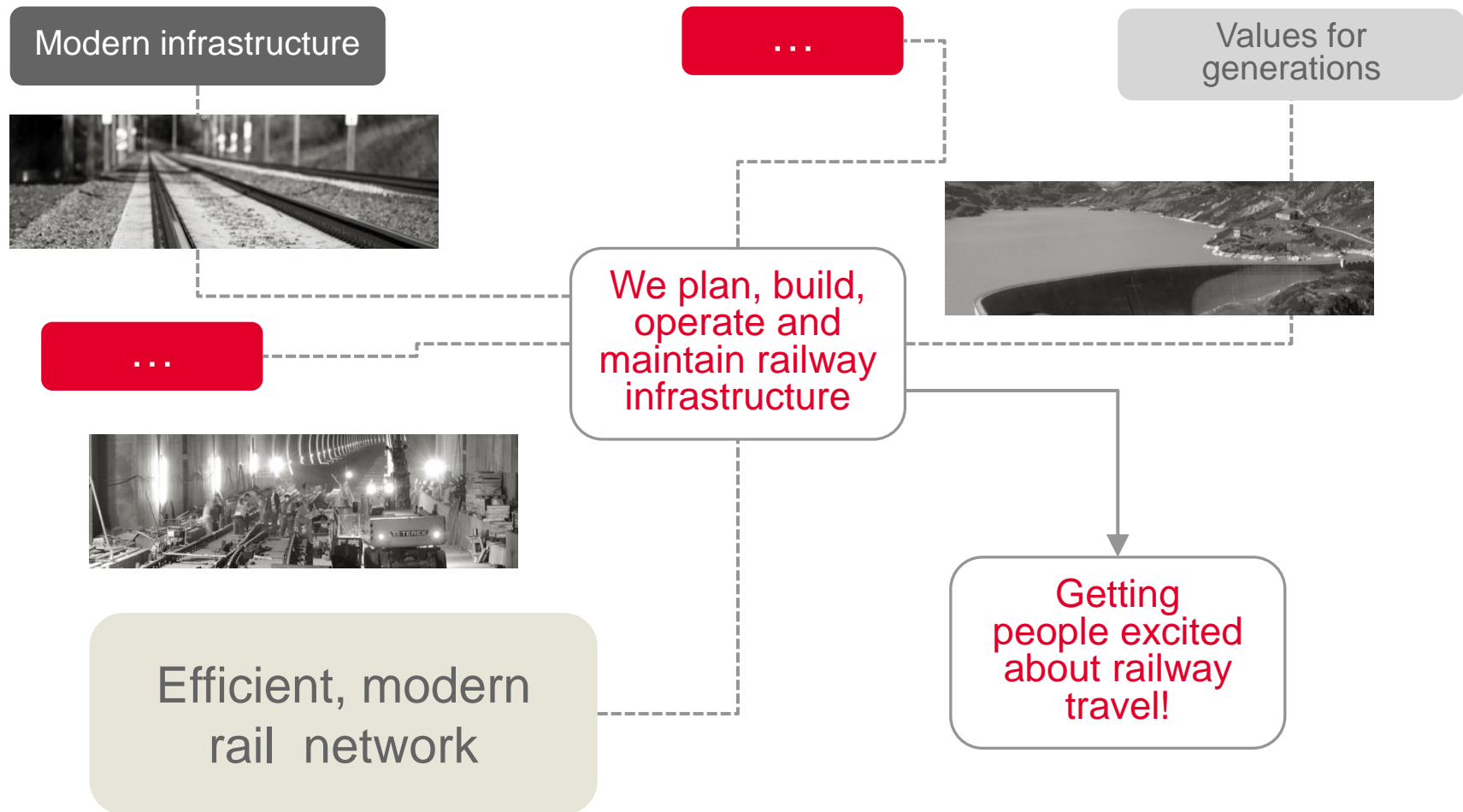


LCM Asset Application & Data Warehouse

From Registration of Assets to LifeCycleManagement



ÖBB-Infrastruktur – Core Tasks and Vision



Modern Rail Infrastructure

Competitive and customer-oriented infrastructure in the heart of Europe

Attractive, sustainable railway system

Sustainable infrastructure needs a **LCC-based asset management**



What is necessary to achieve these goals?

→ Modern and comprehensive Asset-Data-Management

Initial Situation at ÖBB-Infrastruktur

A horizontal bar spanning the width of the slide, composed of a solid grey section on the left and a series of vertical grey lines of varying heights on the right.

Different data warehouses depending on different types of information...

