Media event.
“Safe passage through the new Gotthard Base Tunnel“.

Erstfeld, 3 February 2016.
Safety from the Group's perspective.

Hans Vogt
The diversity of the tunnels determines the safety measures.

- 277 tunnels ➔ approx. 260 km
- Moutier: 7 m / Simplon: 19,823 m
- Hirschengraben: around 800 trains/day (S-Bahn)
- Koblenztunnel: opened in 1854

Specific safety measures

<table>
<thead>
<tr>
<th>Length distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 100 m</td>
</tr>
<tr>
<td>100 m-300 m</td>
</tr>
<tr>
<td>300 m-1 km</td>
</tr>
<tr>
<td>1 km-3 km</td>
</tr>
<tr>
<td>&gt; 3 km</td>
</tr>
</tbody>
</table>
Tunnels are safe – but accidents can still happen.

Risk factors.
- Few points
- Limited external influences
- Means of escape
- Fire

Simplon 2011: Freight train fire.
- Approx. CHF 50 million in property damage
- No casualties
- Route closed for several weeks
Tunnel safety strategy.
Investments made: approx. CHF 100 million

Contributions towards safety

1. No "broken-down" trains in tunnels
2. "Broken-down" trains leave the tunnel
3. Technical support for autonomous help
4. Measures for assisted rescue
Tunnel safety: system safety is key.

Continuous reduction in accidents during railway operation (SBB network 2004–2014)
Safety in the Gotthard Base Tunnel is based on five pillars.

1. Incident prevention.
2. Mitigation.
3. Autonomous help.
5. Basic and advanced training.

Peter Jedelhauser
1. Incident prevention.
Train monitoring equipment.

Schadhafte Züge werden durch verschiedene Anlagen frühzeitig erkannt und vor der Tunneleinfahrt gestoppt.
2. Mitigation.
The Gotthard Base Tunnel has been constructed in accordance with the latest safety standards.

- **Separate tunnel tubes for each direction of travel** prevent collisions.

- **Two ventilation stations** in Sedrun and Faido and 24 jet fans at the portals ensure air circulation in the event of an incident. Positive pressure ventilation can be implemented in the unaffected tube and the multifunction stations to protect the people in them.

- Each tunnel tube has an open water pipeline system. This is fed with 5 litres of water per second (constant circulation) to transport dirt and hazardous substances to the retention basins in front of the tunnel portal. This prevents the explosive ignition of gases in the tunnel.

- Specific **safety requirements for vehicles** have been defined based on the structural conditions (e.g. ETCS Level 2, running characteristics, fire alarms, etc.).
In the event of a fire or other incident, the passenger train stops at the next emergency stop station.

Operating principle: After the alarm is triggered, the train is automatically guided to the next emergency stop station. This measure is only cancelled once the reason is known and a fire can be ruled out.
Operational measures in the event of an incident.

Bei einem Ereignis im Gotthard-Basistunnel werden folgende betriebliche Massnahmen getroffen.
3. Autonomous help.

Linus Looser
Autonomous help is only possible through coordinated practices in installations and rolling stock.

- **On the train.**
  - Safety notices
  - Signage

- **In the tunnel.**
  - Tunnel tubes
  - Emergency stop stations
Even with autonomous help, neither customers nor staff are left on their own if an incident occurs.

Using the example of SBB Passenger, this means:

<table>
<thead>
<tr>
<th>Staff</th>
<th>Rolling stock</th>
<th>Customer information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Deploying</strong> specially trained staff on all passenger trains.</td>
<td><strong>Adapting the fleet</strong> for use in the GBT (vehicles in the old design) and thereby raising the safety standards.</td>
<td><strong>Improving the ways that information is provided</strong> via the safety platform and leaflets.</td>
</tr>
<tr>
<td><strong>Involving the control centre staff</strong> in the processes for optimum support of on-site staff</td>
<td><strong>Procuring</strong> new, ultra-modern rolling stock for improved safety and comfort (ETR610 &amp; Giruno).</td>
<td><strong>Using standardised loudspeaker announcements</strong> that are the same across the board.</td>
</tr>
</tbody>
</table>
Both during regular operation and if a fault occurs, the installations, rolling stock and staff must all work together.

