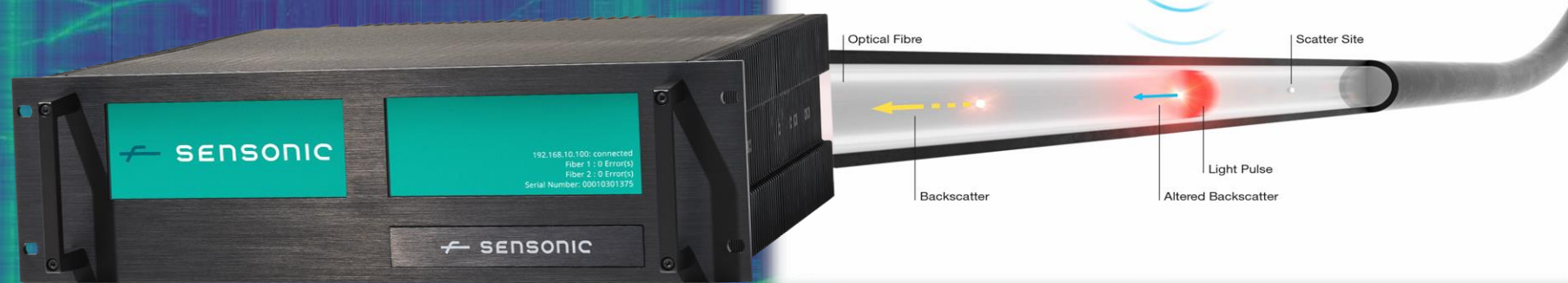
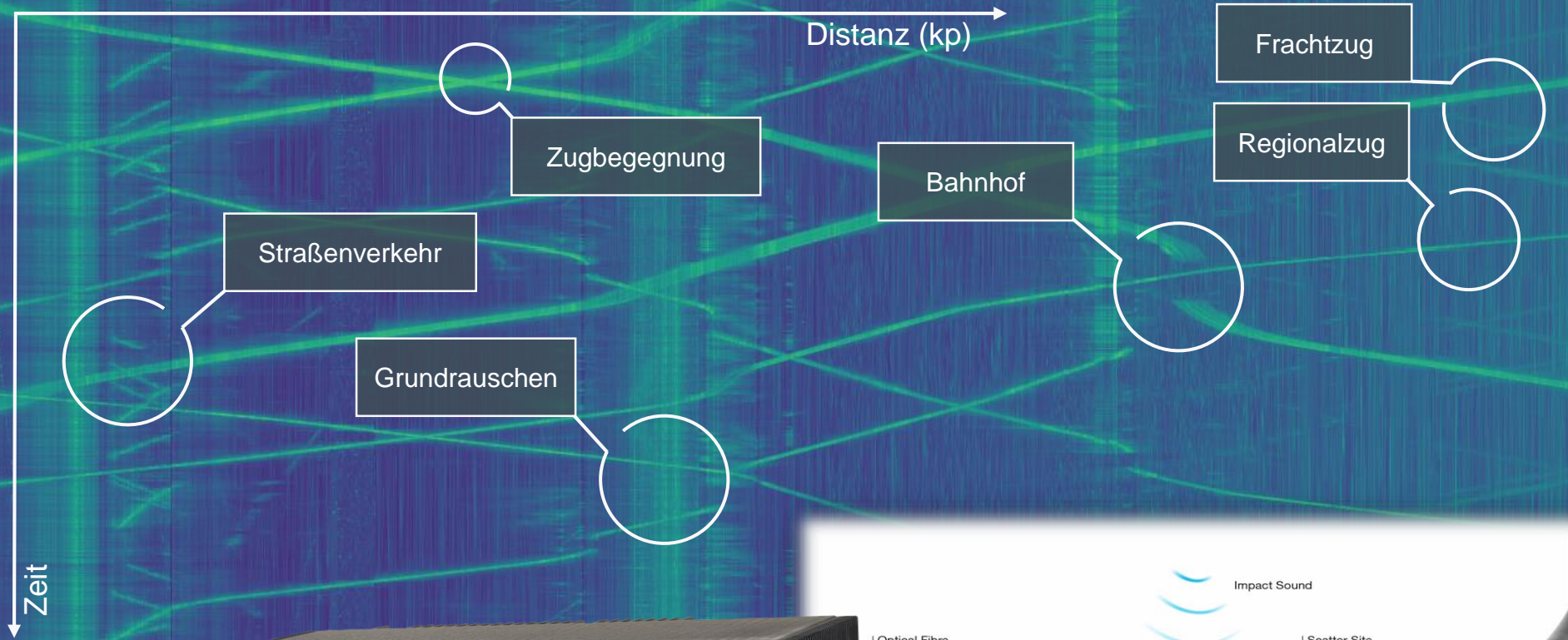


