Wayside Train Monitoring Systems in Switzerland: no compromises on safety

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Rail Conference

Summary

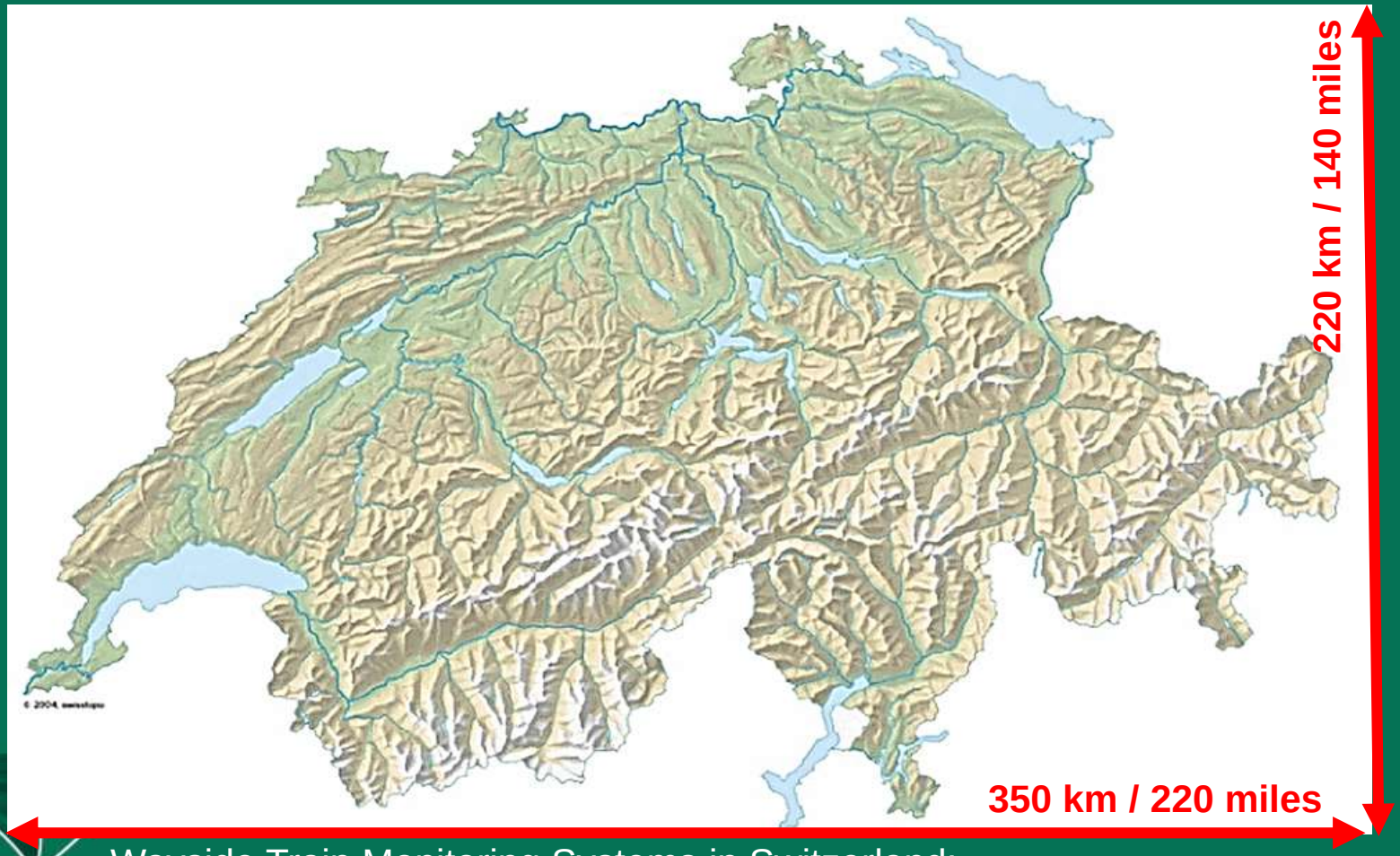
1. Main Information's about the Swiss Federal Railways and the Swiss Rail Network
2. The aim of the project “Wayside monitoring» : the new very long tunnel in Switzerland
3. The reality of the daily operations
4. Feedback and consequences
5. Prevention is better than cure : the Swiss WTMS – Wayside Train Monitoring Systems
6. Conclusions

1. Some main information's about the railway system in Switzerland

Switzerland: a small country in the heart of Europe.

1. Some main information's about the railway system in Switzerland

A small Confederation full of mountains and with 4 languages…



1. Some main information's about the railway system in Switzerland

But with a very dense railway network …

1. Some main information's about the railway system in Switzerland

… that is the most densely used in term of train traffic and one the most frequented in term of passengers in the world!

- Freight modal share for rail: **~ 45%**
  position 5 in the world with the USA and European champion
- Passenger modal share for rail: **~ 17%**
  position 2 in the world after Japan and European champion
- Passenger-km travelled per year and per inhabitant:
  ~ 2'200 position 1 in the world ahead Japan

In Switzerland the train is for everyone and for everything

1. Some main information's about the railway system in Switzerland

Zurich main station, one of the busiest rail station in Europe, with more than 450'000 passengers and 1'500 trains each day

The Gotthard rail tunnel, the longest rail tunnel in the world (57 km)

1. Some main information's about the railway system in Switzerland






2. The aim of the project “Wayside monitoring» : the new very long tunnel in Switzerland

The freight traffic is very dense and the rail is also the most secure transport system for the transport of dangerous goods. Some years ago the question was:

➔ **how to ensure the maximum of security and prevent an accident in this new infrastructure ?**