- Asset information
- Maintenance information
- Measurement data

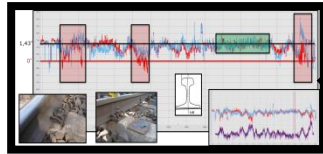
... and on the field of engineering

- Track
- Catenary
- Civil engineering

Further developments together with Graz University of Technology

- Track set forecast
- Development concerning frictional connection rail/sleeper and ballast condition

Initial Situation at ÖBB-Infrastruktur



Prozessschema Messdaten → NATAS → TUG-Datenbanken

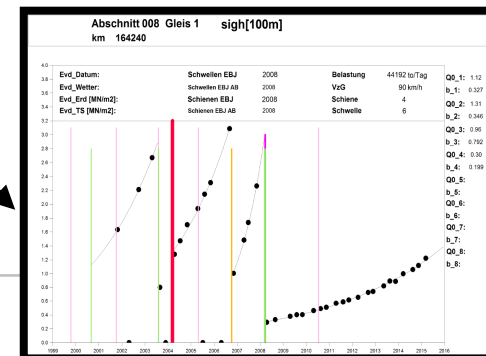
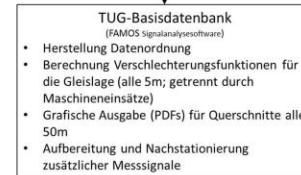
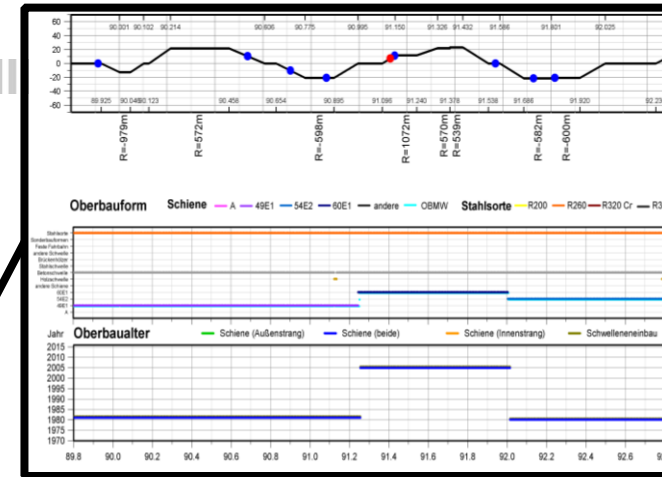


Interface

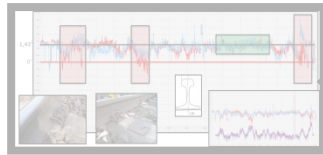
Interface

Interface

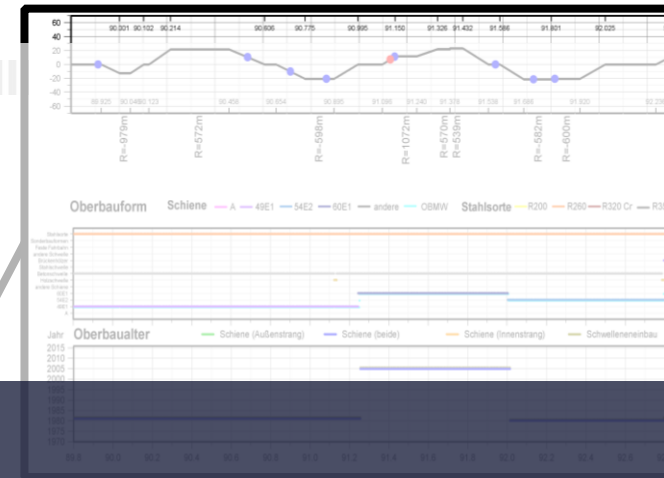
Interface



Initial Situation at ÖBB-Infrastruktur



Prozessschema Messdaten → NATAS → TUG-Datenbanken



Interface

Decision:

Development of a new Data Warehouse

LCM Asset Application & Data Warehouse

Interface

Interface



LCM Asset Application & Data Warehouse

Main-Targets of the new Development

- Reduction of interfaces in the data process
- Further development of the track analysing system *NATAS*
- Various executions of condition prognosis
- Professional implementation of Graz University of Technology innovations (in the recent past)
- Receive one modular designed basis for an interdisciplinary data warehouse
- Provide other fields of engineering (besides track system) with a modern data warehouse solution

ÖBB-Core-Project-Team

- Manfred Datler
- Robert Fleischmann
- Andreas Zidan
- Armin Berghold
- Jörg Vogel
- Markus Rieder
- Georg Neuper (PL)

➤ Support LifeCycleManagement with a solid technical data pool

LCM Asset Application & Data Warehouse

Steps to the New Data Foundation

Data Acquisition

- Measuring data and asset data are available in different formats on different file locations



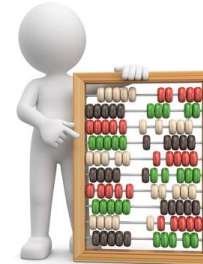
Quality Control

- Measuring data are existing in a consistent structure with time stamp, quality mark and correct position



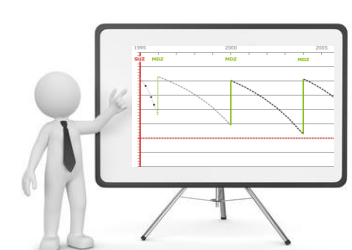
Analysis

- Various additional calculations, computations and aggregations for measuring and asset data are executed



Presentation

- Measuring and asset data are available in a readable and easy interpretable way



LCM Asset Application & Data Warehouse Quality Control

Quality Control

- Measuring data are existing in a consistent structure with time stamp, quality mark and correct position