Kontinuierliches Monitoring und erhöhte
Sicherheit der Gleisinfrastruktur durch
Fiber Optic Sensing





FOS für Anwendungen im Eisenbahnumfeld

In a nutshell

1



Vibrationsdaten messen

- ungefiltert
- 4TB Daten pro Tag und Unit

2



Pre-Processing

- Extraktion der relevanten Frequenzen
- Erstellung der Wasserfall Daten

3



Veränderungen analysieren (KI)

- Detektion von Events
- Quantifizierung von relativen Veränderungen bzw. Anomalien

4



berichten / alarmieren

- Alarme
- Berichte
- API
- Schnittstellen



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Anwendungen



Track Condition
Monitoring



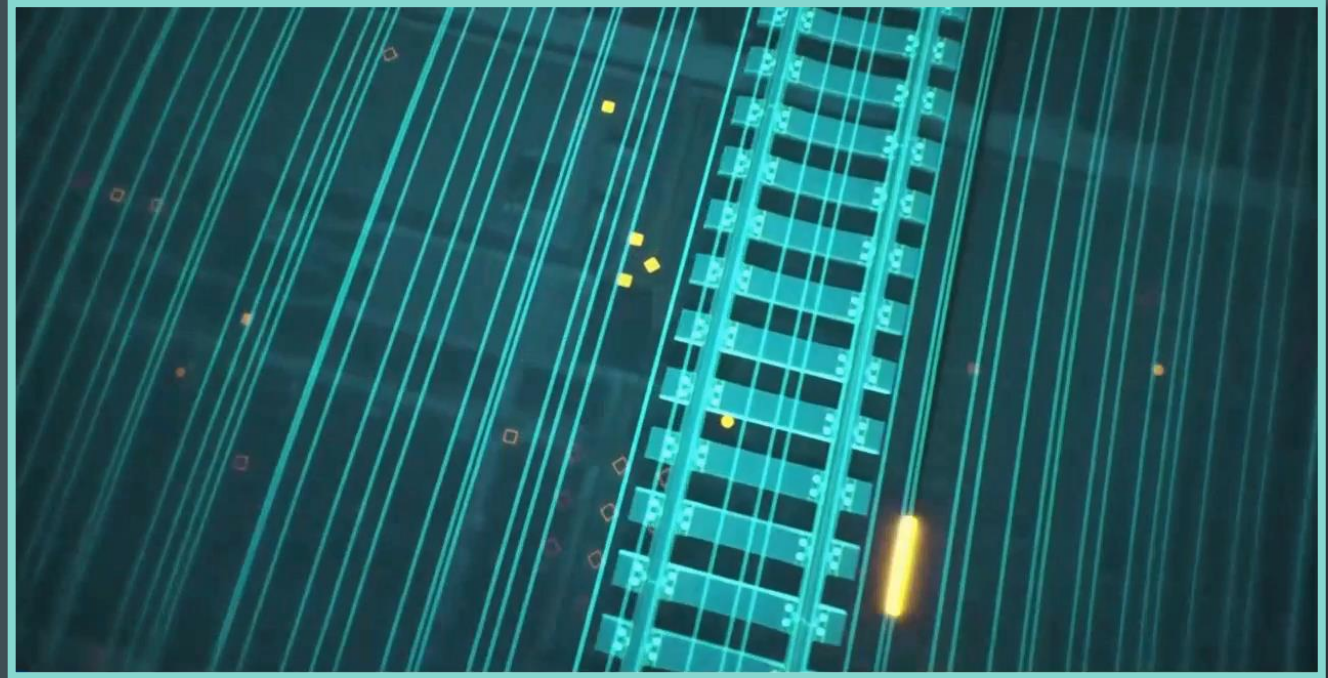
Catenary
Flashover
Localization



Natural
Hazards



Security



FOS für die Eisenbahn

Anwendungen