The old Gottahrd line

The new Gotthard base tunnel

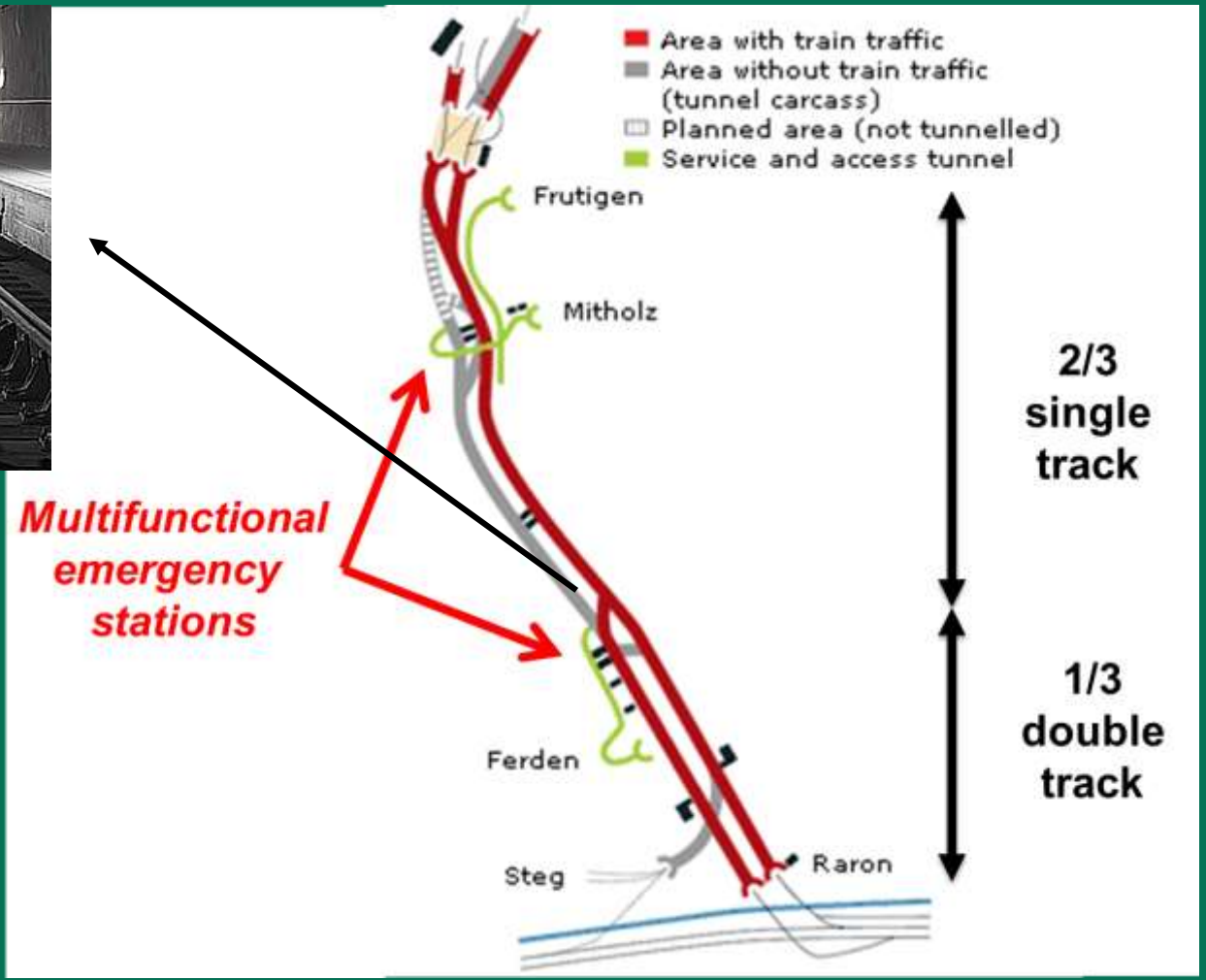
2. The aim of the project “Wayside monitoring» : the new very long tunnel in Switzerland

		country	*km*	*in service since*
1	**Gotthard**	**Switzerland**	**57**	**2016**
2	Seikan	Japan	54	1983
3	Channel	France-GB	50	1993
4	**Lötschberg**	**Switzerland**	**35**	**2007**
5	Guadarrama	Spain	28	2007
5	Taihang	China	28	2008
7	Hakkōda	Japan	26	2010
7	Iwate-Ichinohe	Japan	26	2002
9	Tianshan	Chine	22	2012
9	Dai-shimizu	Japan	22	1982
11	Wushaoling	China	21	2006
11	Lüliangshan	China	21	2011
13	Geumjeong	South-Corea	20	2010
13	Simplon	Switzerland -Italy	20	1905
14	Vereina	Switzerland	19	1999

2. The aim of the project “Wayside monitoring» : the new very long tunnel in Switzerland

2. The aim of the project “Wayside monitoring»: The Lötschberg Tunnel, 35 km

switch in the middle of the tunnel



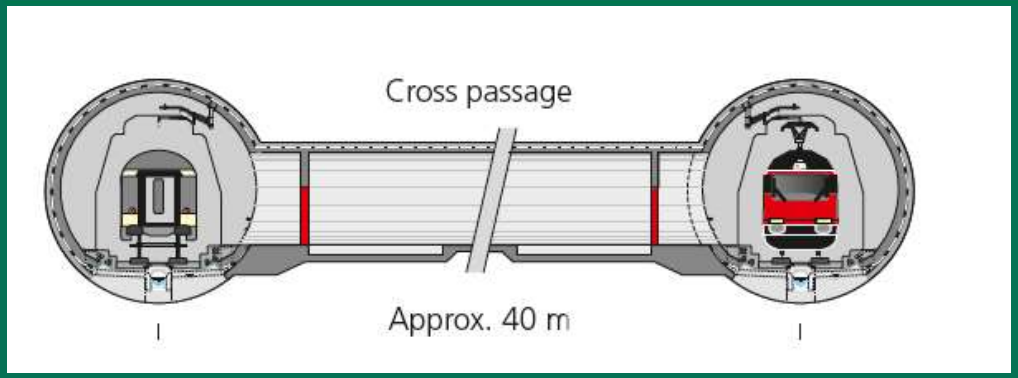
2. The aim of the project “Wayside monitoring»: The Lötschberg Tunnel, 35 km