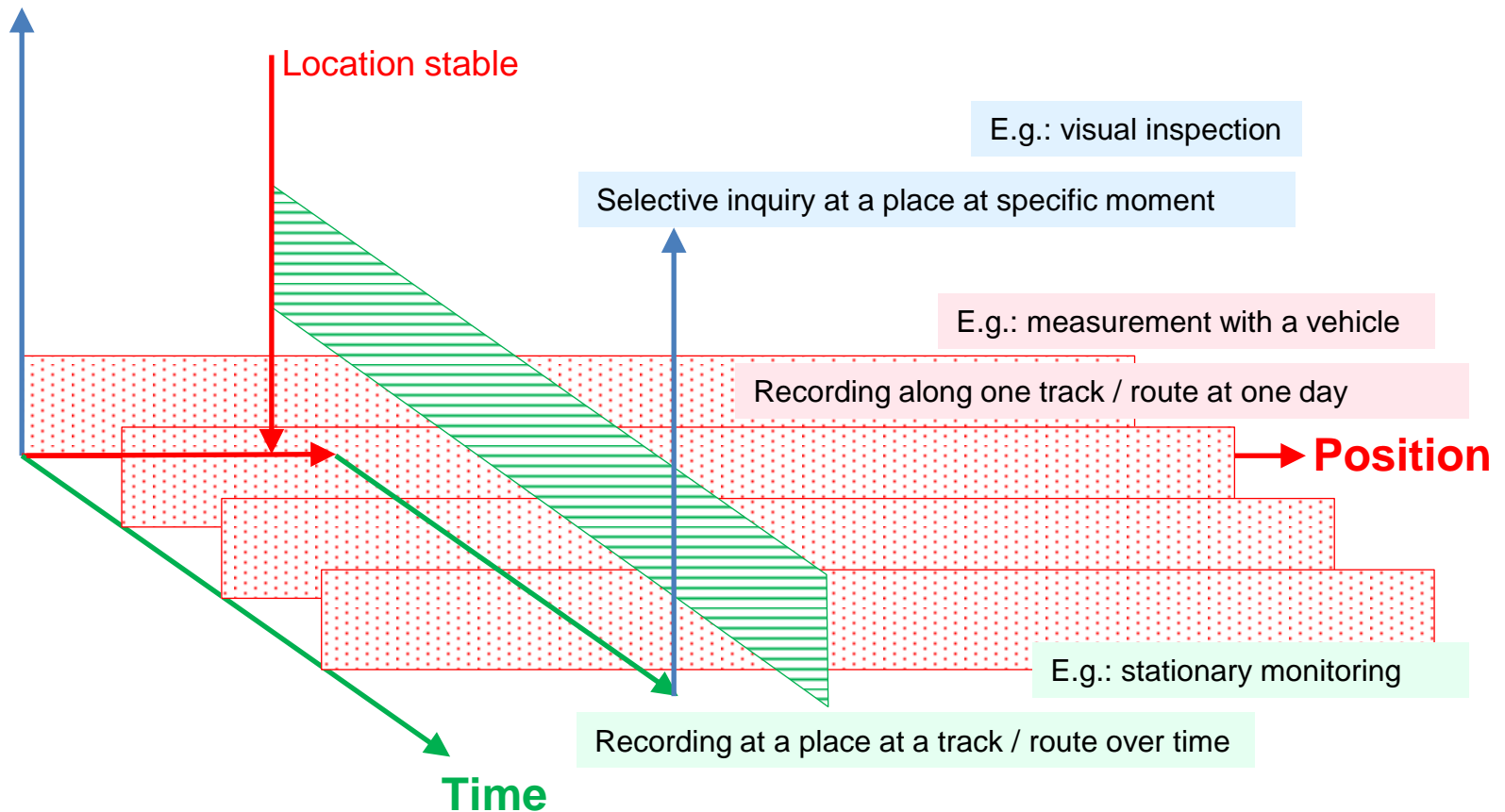
Central issue to create correct time-series