Track Condition
Monitoring



Catenary
Flashover
Localization



Natural
Hazards



Security



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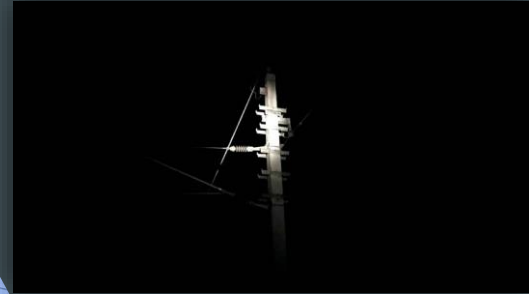
Anwendungen



Track Condition
Monitoring



Catenary
Flashover
Localization

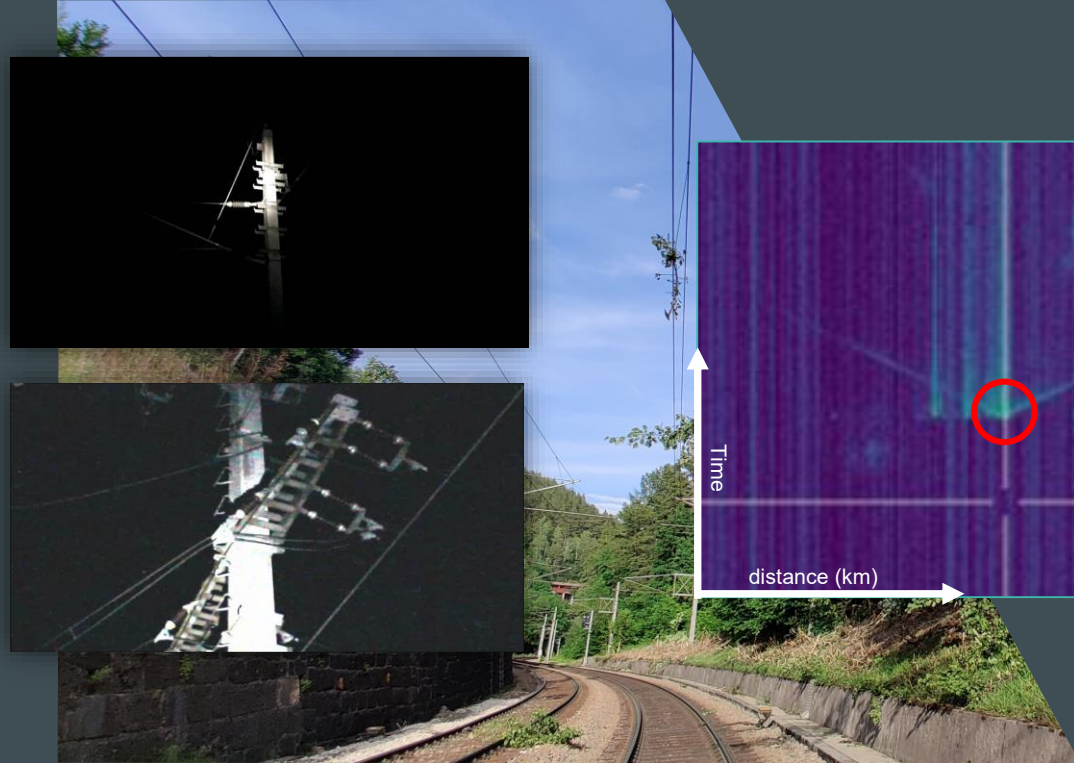


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Catenary
Flashover
Localization



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Catenary
Flashover
Localization



Natural
Hazards



Rainy weather stops rail traffic on three major cross-Alpine railway routes

Lubomir Cech, 29/08/2023



© ÖBB_Getsler

Heavy rains, floods and landslides. These are the causes of more railway lines being closed for traffic in Austria, France and Italy.

