swissTAMP.

Capitalizing predictive maintenance and asset performance.
SBB operates and maintains one of the busiest track networks in the world. Passenger and freight trains travel along the same routes at frequent intervals. Rail companies are transporting more and more passengers and freight. With new installations like the Gotthard Base Tunnel or the Zurich cross-city link, the track network is getting busier and more complex.

Until now, rail companies have used a track maintenance system which identifies and repairs damage and wear swiftly. This system has been continually improved so the rails can withstand increasingly intensive use.

Switzerland will be investing more in rail network maintenance in the near future, and SBB will be using this money as efficiently as possible. The costs of the railway system as a whole are set to go down in the long term as a result.

We are also taking preventative action to tackle some of the challenges of trackbed maintenance. We are breaking away from the reactive approach and moving towards proactive installation management.

Our goal is to make rail travel safe, attractive and affordable for future generations.

Supporting us in our efforts is swissTAMP, a tool for track analysis and maintenance planning.

Tools for managing the track.

Facts:
- SBB manages 6,600 km of tracks
- 13,000 sets of points
- CHF 20 billion replacement value
- CHF 800 million per year on maintaining tracks

Vision:
Future-oriented installation management identifies damage before it occurs and knows how to prevent it. By anticipating future behaviour (prognosis), targeted measures can be taken to maintain tracks in good time. Optimising vehicles and routes across the infrastructure with the aim of eliminating the causes rather than fighting the symptoms reduces the total system costs.
swissTAMP stands for Track Analysis and Maintenance Planning and is the key element in an efficient planning platform for systematic maintenance of the trackbed and its components. By linking data from various systems in the SBB IT network such as measurements, visual status assessments and traffic data, information on trackbed behaviour can be displayed clearly and any necessary maintenance measures identified.

This enables maintenance measures to be planned in a transparent and needs-oriented way, making them optimally cost-effective for several years to come in terms of time, place and installation length.

The introduction of swissTAMP enables us to make the transition from reactive (find and fix) to proactive (predict and prevent) maintenance planning.

swissTAMP allows us to:
- visualise and analyse the state of components and systems;
- anticipate future trackbed behaviour;
- predict future track maintenance in specific locations;
- Take measures with optimised life-cycle costs.

swissTAMP integrates:
- **Data lab**: the driving force behind digitalisation, providing expertise to understand the overall system.
- **Standard elements**: the systematic display of maintenance cycles with optimised experience and life-cycle costs.
- **Anabel**: the vehicle-focused analysis of stress and strain on specific installations.
- **Track wear factor**: the track wear model that targets causes to ensure sustainable strain reduction.

A TOOLKIT FOR TRACK ANALYSIS AND MAINTENANCE PLANNING: PREVENTATIVE, DIGITAL AND COST-EFFECTIVE.
Data lab
Turning data into information and knowledge is the guiding principle behind the data laboratory. Findings from research and functional knowledge are linked to productive real data, driving digitalisation. An interdisciplinary team of specialists and developers is hard at work on a Big Data platform, linking data to meaningful information that can then be integrated into new or existing tools. The knowledge generated via the trackbed system in conjunction with the vehicle-track interaction enables SBB to understand and anticipate the causes of faults, risks and economic trends.

Standard elements
The standard elements catalogue SBB specialist knowledge about life-cycles and necessary maintenance measures and match these up with scientific findings. This tool is used to create standardised nationwide investment and maintenance strategies based on life-cycle considerations. SBB standard elements form the basis for transparent and reliable planning of track maintenance volumes.

Anabel (analysis and evaluation of stress data)
Anabel enables transparent and traceable monitoring of strain on installations at an unprecedented level of detail. The wheel/rail forces generated by individual vehicles can be recorded, tracked and displayed to the nearest metre, forming the basis for developments in trackbed behaviour and calculating wear. This means that wear forecasting and the ability to plan measures for specific tracks are now within reach.

Track wear factor
The track wear factor is based on SBB’s track wear model, which allows individual vehicles to be classified and their effect or impact on the track to be calculated accurately. The current fixed calculation of overall gross tonnes is thus being expanded to include vehicle-specific calculation of train path prices in accordance with the costs-by-cause principle. In the medium to long term, this will provide an incentive for using the track more carefully and developing vehicles that are more track-friendly.

Prototype of the Head Check prognosis
The network-wide Head Check prognosis of SBB is based on the actual traffic data from the system Anabel. The prototype was developed in the Data lab and the results were verified by track managers. The implementation through productive tools follows in a third step.