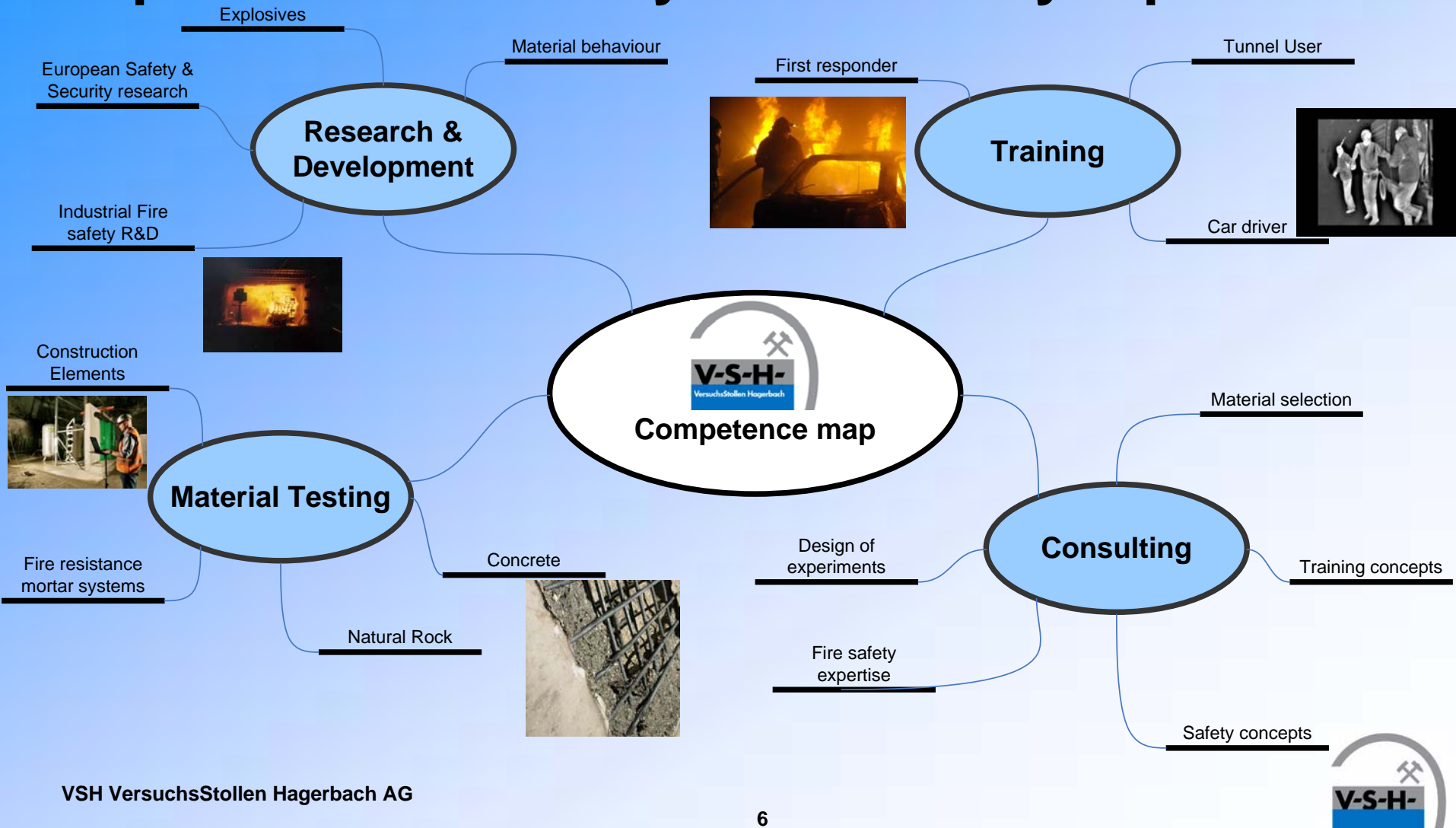
- ❑ **1970 First tests on investigations**
- ❑ **1975 Foundation of VSH Hagerbach Test Gallery Ltd.**
- ❑ **1994 Accreditation of Laboratory by EAM (STS 060)**
- ❑ **1998 Opening Shooting Range**
- ❑ **2000 Opening Fire research centre**
- ❑ **2003 Starting Fire Fighter training**
- ❑ **2005 LSurF-Project Large Scale Underground Research Facility**
- ❑ **2008 InTeg-Risk-Project**  
(Early Recognition, Monitoring and Integrated Management of Emerging, New Technology Related Risk)
- ❑ **2008 UpSafety-Project**  
(Education, Training and Exercise programs for multidisciplinary approach in conviced spaces)



# 5 km Tunnel Net at Hagerbach Test Gallery



# Experiences in Safety and Security topics



# Emergency door; Safe side and Fire side



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# Special requirement for underground spaces

- ☐ Long operation time
- ☐ Tailback of heat
- ☐ Intensive smoke and low visibility
- ☐ Limited communication
- ☐ Unknown load in vehicles
- ☐ Danger of Fire and Explosions by leaking of fuel
- ☐ Accessibility
- ☐ Electrical power supply installations
- ☐ Long way of attack



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# Aim of education

- **Introduction into challenges of tunnels**
- **Knowing the personal capabilities under real fires**
- **Testing of new tactic**
- **Knowing the boundary conditions of tunnels**
  - **Ceiling**
  - **Ventilation**
  - **Material behaviour**
- **Assure knowledge an experience**
- **Exchange of experience**

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# Aim of fire fighter training at Hagerbach Test Gallery

## □ Fire fighters

- Basic knowledge of fire fighting
- Qualified for breathing protection
- Tackle physic and psychological stress
- Tunnel in their area
- For tunnel under construction
- Will be responsible for tunnels in the future

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# Module of Education

- ❑ **Safety Aspects for Intervention and Rescue in tunnels**
  - **Presentation of general aspects**
  - **Group work to evaluate certain scenarios with the client**
- ❑ **Strategy for handling the fire scenarios**
- ❑ **Fire fighting in tunnels – General aspects**
- ❑ **Experiences of the fire fighters during the fire at the Gotthard-Road-Tunnel, October 2002**

# Module of Training/Exercise

- ☐ **Fire fighting of small fires**
  - Cooling, Handling the fire, security of fire fighters, rescuing persons
- ☐ **Fire fighting on multiple small fires**
  - Intensifying the experiences of unit 1
- ☐ **Reconnaissance of accident situation.**
  - What has really happened? How many persons are injured? Are there any hazardous goods involved (terrorists attack)?
- ☐ **Rescue persons from long distances**
- ☐ **Spreading of smoke**
  - Stopping smoke & condensing fumes at tunnel portal (real fire)
- ☐ **Ventilation technology**
  - Positive/Negative ventilation
- ☐ **Tactical aspects of finding persons in smoke covered tunnels**
  - Access through staircases; security of fire fighters; communication
- ☐ **Tunnel accident**
  - Simulation of a realistic accident with multiple fires in a tunnel including all aspects which have been trained in separate units before
- ☐ **Large scale tunnel accident**
  - Final training unit with all aspects of a large tunnel fire



# Education for Rail tunnels



# Rescuing of persons



# Recognizing and handling of hazard materials





# Protection of building









# Inset at road tunnel with bus



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# Summary and Conclusion

- ☐ **Accidents in tunnels are challenging events for rescue forces**
- ☐ **Education for tunnel forces has to be done step by step**
- ☐ **Real fire trainings give confidence in the capabilities of fire fighters.**
- ☐ **Real fire trainings will be needed in the future.**





**Thank you very much for  
your attention!**

**Glück auf !**