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Natural
Hazards



Rainy routes
three routes
Lubomir Czech

17 INJURED AS DERAILED TRAIN FALLS INTO AUSTRIAN MOUNTAIN RIVER

f 17 TWEET EMAIL TRUTH

Heavy rains, flood traffic in Austria

FOS für die Eisenbahn

Anwendungen

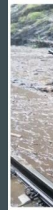


Natural Hazards



Rainy
three
route

Lubomir Cech



Heavy rains, 8
traffic in Austri

Landslide derails train in Swiss Alps, 11 hurt



A derailed passenger train is pictured near Tiefencastel, Switzerland, Wednesday, Aug. 13, 2014. A passenger train traveling from St. Moritz to Chur in eastern Switzerland has been derailed by a landslide, injuring nearly one dozen

INTO

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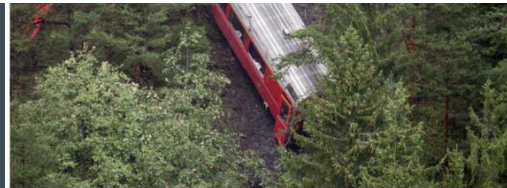
Rainy weather stops rail traffic on three major cross-Alpine railway routes

No trains between France and Italy for days after rock avalanche

Aug 28, 2023 ABROAD



PARIS/ROME - No trains will run between France and Italy until at least Thursday due to a rock avalanche in the Maurienne Valley in the French Alps, near the border with Italy. A number of roads are also blocked.



A derailed passenger train is pictured near Tiefencastel, Switzerland, Wednesday, Aug. 13, 2014. A passenger train traveling from St. Moritz to Chur in eastern Switzerland has been derailed by a landslide, injuring nearly one dozen



Natural Hazards

FOS für die Eisenbahn

Anwendungen



Natural Hazards

Rainy weather
three major cr
routes

Lubomir Cech, 29/08/2023



Heavy rains, floods and landslides: T
traffic in Austria, France and Italy.

Landslide
Alps, 11 hu



A derailed passenger train is pictured r
traveling from St. Moritz to Chur in east

Europe – Rain Triggers Deadly Flash Floods and Mudslides in Germany, Austria and Italy

18 AUGUST, 2021 BY RICHARD DAVIES IN EUROPE, NEWS

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share

Flash floods and mudslides triggered by heavy rainfall caused widespread damage across parts of southern Germany, Austria and northern Italy from 16 August. One person died and one reported missing in Bavaria, Germany. Flash floods in Austria buried a train in rocks and debris in Wald im Pinzgau, Austria.



France and rock



d Italy until at least Thursday due
French Alps, near the border with

TRAIN FALLS INTO
R

TRAVEL T TRUTH



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Anwendungen

Rainy weather stops rail traffic on three major cross-Alpine railway routes

Lubomir Cech, 29/08/2023



No trains between France and Italy for days after rock



Thursday due order with

Natural Hazards



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Natural Hazards

Rainy weather stops rail traffic on three major cross-Alpine railway routes

Lubomir Cech, 29/08/2023



Heavy rains, floods and landslides: These are the causes of traffic in Austria, France and Italy.



No trains between France and Italy for days after rock

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ED AS DERAILED TRAIN FALLS INTO MOUNTAIN RIVER



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Anwendungen

Ansatz:

Threshold-based „Change Detector“ + KI

- Dauer (sek)
- Ausbreitung (m)
- relative Energieveränderung
- Muster

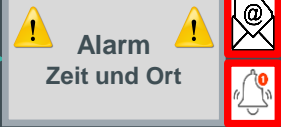
Regel 1

Regel 2

Regel 3

Regel n

erfüllt

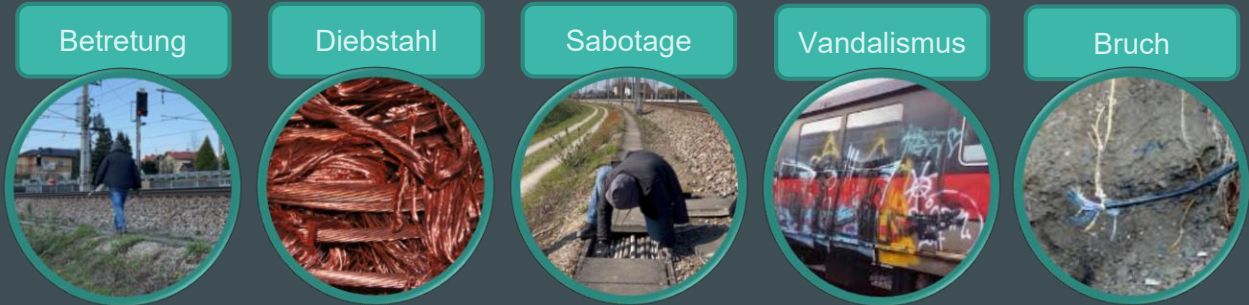
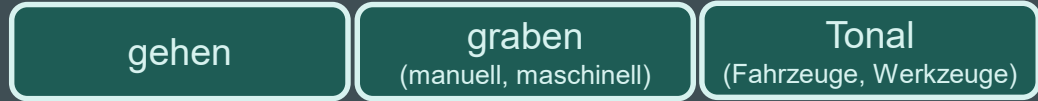