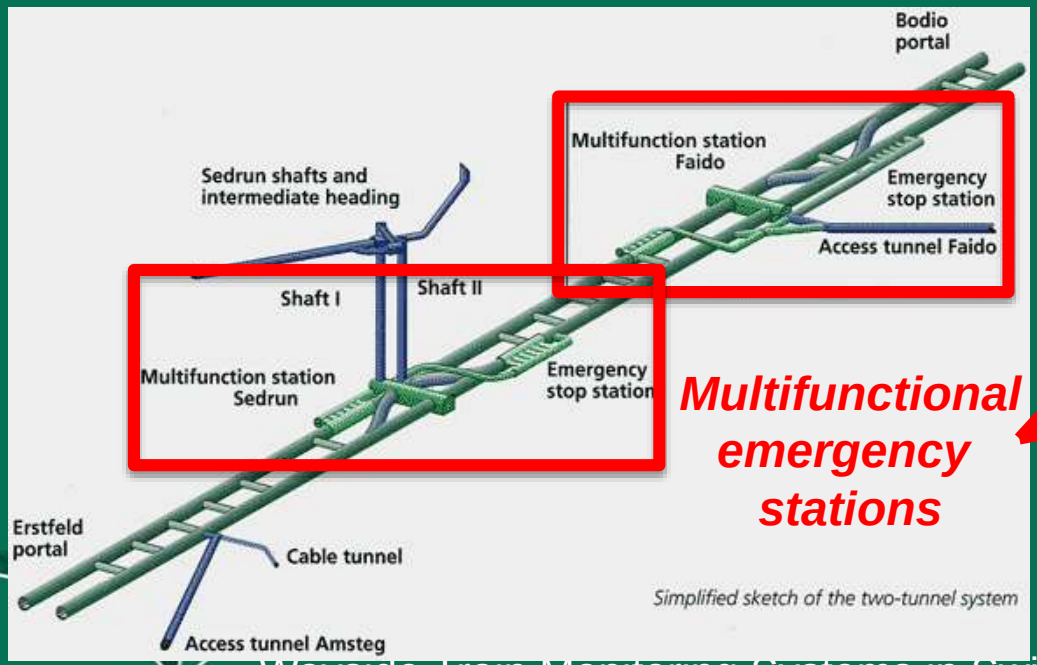

security communications doors


ventilation

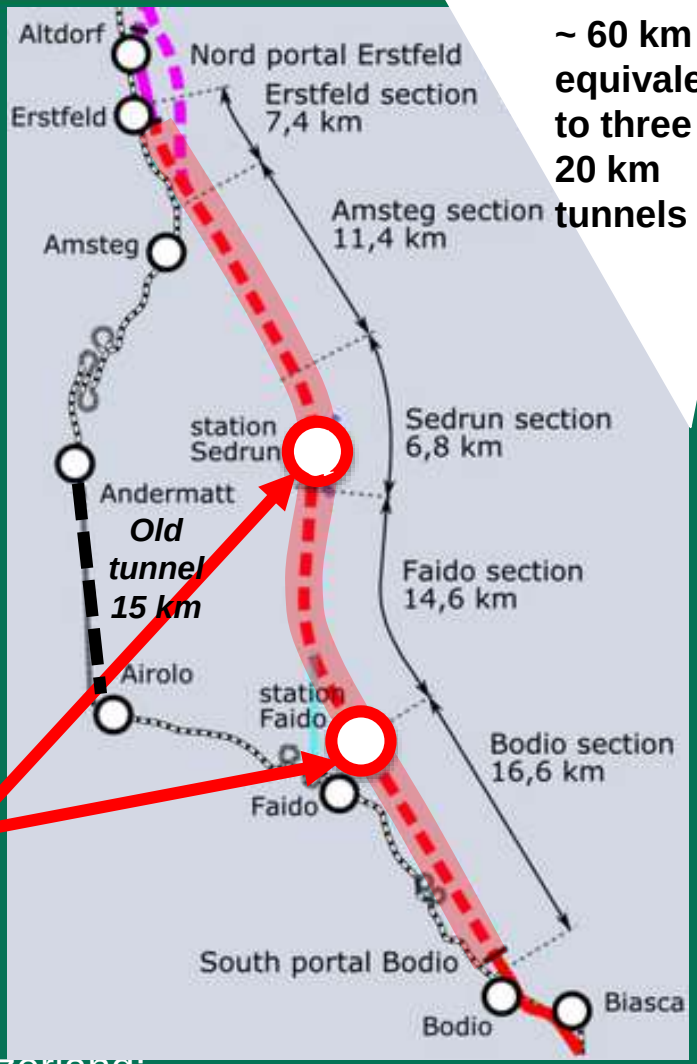
~ 100 trains/day (200km/h passenger's and 100 km/h freight)