- Correct positioning of data from measurement cars

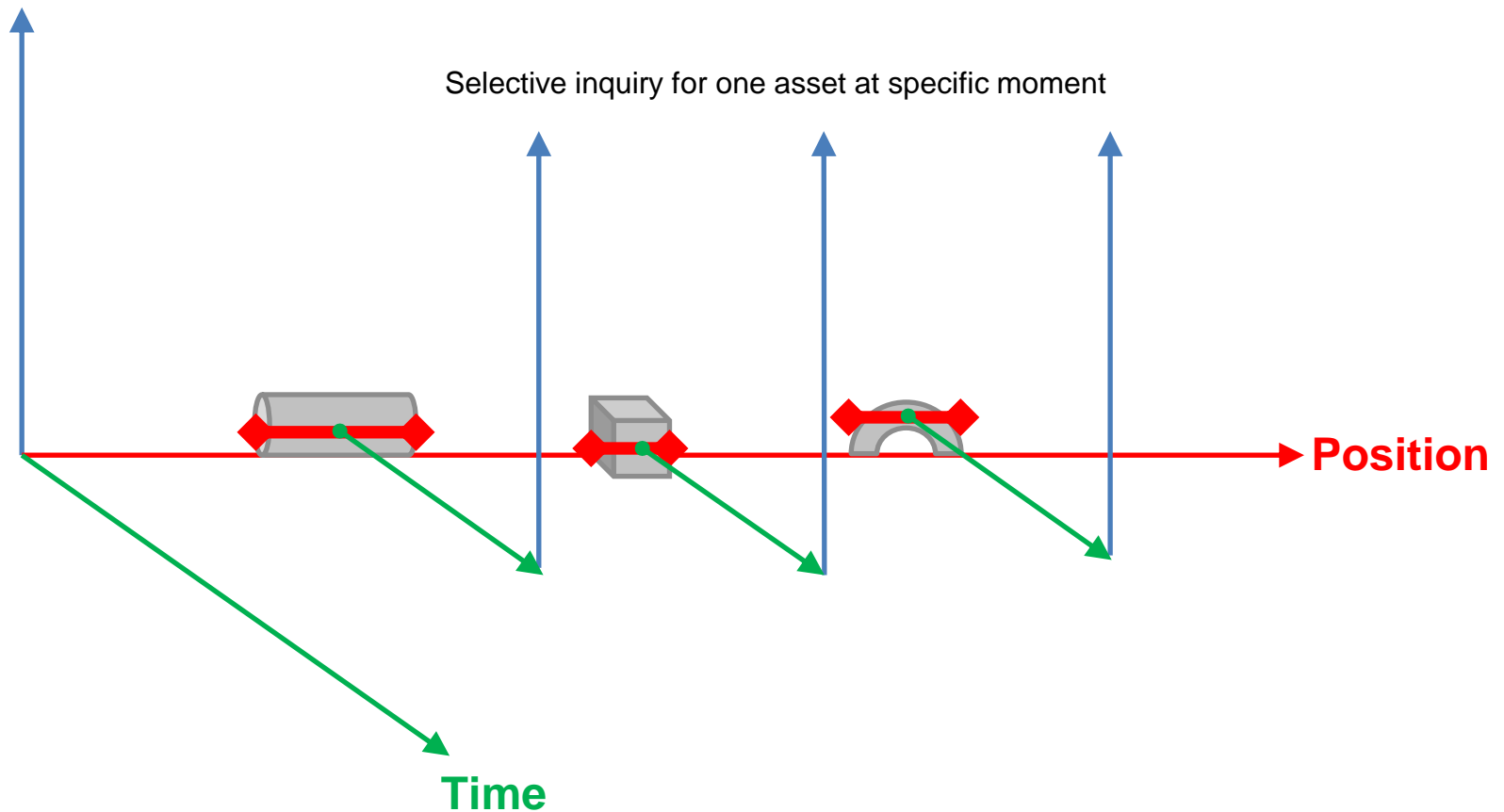
Solutions

- Unique positioning system based on GPS-area-IDs
- Automated or semi-automated positioning correction

