

**GeoNext Rail Resilience:
Real-Time Monitoring
for Seamless
Construction Integration**



Introduction

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Overview



Ensuring uninterrupted railway operations amidst construction is vital for safety and efficiency.



This presentation explores the significance of real-time track monitoring in safeguarding Train, Metro and Tram systems during construction.



By integrating Trimble technology, we address challenges, mitigate risks, and maintain operational continuity.



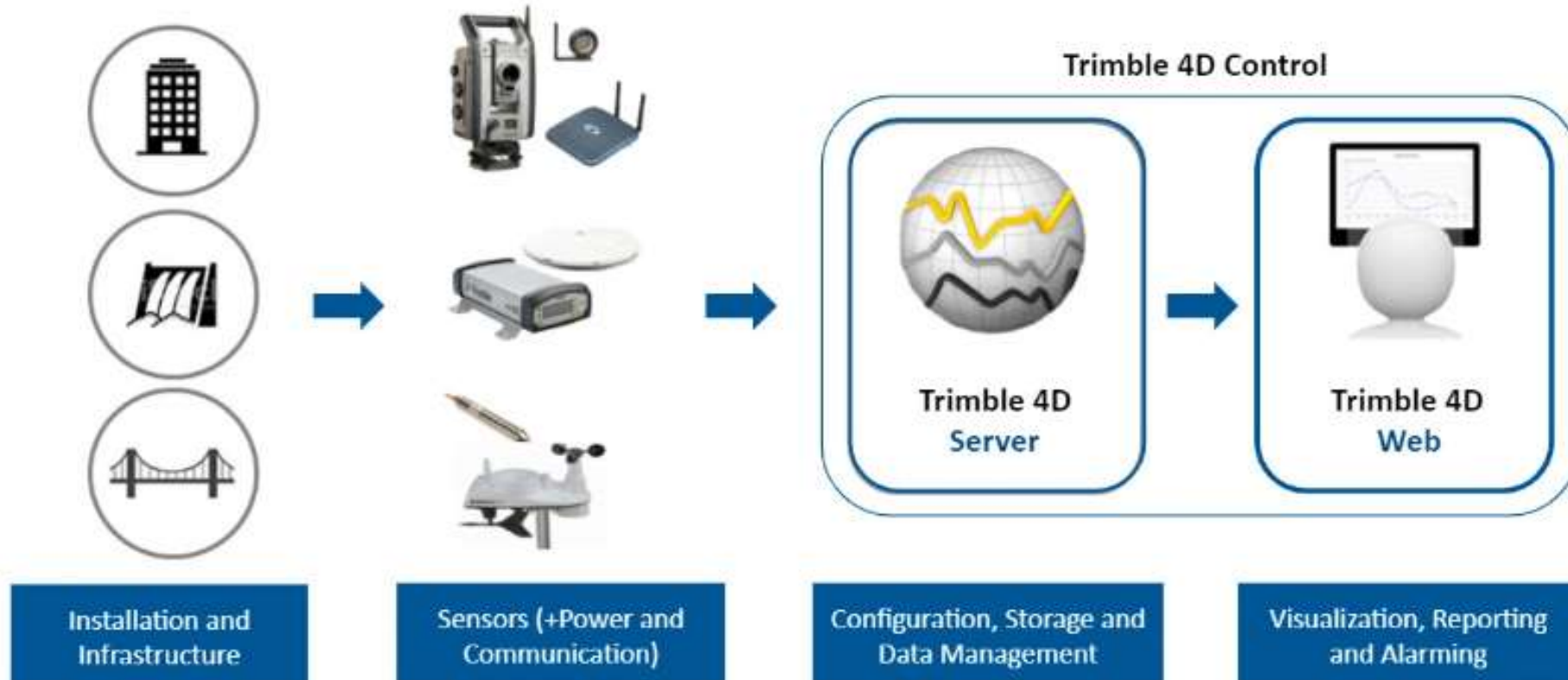
Railway Construction Challenges

- Railway construction poses unique challenges that require careful management to ensure safety and efficiency.
- **Continuous Operations Requirement:** Railways must remain operational during construction to avoid disruptions to service.
- **Safety Risks:** Construction activities can lead to track geometry deformations, traffic delays or even derailling.
- **Operational Disruptions:** Changes in overhead wire positions may lead to damages in train power systems. Structural deformations or shifts can disrupt train, metro or tram operations.