2. The aim of the project “Wayside monitoring»: The Gotthard base Tunnel, 57km



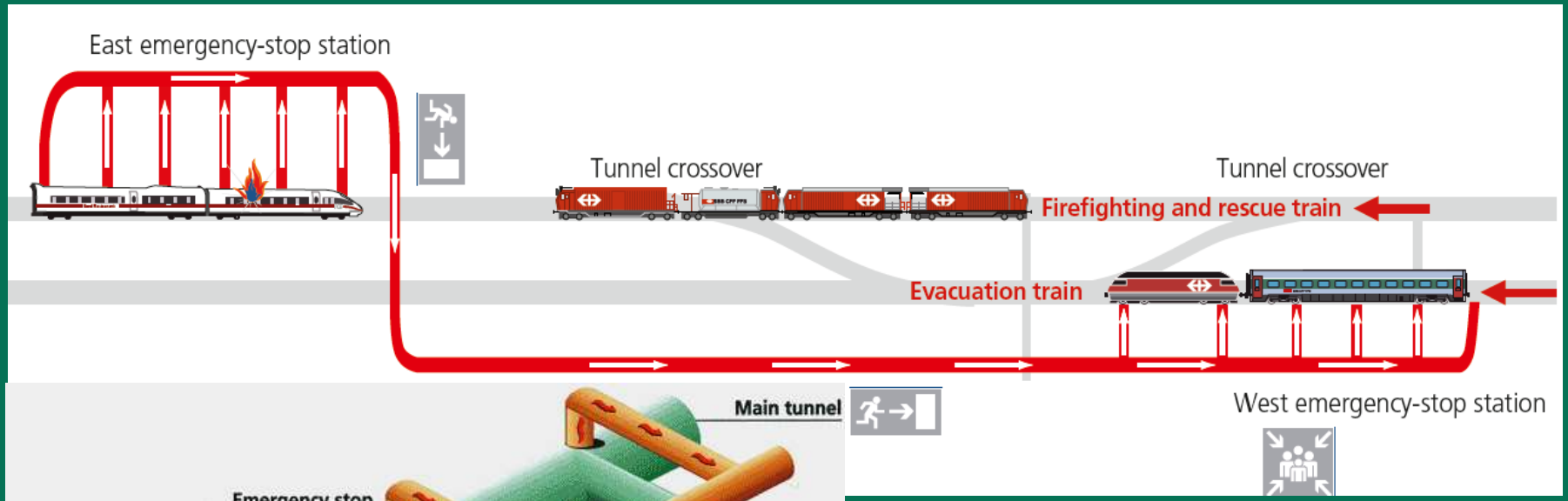


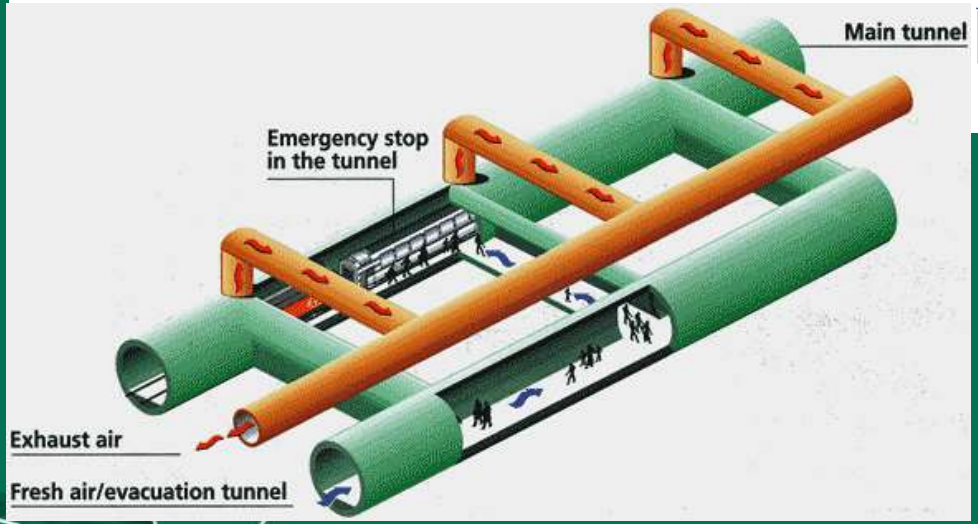
Multifunctional emergency stations



~ 60 km = equivalent to three 20 km tunnels

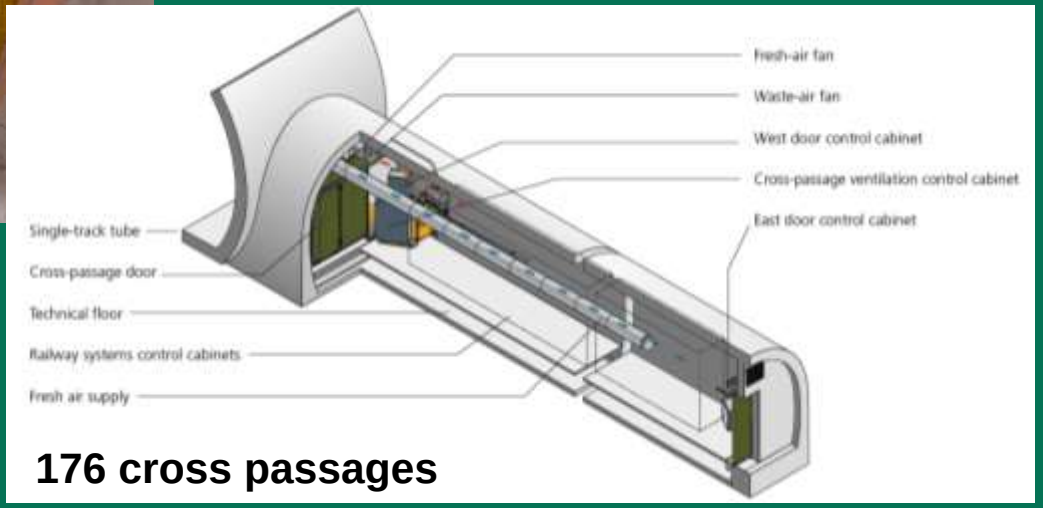
2. The aim of the project “Wayside monitoring»: The Gotthard base Tunnel, 57km





evacuation and rescue concept

2. The aim of the project “Wayside monitoring»: The Gotthard base Tunnel, 57km



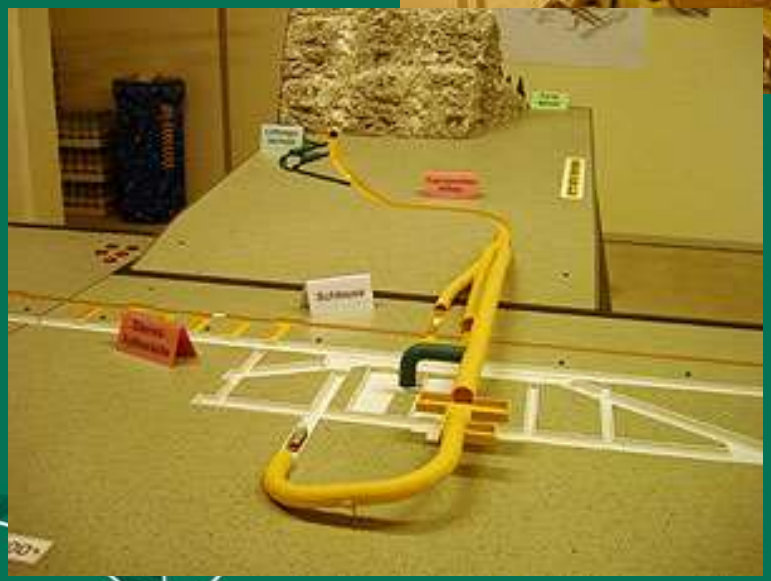
176 cross passages

2. The aim of the project “Wayside monitoring» : the new very long tunnel in Switzerland

Special rescue trains.