Condition

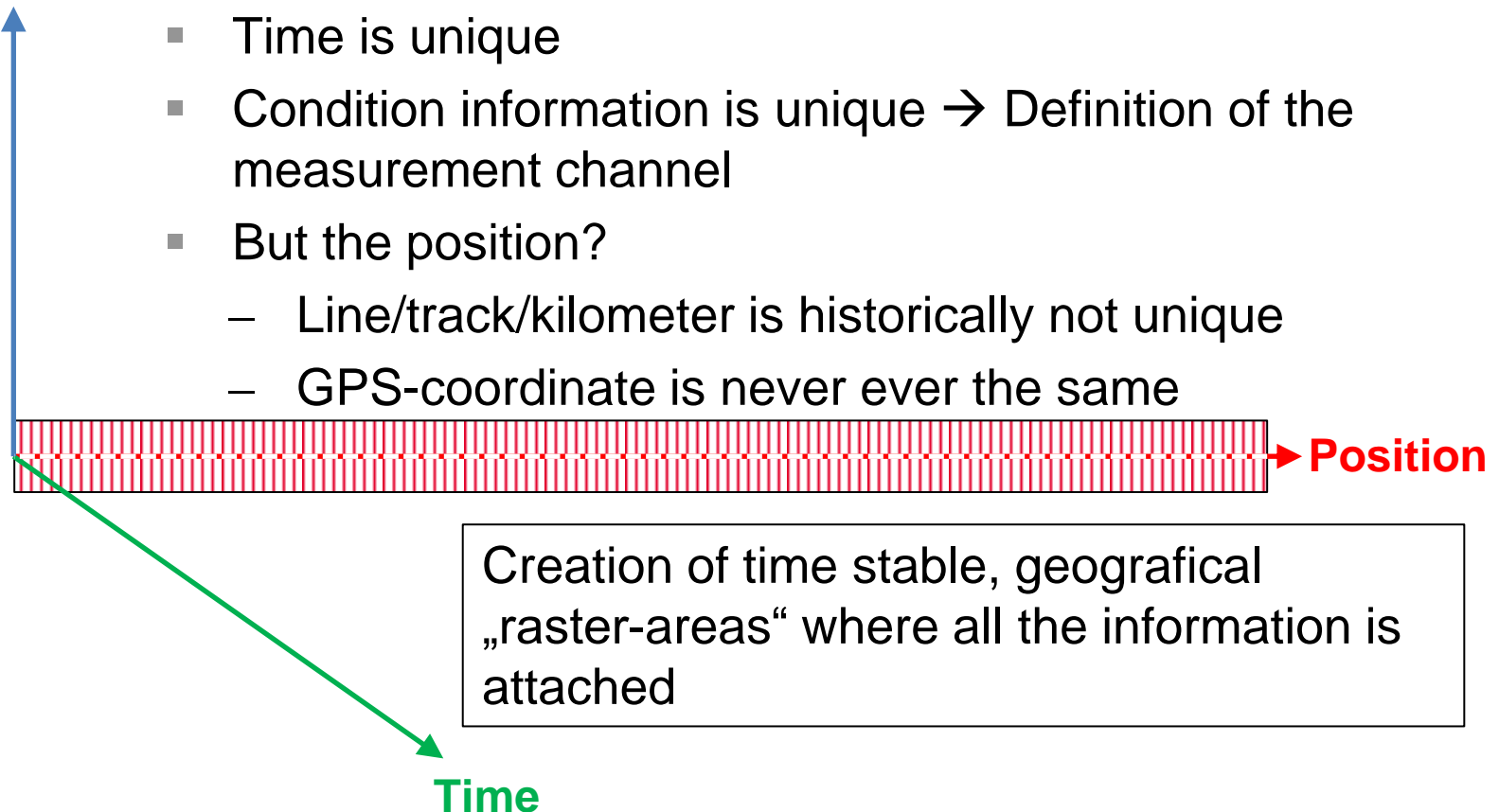


Condition



Condition

- What is the problem?
 - Time is unique
 - Condition information is unique → Definition of the measurement channel
 - But the position?
 - Line/track/kilometer is historically not unique
 - GPS-coordinate is never ever the same



LCM Asset Application & Data Warehouse

Quality Control

Quality Control

- Measuring data are existing in a consistent structure with time stamp, quality mark and correct position



Central issue to create correct time-series

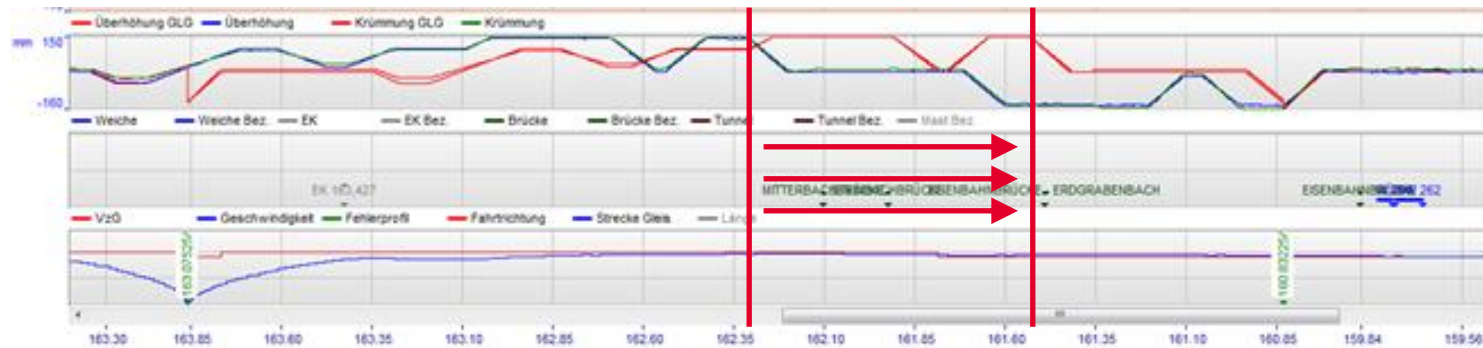
- Correct positioning of measuring data

Solutions

- Unique positioning system based on GPS-area-IDs
- Automated or semi-automated positioning correction