Natural
Hazards



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Anwendungen



Natural
Hazards



Security

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Security



Optional:
CCTV Verifizierung

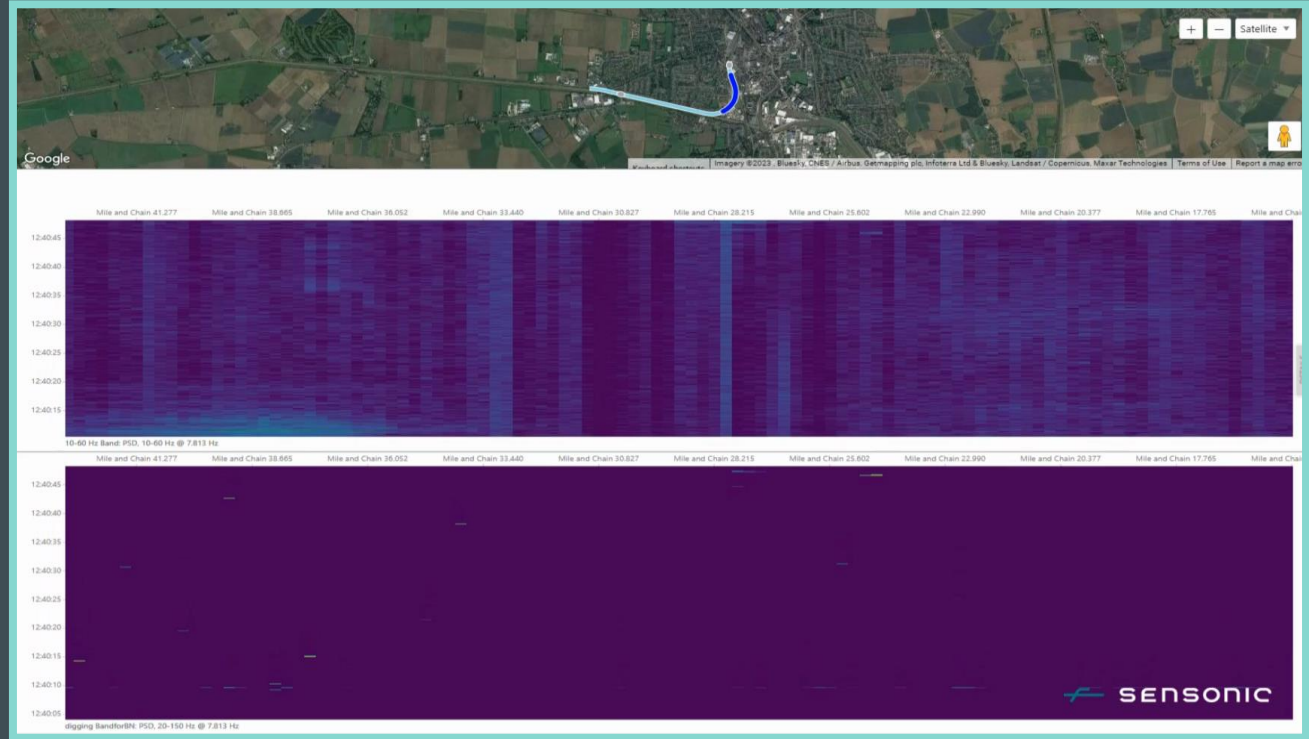