2. The aim of the project “Wayside monitoring» : the new very long tunnel in Switzerland

the training and emergency center



2. The aim of the project “Wayside monitoring» : the new very long tunnel in Switzerland

simulation of accident
and training

3. The reality of the daily operations

3. The reality of the daily operations

The real risks: a tilting train accident on the old Gotthard line

3. The reality of the daily operations

The real risks: problem with freight wagons






3. The reality of the daily operations

The big accident in the Simplon tunnel in 2011

3. The reality of the daily operations

800° Celsius and damage for over 130 million of $!

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4. Feedback and consequences

Even with the best constructions, technology, equipment, systems, processes, means of intervention ...

PREVENTION IS ALWAYS BETTER .... THAN CURE!

The basic principle:

ONLY ONE TRAIN "HEALTHY" MUST ENTER THE TUNNEL …

B U T H O W ?

5. Prevention is better than cure : the Swiss WTMS – Wayside Train Monitoring Systems

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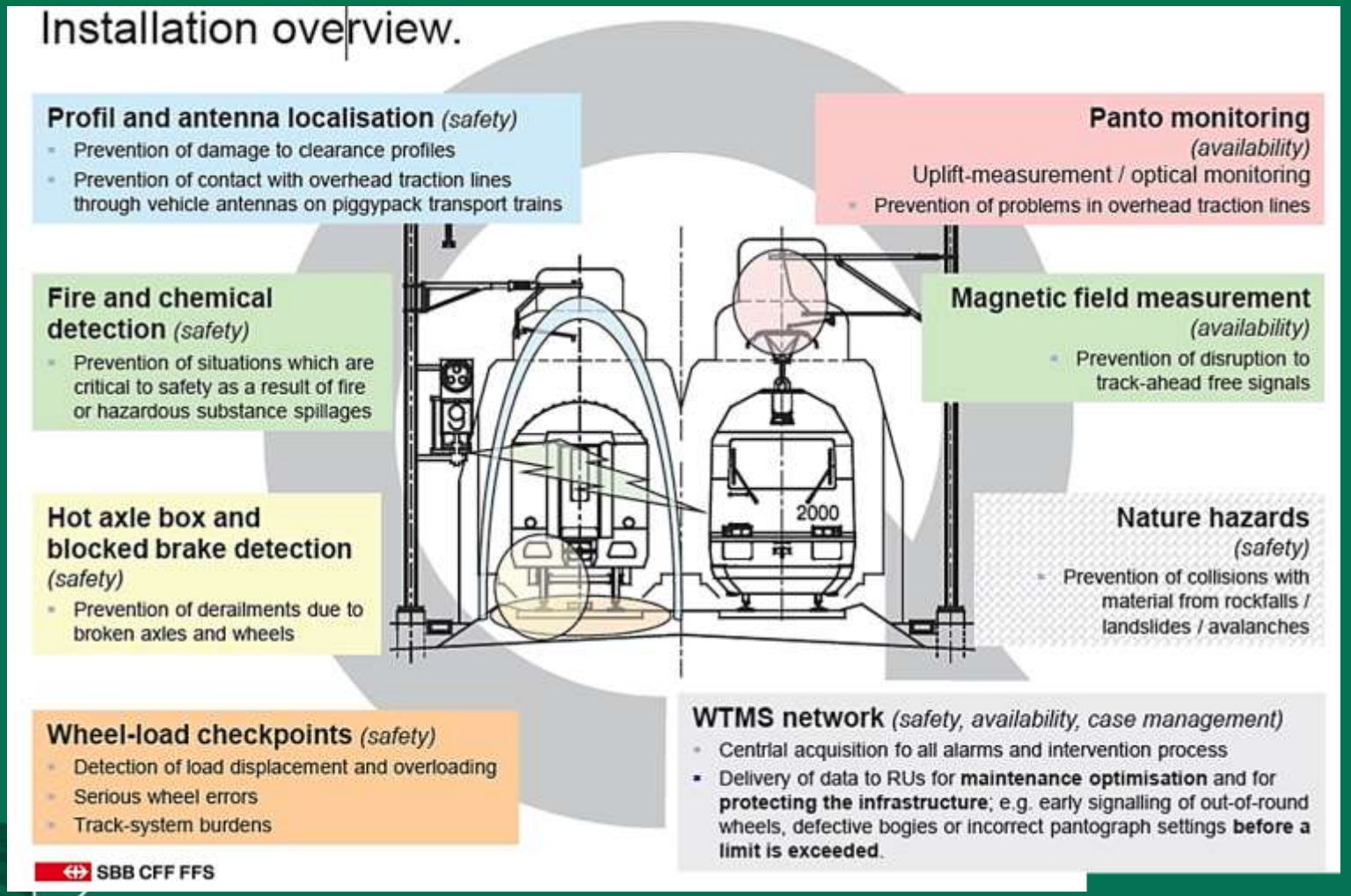

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5. Prevention is better than cure : the Swiss WTMS – Wayside Train Monitoring Systems

Hot axle box and blocked brake detection.

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Hot axle box and blocked brake detection

Critical incidents: hot axle box.

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Hot axle box and blocked brake detection

Critical incidents: blocked wheel.

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Wheel-load checkpoints.

