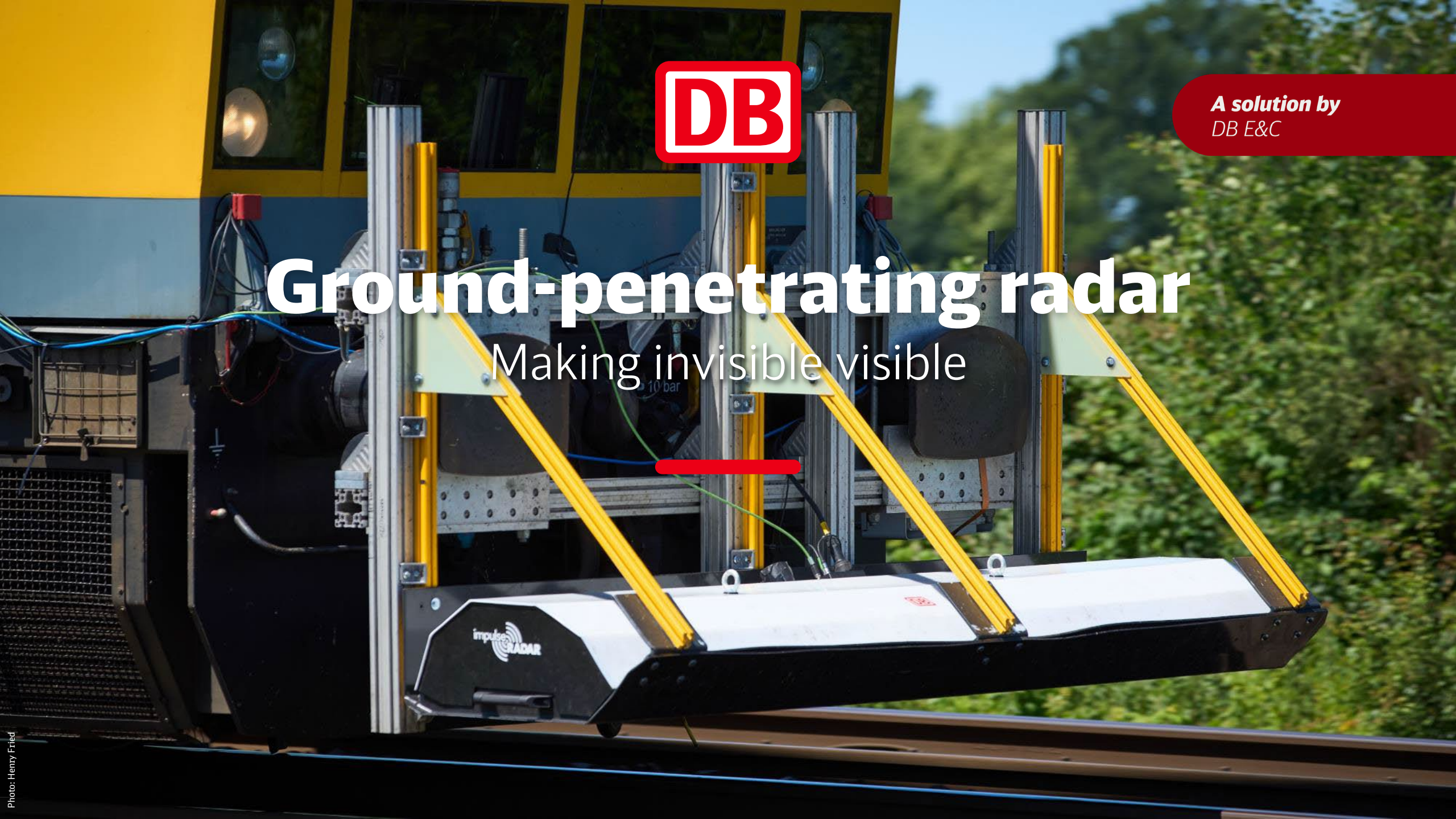
DB
A solution by
DB E&C
Ground-penetrating radar
Making invisible visible
impulse RADAR
Photo: Henry Fried

# All about ground-penetrating radar (GPR)

Ground-penetrating radar (GPR) is a non-destructive method that allows us to inspect the condition of traffic routes and structures at a very granular level, revealing what would otherwise remain invisible.

In other words, GPR is a geophysical measurement method that we use to survey the subsoil. In contrast to conventional investigations by drilling or probing, ground-penetrating radar provides continuous and comprehensive information about the subsoil.

It records and documents obstacles concealed in the subsoil (e.g. pipes, foundations etc.) and risks in the composition of the subsoil (e.g. peat lenses or rock) in advance. This can obviate the need for expensive follow-up studies, because exposures can be made at the specific sites of anomalies in the subsurface.

# All about ground-penetrating radar (GPR)

Ground-penetrating radar investigations thus complement and optimize conventional exploration methods by providing additional findings. The outcome is a comprehensive image of the subsoil. Geotechnical reports prepared this way are more meaningful and reliable, guarding against unpleasant surprises while construction is underway. This optimizes planning, bidding and implementation of projects in line with scheduling and budget requirements.

Ground-penetrating radar is recommended in DB Guideline 836.1002 (Geotechnical investigations) and in DIN 4020 (Geotechnical investigations for civil engineering purposes).

# How does ground-penetrating radar work?


Ground-penetrating radar works by transmitting pulses of electromagnetic radiation into the subsoil. At the boundary between different materials, the signal is (partially) reflected and recorded by a receiver. An antenna moves over the surface, continuously scanning the subsoil. Depending on the resolution available, a measured value is generated at certain intervals (scans/m).

A radargram, that is, a vertical section of the soil along a measured line, is generated by stringing the individual measured values together. The data we collect is processed and evaluated using our in-house software and can be converted into a BIM discipline model, which can then be used for further purposes. Our GPR data can also be used on our X2BIM platform.