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Security



Optional
CCTV Verifizierung

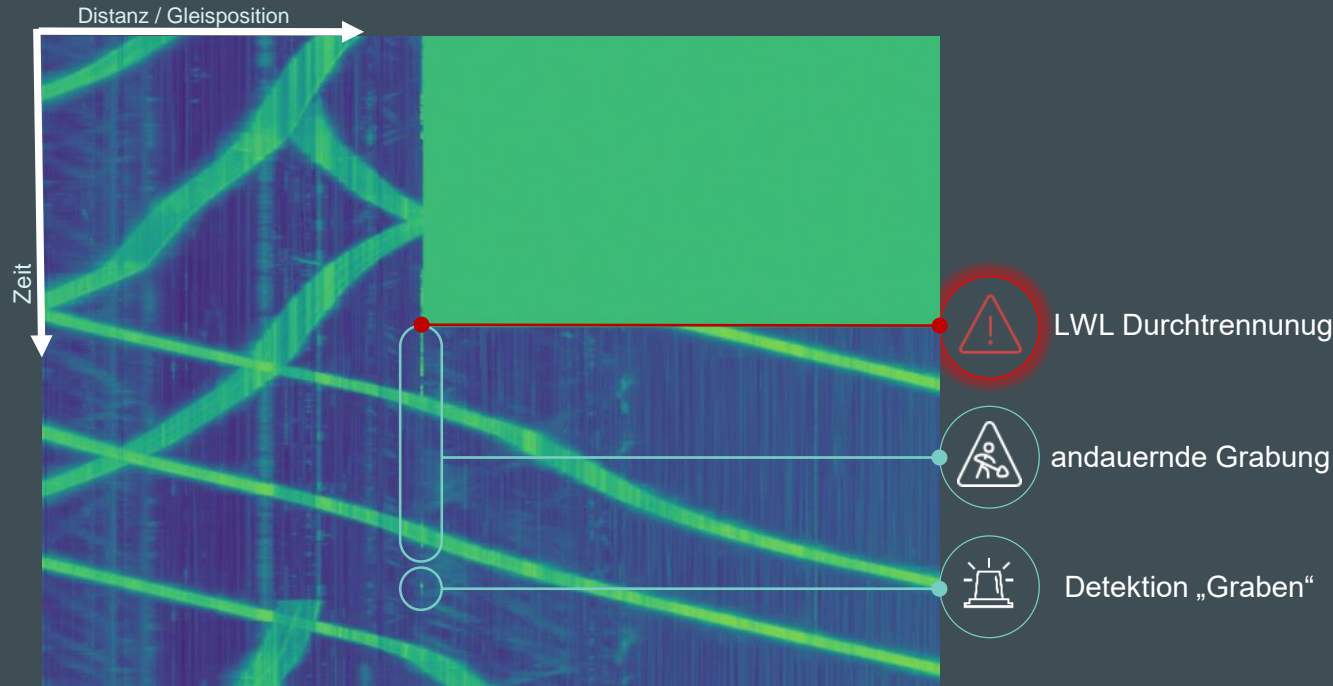


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Security



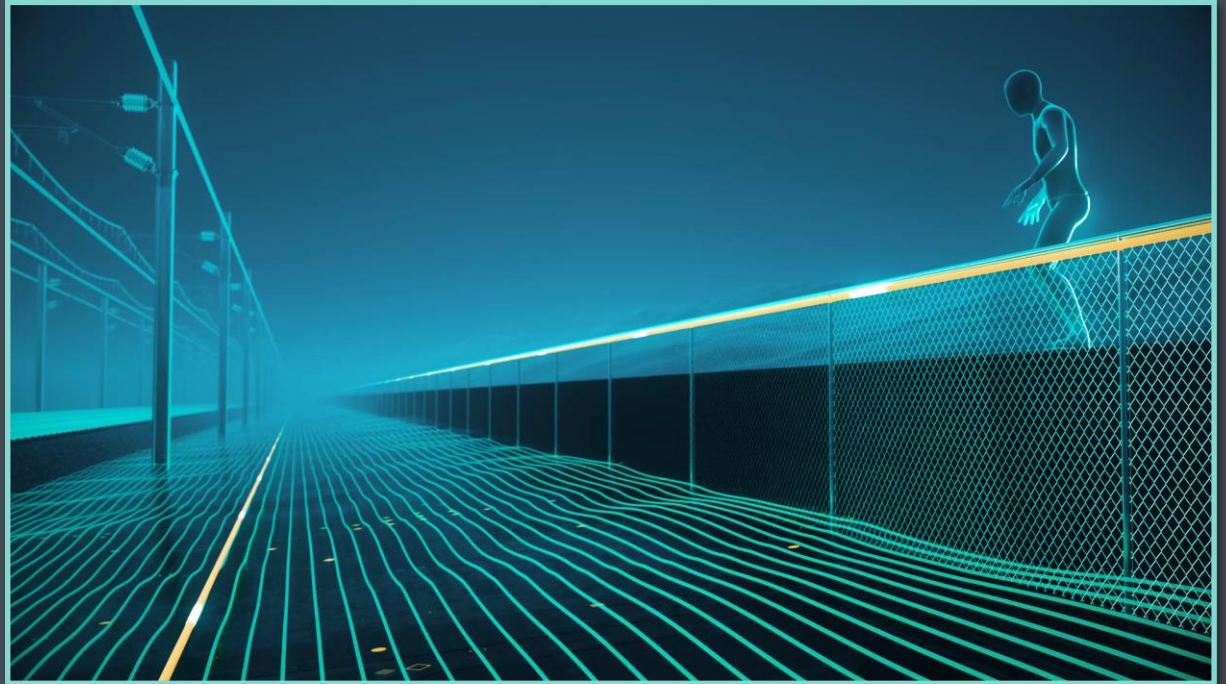
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Security