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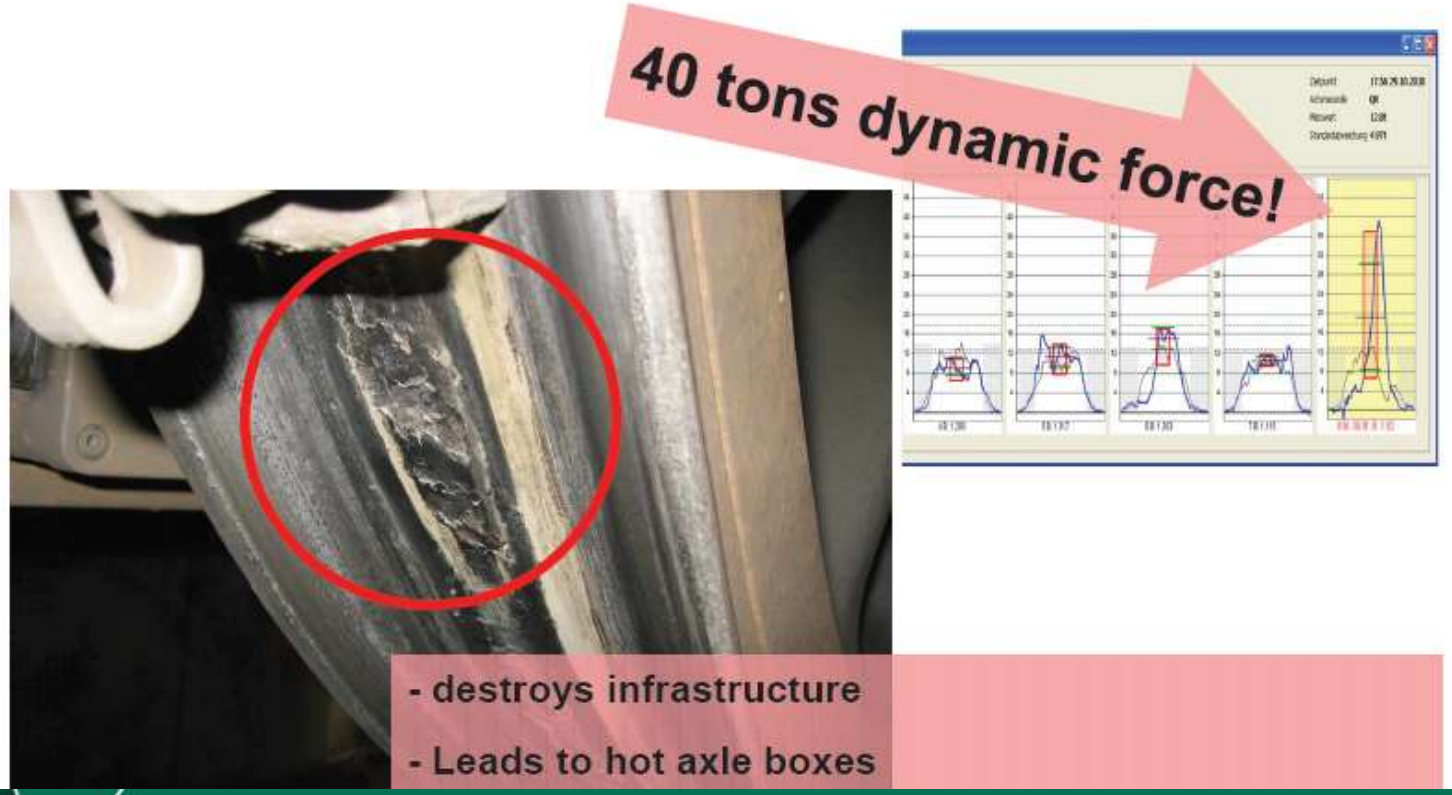
critical incidents: load displacement **1:1.93**.

5. Prevention is better than cure : the Swiss WTMS – Wayside Train Monitoring Systems

Detection of Flat wheels

to reduce noise / vibration / protect infrastructure.



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Profile and antenna localisation.

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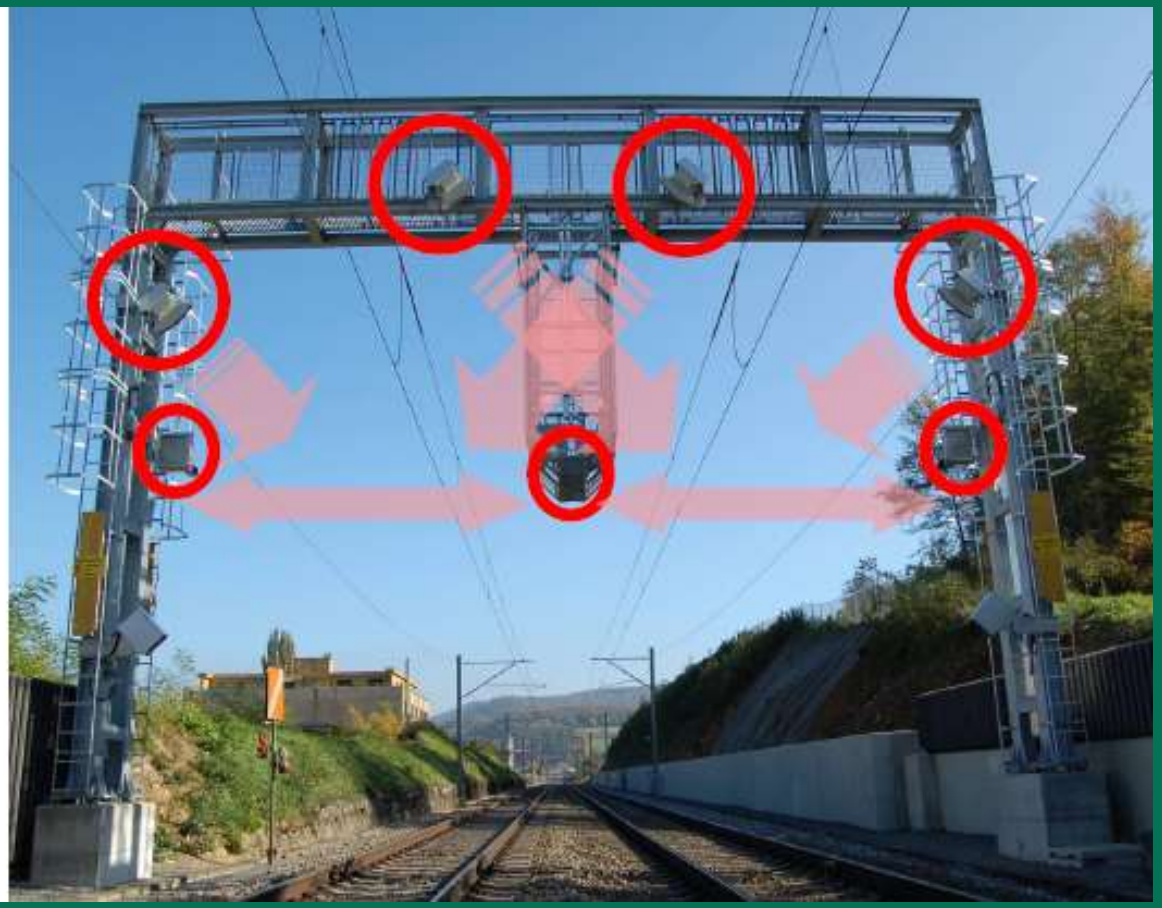