- **Environmental Factors:** Challenges such as adverse weather conditions have huge impact, not only on construction itself but also on the monitoring systems.
- Addressing these challenges is critical to maintain operational continuity and ensure the safety and reliability of railway systems.

Importance of Real-Time Monitoring

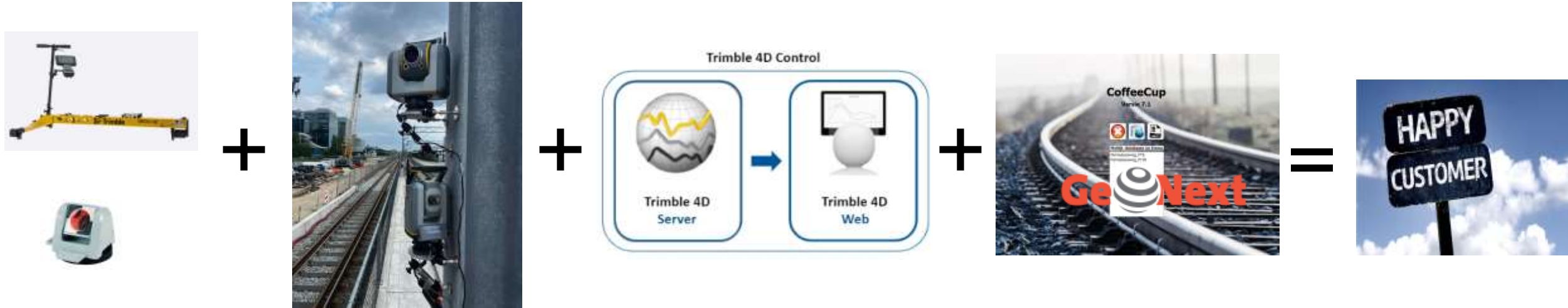
- Goals of the Railway Monitoring:
 - Continuous tracking of geometrical changes over time
 - Shift, Height and Twist of rails are three main factors to maintain safety
- Why is it better than the old-fashioned way?
 - Immediate Detection and Notification:
 - More observations = faster detection
 - Spot changes and deformations instantly
 - Timely Interventions:
 - Quick responses enhance safety and prevent disruptions
 - Enhanced Safety:
 - Reduced risk of accidents and derailments
 - Operational Stability:
 - Maintains smooth train operations
 - Cost Efficiency:
 - No surveyor needed

Automated Monitoring System



www.trimble.com

Automated Monitoring System



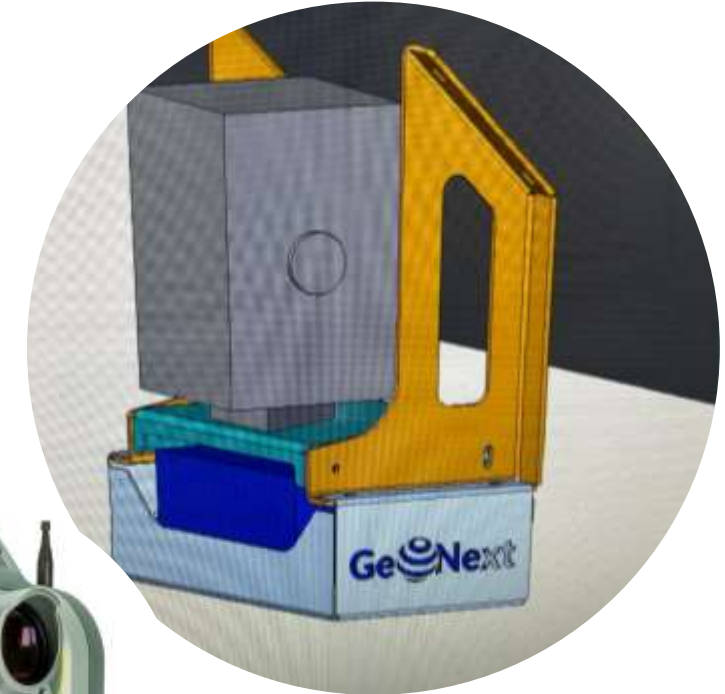
Technology Integration in Track Monitoring