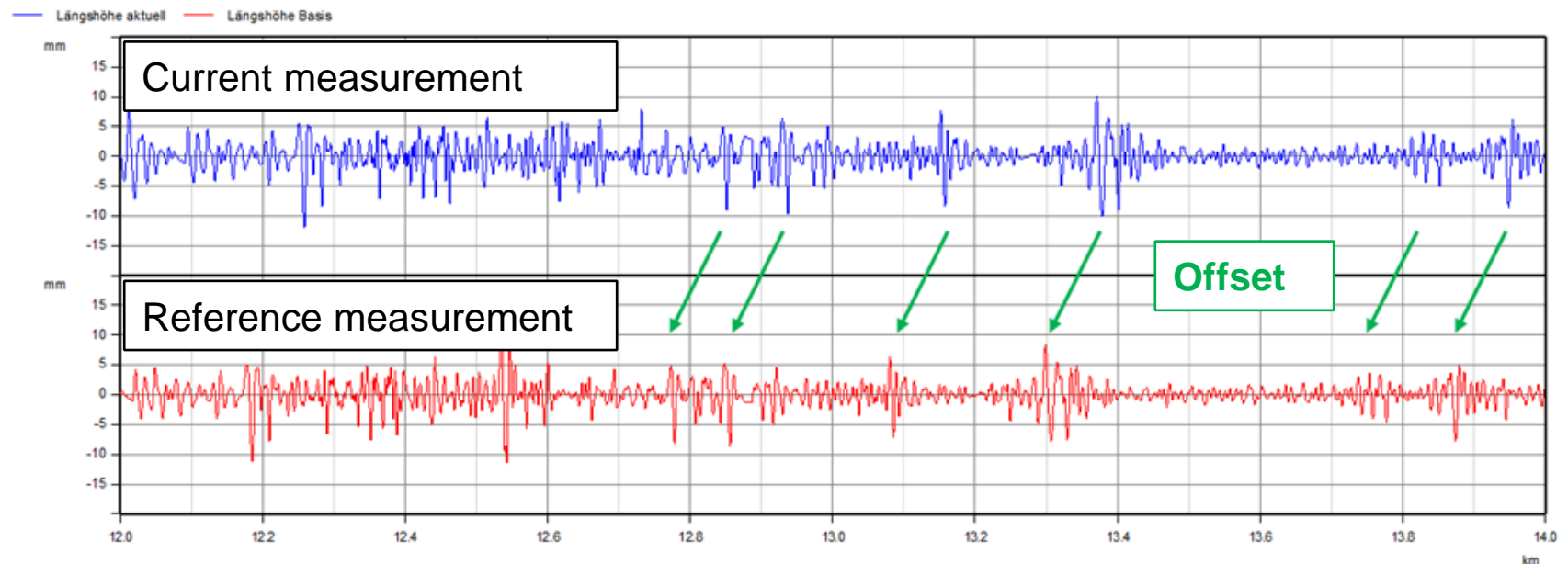
If there is any problem with GPS → offset correction with different methods

- Correlation of the measured curvature with the reference curvature



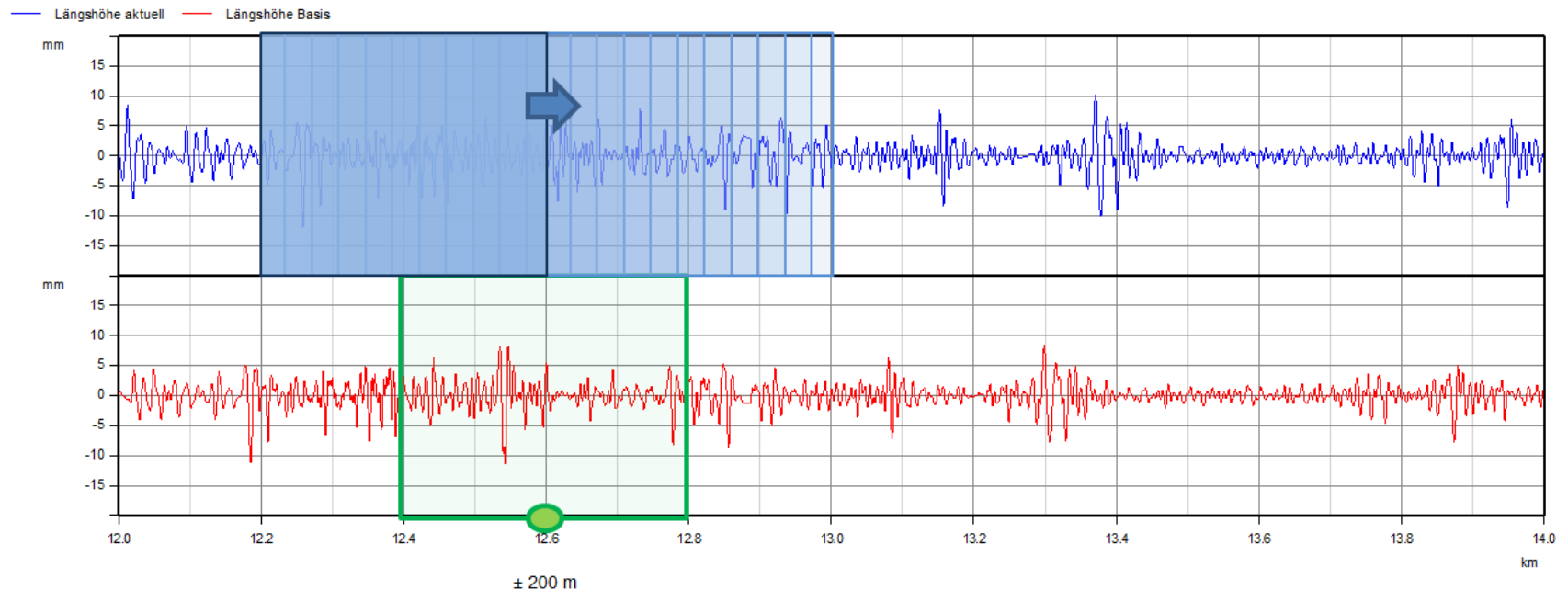
If there is any problem with GPS → offset correction with different methods