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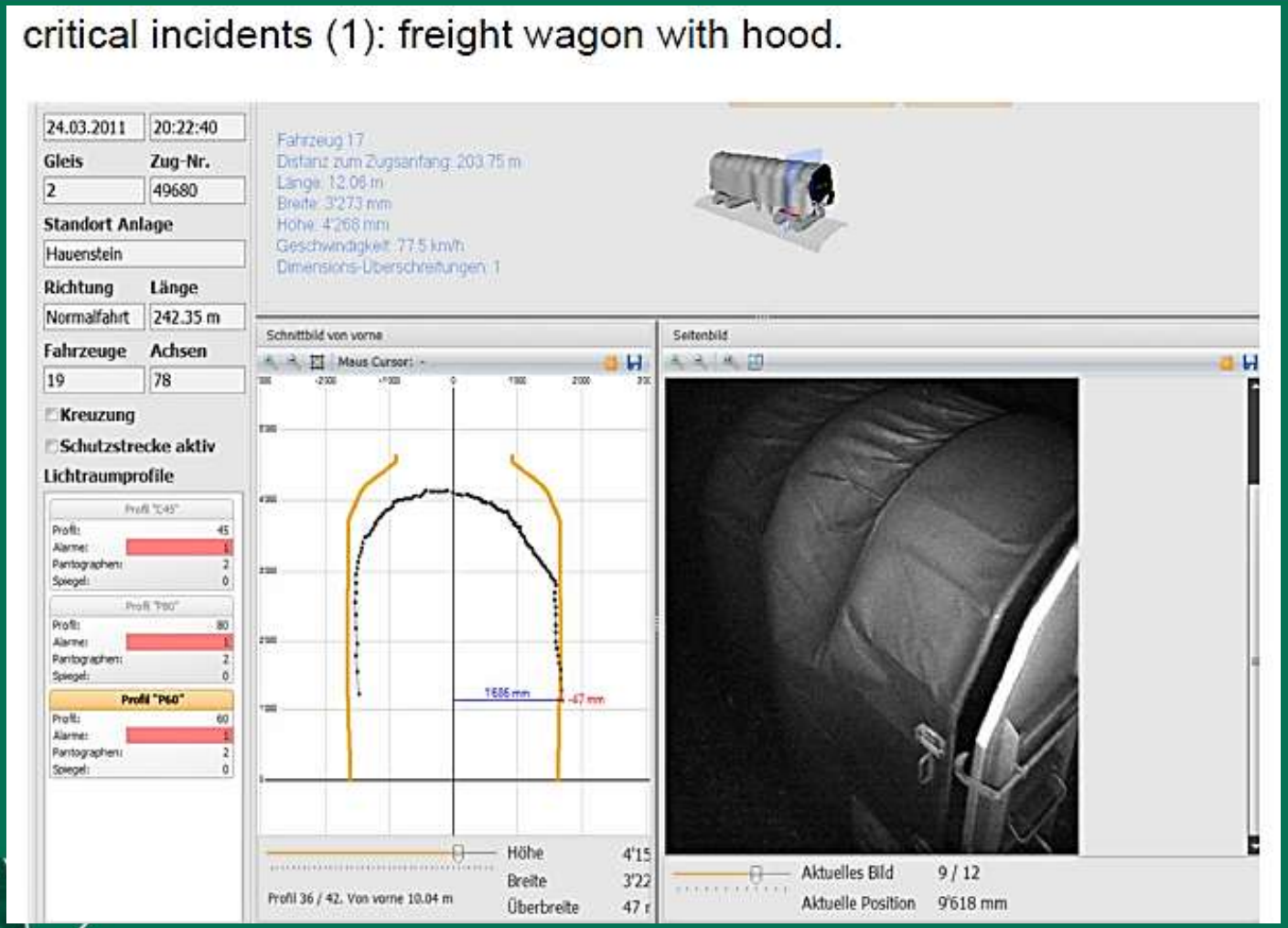
critical incidents (1): freight wagon with hood.