Software

- Trimble T4D Control
 - Managing multiple sensors
 - Performing real-time and post-processed analysis
 - Visualizing data
 - Alarms and notifications
- GeoNext CoffeeCup
 - Advanced Track analysis
- GeoNext Online platform
 - Custom results presentation
 - Advanced Trend analysis
 - Custom / Automated reporting

Hardware

- Robotic Total Stations Trimble S7, Trimble S9, Trimble SX12
- Track measurement trolley – Trimble Gedo CE 2.0
- Settop M1 modem
- Custom made brackets and off-grid instruments Mounting System



Automation in Track Monitoring

- System health check
- Automatic Real-time alarms and notifications
- Live results presentation on custom GeoNext online platform
- Automatic Reporting Tool



2024-04-12 03:51:00 (project local time).

Friday, Apr 12 • 08:51

Alarm Definition T2_T3_Oost_Zakking
Revision 2 (BDS2312 (UTC +1)) changed
from Warning to Attention during evaluation
at 2024-04-12 07:51:00 (project local
time).

Alarm Definition T4_Zakking revision 3
BDS2312 (UTC +1)) changed from Warning
to Attention during evaluation as at
2024-04-12 08:01:00 (project local time).

Alarm Definition T2_T3_Oost_Zakking
Revision 2 (BDS2312 (UTC +1)) changed
from Attention to Warning during evaluation
as at 2024-04-12 08:21:00 (project local
time).