Perimeter Security

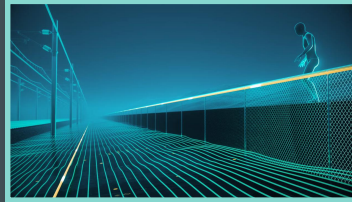


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Security



Perimeter Security



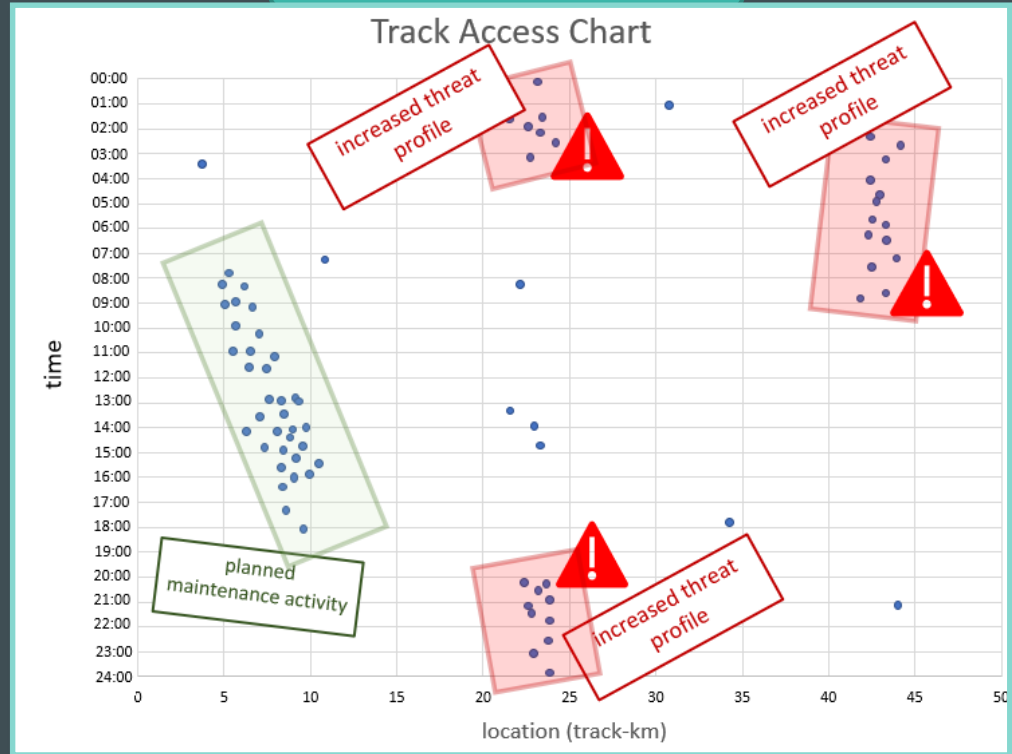
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Anwendungen



Security

Analyse von Gefahrenzonen



Vielen Dank !

SENSONIC



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