# Which device for which application?

## Train-based measurement
Number of antennas: up to 28
Scanned area: 2.5 m
Depth penetration: 4–5 m
Scans/m: 20
Speed: 120 km/h

## Large multi-channel scanner
Number of antennas: 18–28
Scanned area: 1.7–2.5 m
Depth penetration: 4–5 m
Scans/m: up to 100

## Small multi-channel scanner
Number of antennas: 8
Scanned area: 0.64 m
Depth penetration: 4–5 m
Scans/m: up to 100

## Hand-guided antenna
Number of antennas: 1
Depth penetration: varies depending on project requirements specification
Scans/m: up to 100

Photos: Henry Fried, DB E&C

# Advantages

Precise and extensive advance knowledge about building terrain enables optimal planning and bidding for construction services, ensures construction will proceed smoothly, and lowers the risk of having to add to or pause work during the construction phase.

No operational restrictions of rail or road traffic, as measurements can be made during regular operation.

Non-destructive use

Combining GPR with other methods and data (e.g. from multicopter survey flights or the 360° multisensor platform) yields a complete 3D image of the object under investigation, which serves as the basis for the management of infrastructure facilities.

Photo: Henry Fried

# Ground-penetrating radar at a glance

- Used to assess and document the condition of terrain and structures
- Detects cavities and determines the location of reinforcement, pipes and foundations
- Detects anomalies and risks such as peat lenses, areas of mud, hard core, ballast fouling, gravel pockets, cavities, etc.
- Can be used on rails, roads, platforms, tunnels, bridges, dikes, industrial areas, retaining walls and in buildings
- Can measure at a speed of up to 120 kilometers per hour

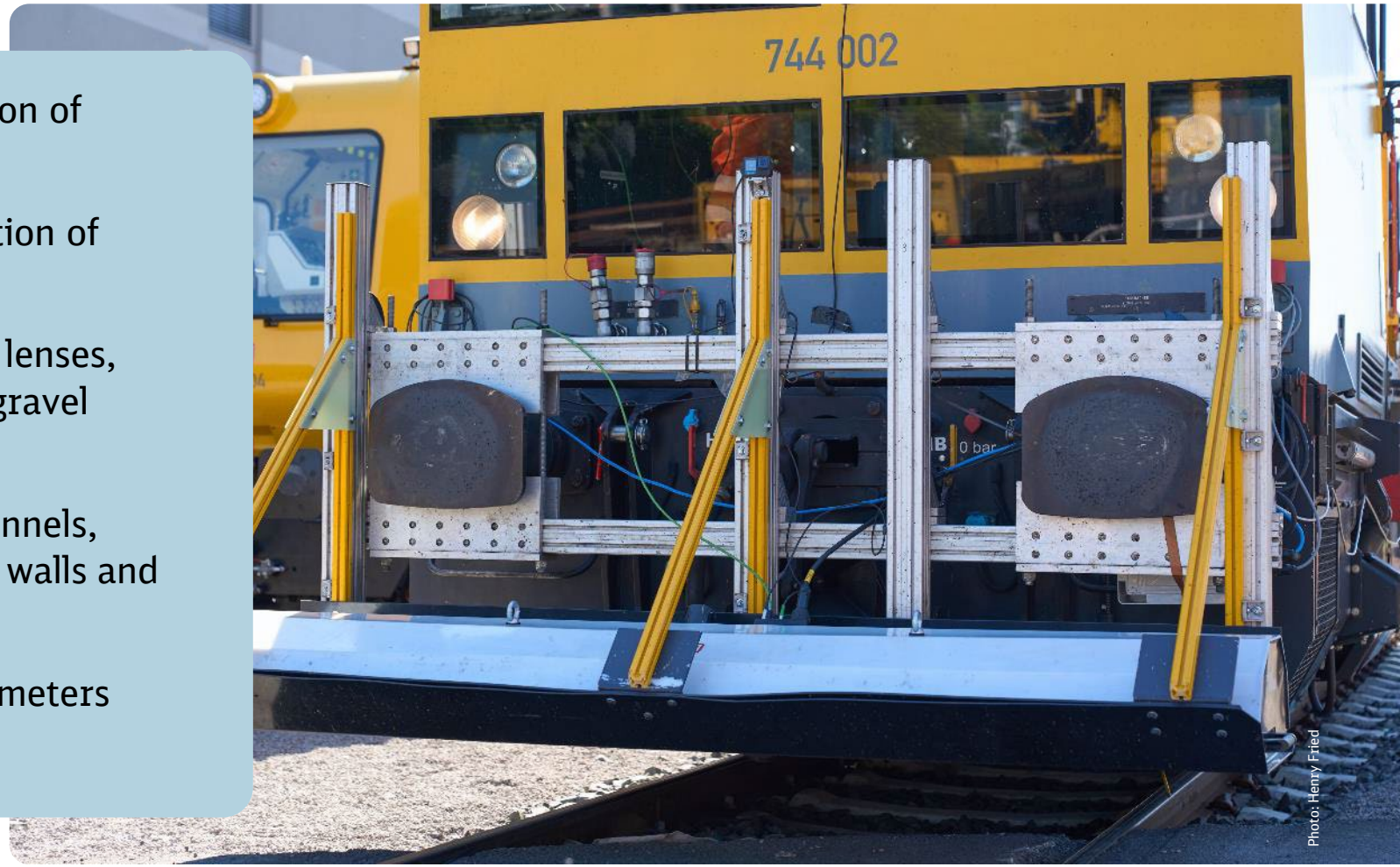

Photo: Henry Fried

# Your contacts for ground-penetrating radar


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More information

Our video on YouTube