**Rolling stock:**
- Designed for the GBT
- Systems on the train
- Handling by staff

**Staff and processes:**
- Cross-divisional processes and procedures
- GBT training

**Installations:**
- Tunnel equipment
- Early warning and emergency systems

Peter Jedelhauser
4.1. Incidents not involving fire.
Ablauf Intervention bei Störung Güter- oder Reisezug ausserhalb einer Nothaltestelle.
4.2. Incidents involving fire.
Ablauf Intervention bei Brand Reisezug in der Nothaltestelle (NHS) Sedrun Nord.
4.3. Intervention forces.
The SBB intervention forces are based at the new maintenance and intervention centres (EIZ).

Each with a 14 series fire-fighting and rescue train.
- 24/7 operation, each staffed by 5 employees
- Ready for deployment within 5 minutes.
- Aided by external emergency services such as fire brigade, paramedics etc. in the event of an incident

Head of Emergency Tunnel Operations – newly created role in incident management.
- Manages and coordinates all emergency forces in the event of an incident.
SBB is supported in its intervention work by the cantonal emergency services.

- Hazmat team
- Fire brigade
- Rescue services
- Police
- Cantonal command unit

- Sedrun fire brigade
- Rescue services
- Police

- Biasca fire brigade
- Bellinzona hazmat team
- Rescue services
- Police
- Cantonal command unit

Southern operations centre
Gotthard Base Tunnel (GBT)
### Staff and rescue exercises: Collaboration between cantonal and SBB command and emergency services.

<table>
<thead>
<tr>
<th>Exercise Type</th>
<th>Exercise Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff exercise 1</td>
<td>&quot;Giruno Uno&quot; (UR)</td>
<td>24.11.2015</td>
</tr>
<tr>
<td>Staff exercise 2</td>
<td>&quot;Giruno Due&quot; (TI)</td>
<td>02.12.2015</td>
</tr>
<tr>
<td>Rescue exercise 1</td>
<td>&quot;Surselva&quot;</td>
<td>10.12.2015</td>
</tr>
<tr>
<td>Rescue exercise 2</td>
<td>&quot;Gottardo&quot;</td>
<td>20.01.2016</td>
</tr>
<tr>
<td>Rescue exercise 3</td>
<td>&quot;Piora&quot;</td>
<td>27.02.2016</td>
</tr>
<tr>
<td>Rescue exercise 4</td>
<td>&quot;Tavetsch&quot;</td>
<td>19.03.2016</td>
</tr>
</tbody>
</table>

- **Rescue exercise 3. "Piora"**
  - No media access to the tunnel for space reasons, photos and video footage will be made available, press briefing after exercise.

- **Rescue exercise 4: "Tavetsch"**
  - No media access to the tunnel for space reasons, photos and video footage will be made available, press briefing after exercise.
5. Basic and advanced training.
A total of some 3,900 employees and external service personnel are to be trained across approx. 20,000 training days.

The "Maintenance" category has the most extensive training.
- Maintenance staff will be trained from Q2 2015 to Q3 2016.
- They will receive particularly detailed training on health protection and the procedures to follow in the GBT.
- Extensive practical training will take place on site at the facilities to provide staff with hands-on experience.

"Operating" staff were trained up to the start of test operation.
- In addition to employees from the southern operations centre and emergency intervention staff, external cantonal emergency services such as the police, fire brigade and paramedics also received training.
- Process training was conducted. Extensive training on the sites and installations was carried out on site.
- The large-scale exercises planned will test staff on their knowledge of the procedures to follow in the event of an incident.

The "driving" category is the largest group to be trained.
- In addition to engine drivers for passenger and freight services, the train crew and other on-board service personnel (SBB Police, Elvetino) are also receiving training.
- Training in the "driving" category began in January 2016 and will continue all year.
- Training includes a visit to the tunnel, where staff can examine the walkways in person.
- However, the core component of the training is the cross-divisional process training with the newly developed 3D simulation.
Gotthard Base Tunnel 3D simulation (3DSim@GBT).
Innovative and sustainable training technology for safety in the GBT.

→ Knowing how to act in an emergency requires training!

In the **virtual learning and training environment** 3DSim@GBT, trainees can improve their ability to act competently, benefit from **knowledge transfer** and learn how to take quick and **confident action**, all under realistic conditions.
Thank you.