09:21 • KPN

Successful Project Implementation

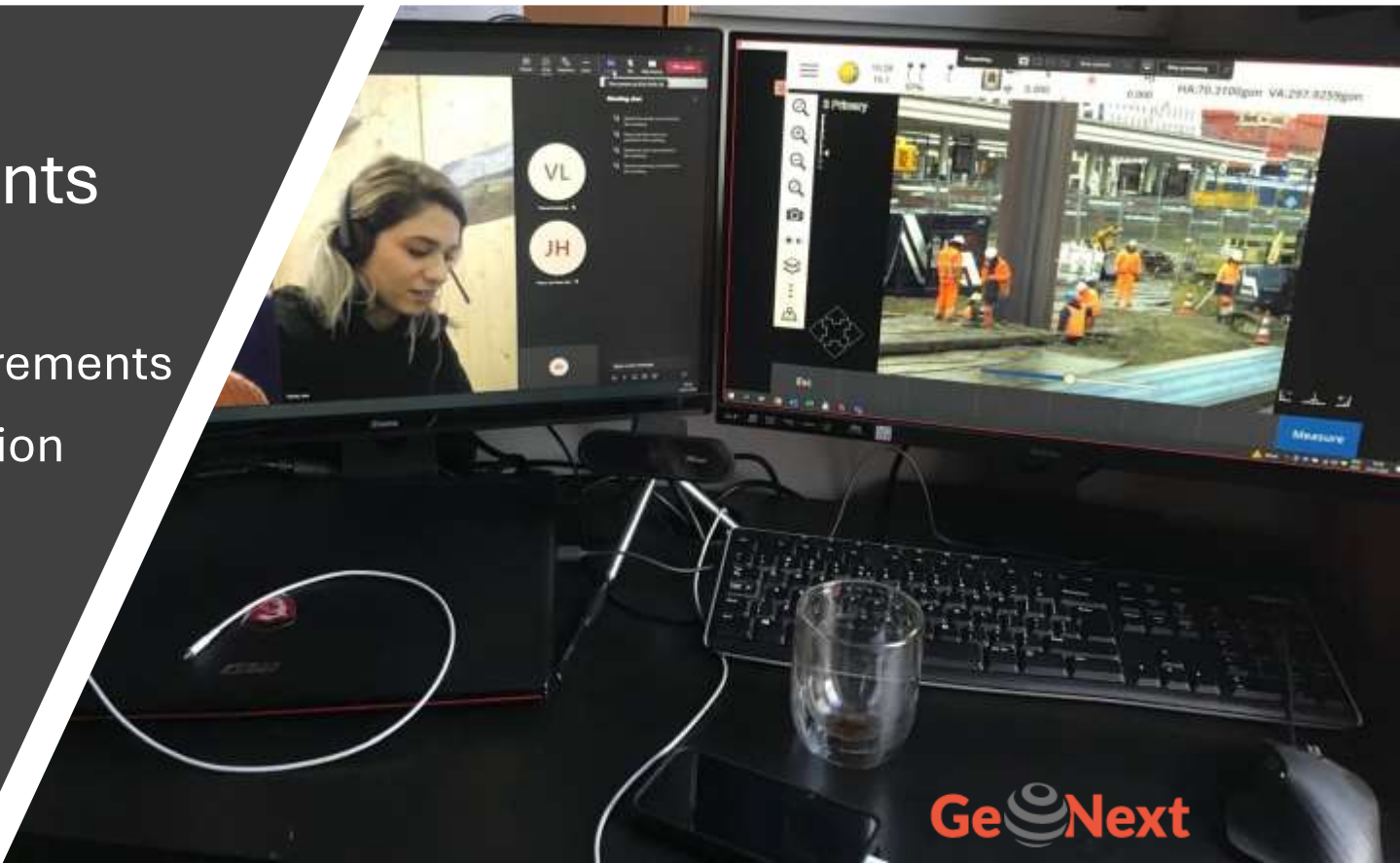
- Zuidasdok – One of the largest infrastructure projects in the Netherlands





“KEUKEN TAFEL” measurements

- Automated Monitoring + Online remote measurements
- Live decision-making process during construction operations



Benefits

Safety Enhancements

- Reduced incidents and accidents
- Improved response times to potential threats
- Enhancing passengers' safety