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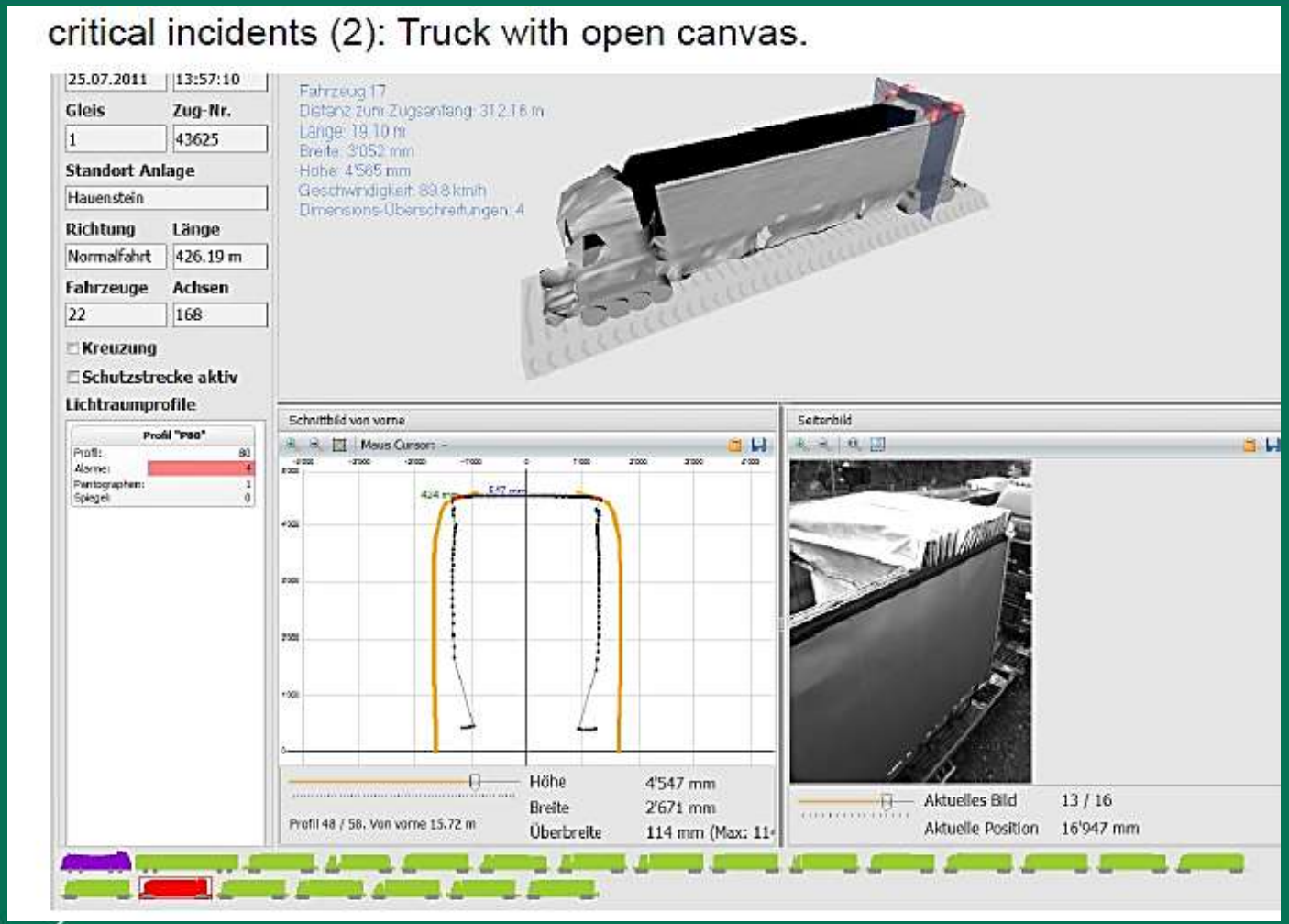

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Uplift mesurement

Geology detection

Fire and chemical detection

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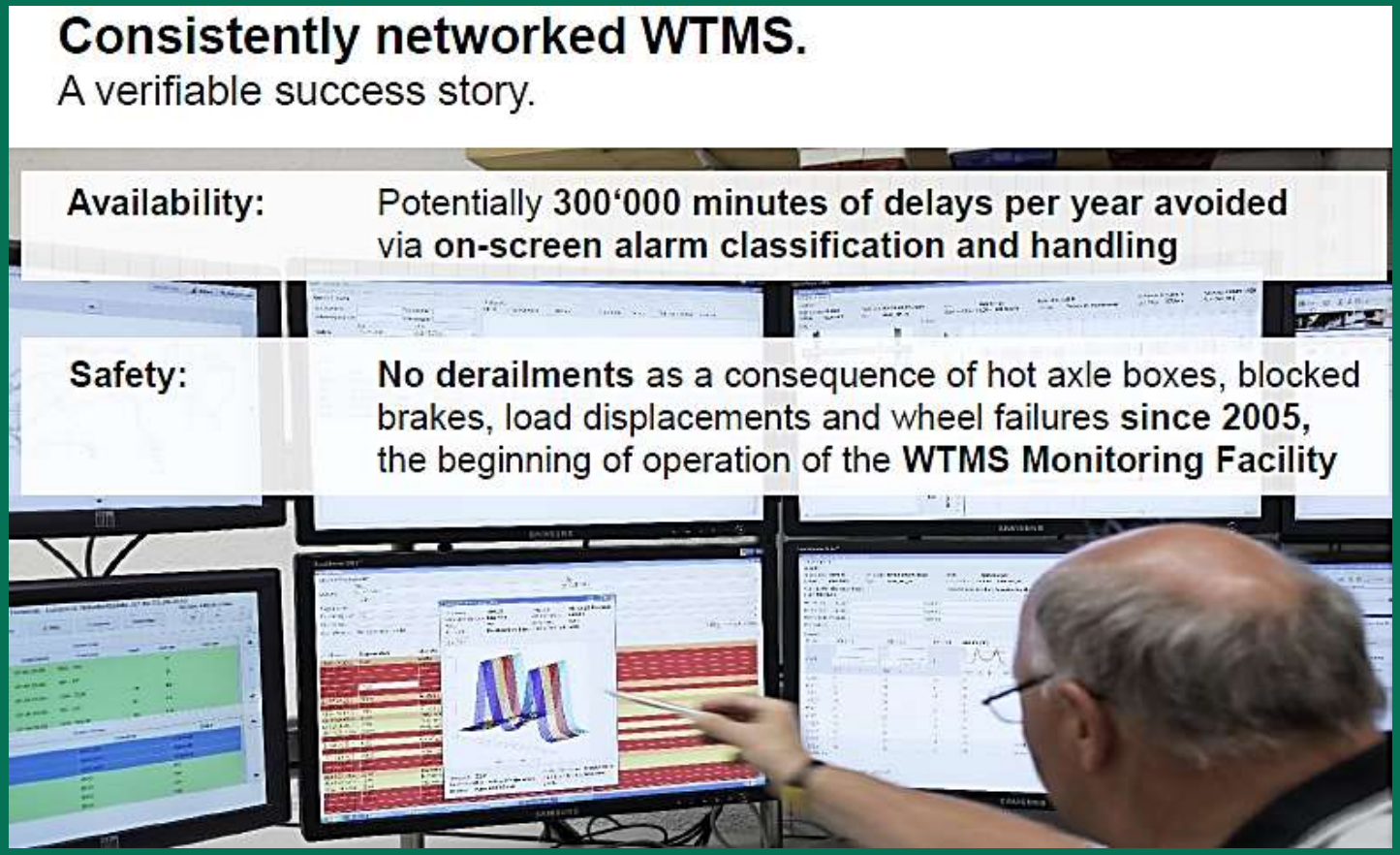

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