- Correlation of the measured curvature with the reference curvature
- Correlation of one measuring channel with a reference measurement



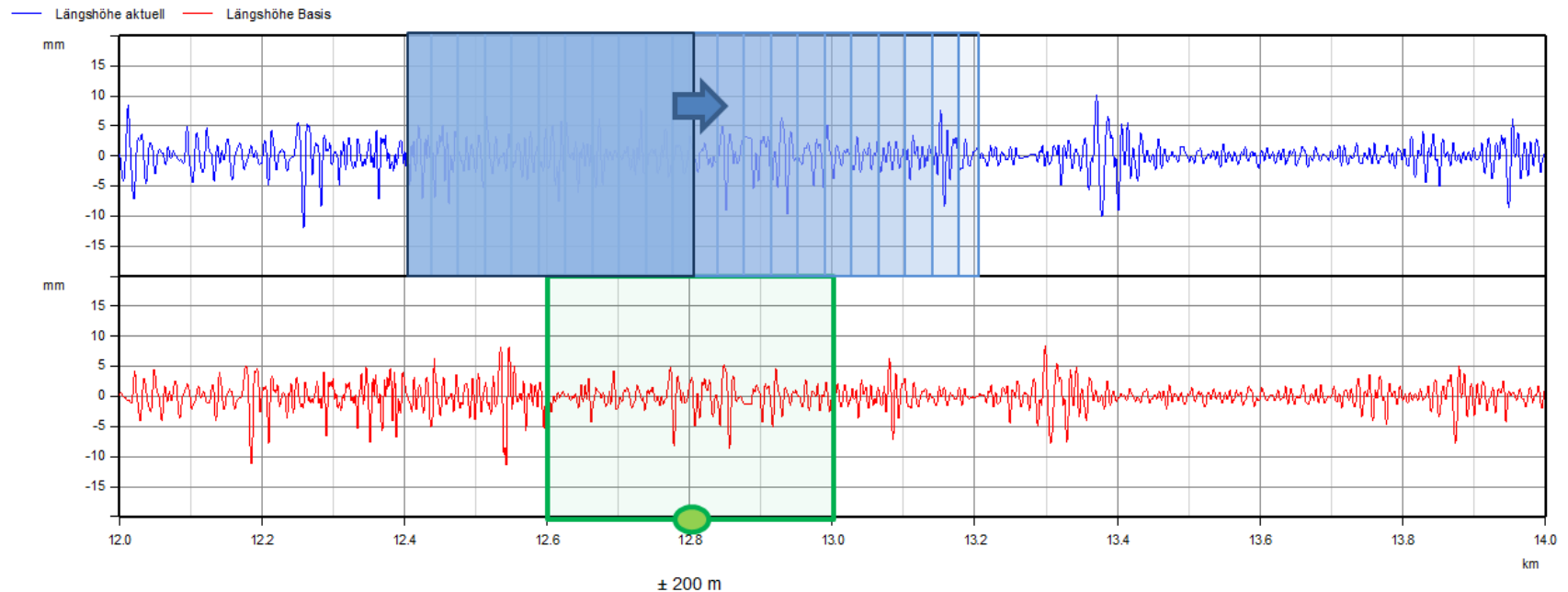
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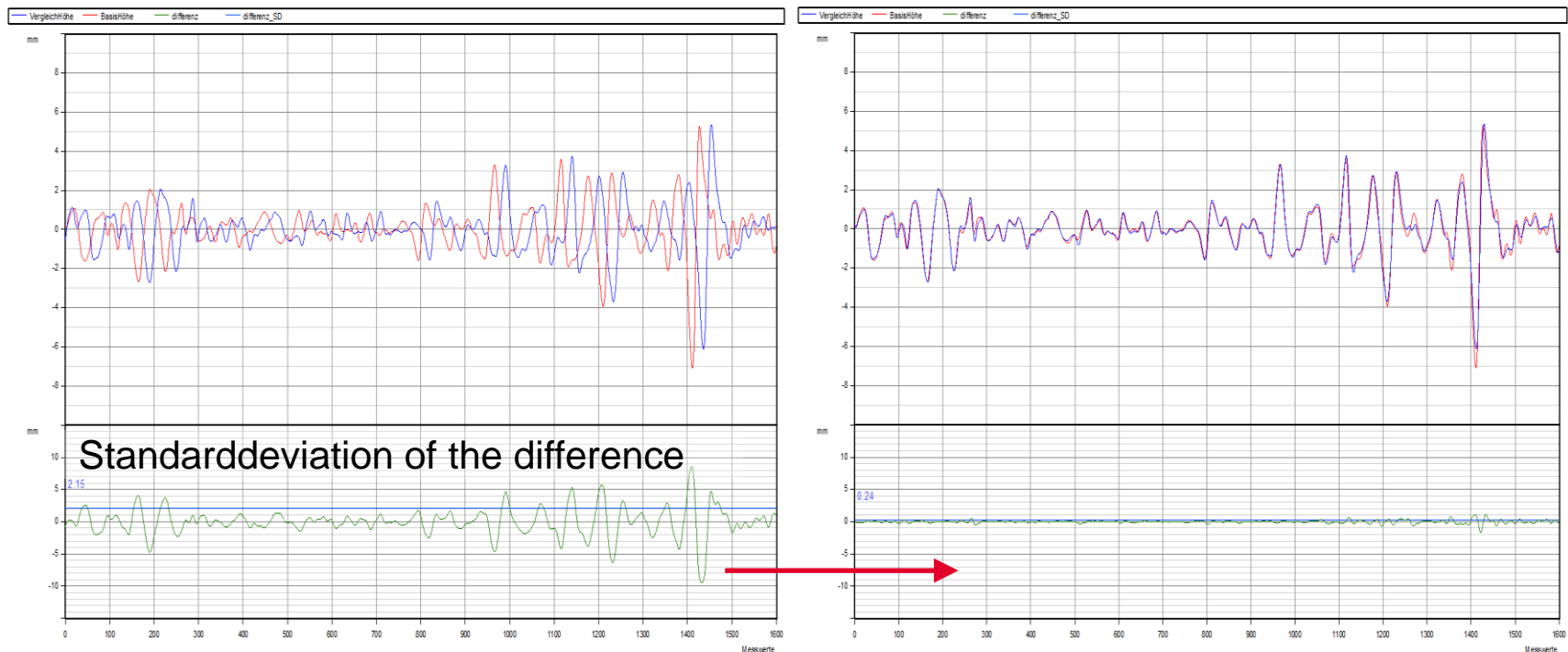