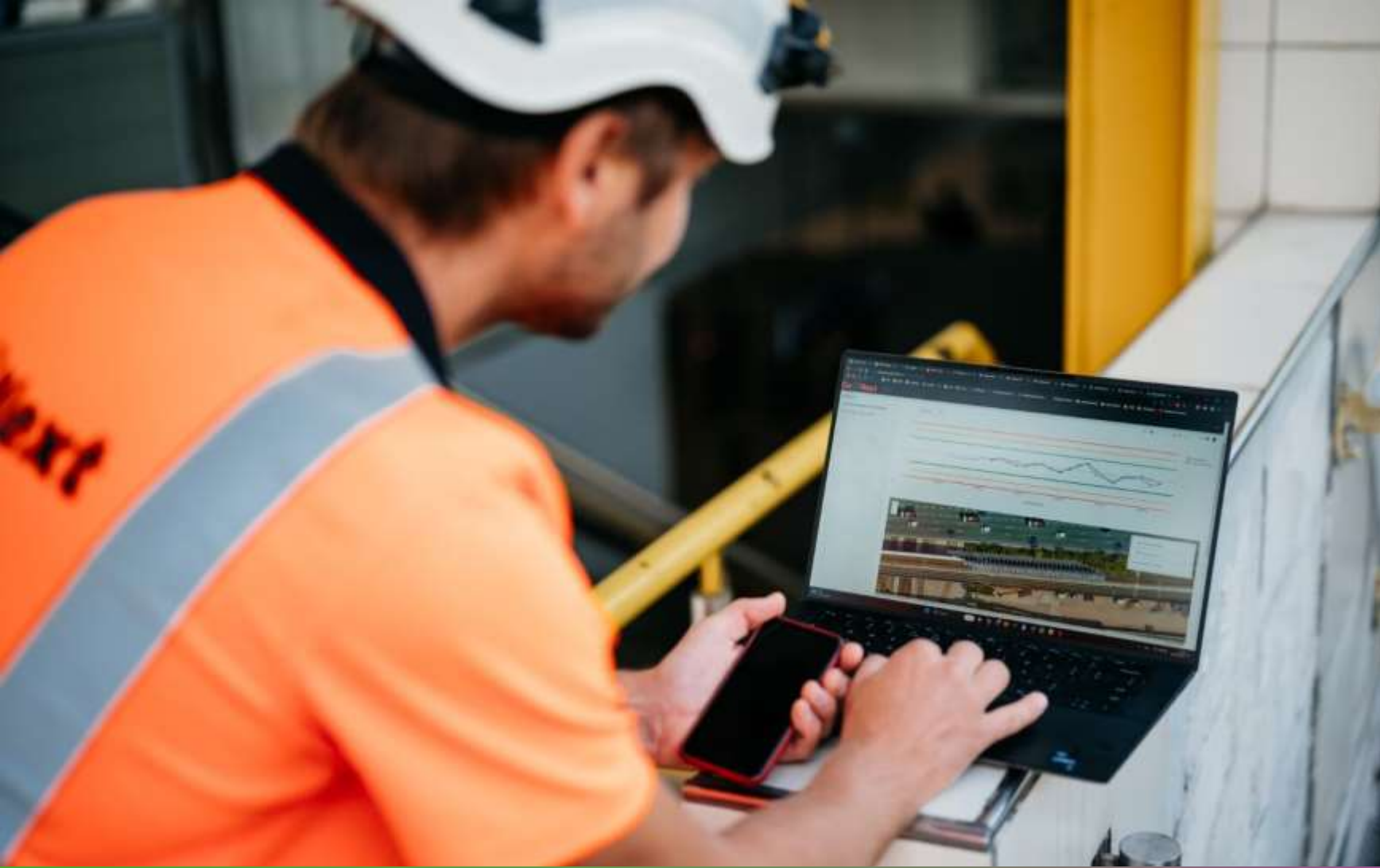
Operational Efficiency

- Optimal resource allocation
- 24h operational
- Mitigating risks
- Time and cost efficiency
- Minimizing service interruptions

Summary

- The critical need for real-time monitoring in construction
- Technological advancements, driving safety and efficiency.
- Future directions and potential for further innovation
- IoT sensors and total stations combination

The screenshot shows a news article on the website 'Zuidas' with the headline: "Metrospoor Amsterdam verzakte door combinatie insluiting en intrillen damwanden". The article text discusses the cause of the subsidence and mentions that the metro line will be closed for several days. Below the article is a line graph titled "Metrospoor" showing displacement (in meters) over time from February 11, 2023, to February 19, 2023. The graph shows a sharp drop in displacement for several points (BWS1, BWS2, BWS3, BWS4, BWS5, BWS6, BWS7, BWS8, BWS9, BWS10, BWS11, BWS12) between 18:00 and 20:00 on February 11, 2023, indicating the subsidence event. The displacement then gradually returns to its initial level over the following days. The website header includes navigation links for 'Zuidas', 'Zuidasdok', and 'Informatiecentrum'. A yellow banner at the bottom of the page reads "Eén metrospoor dicht door lichte verzakking" and "Na werkzaamheden van Zuidasdok in het weekend van 11 en 12 februari 2023 is gebleken dat één metrospoor bij station Amsterdam Zuid licht is verzakt. Het GVB heeft uit voorzorg besloten om dit spoor uit dienst te nemen. Er rijden minder metro's". The GeNext logo is visible in the bottom right corner.



Q&A Session

Thank you!



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