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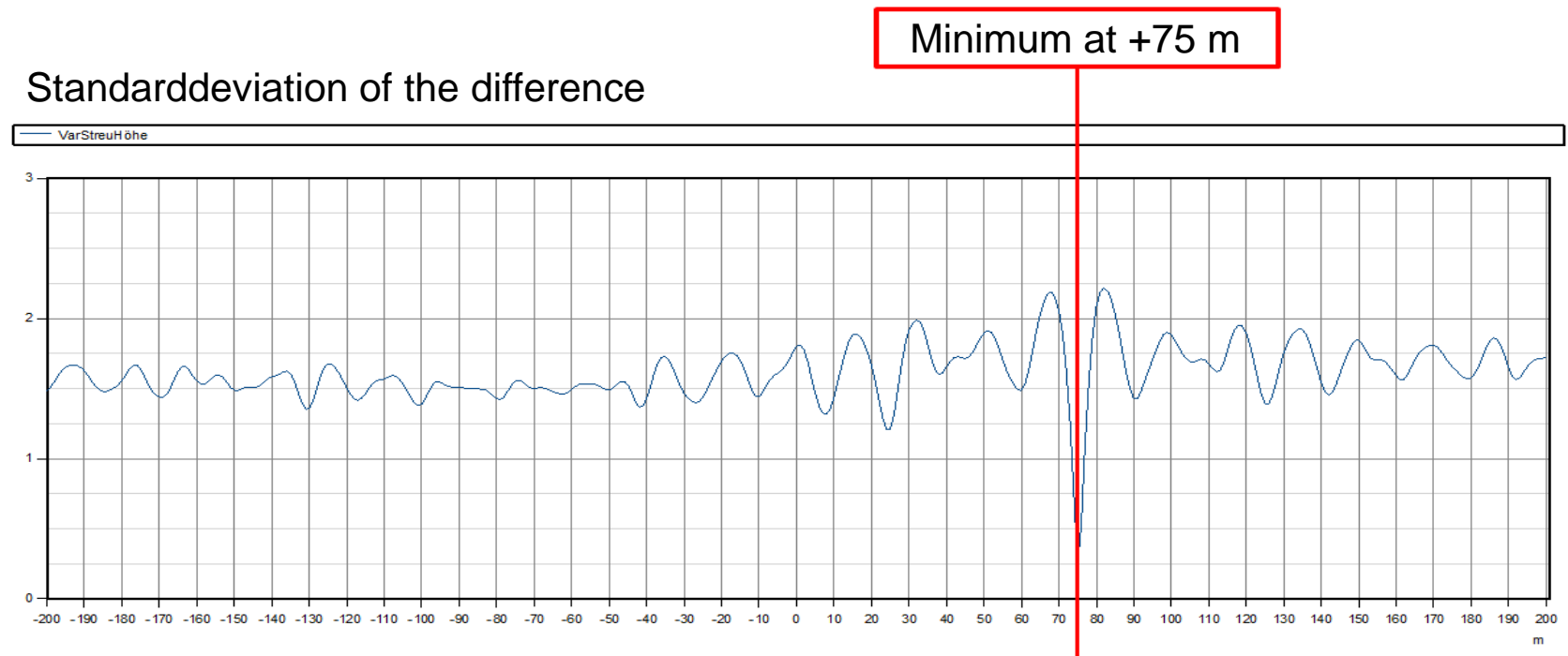
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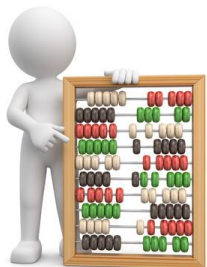
If there is any problem with GPS → offset correction with different methods

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Analysis

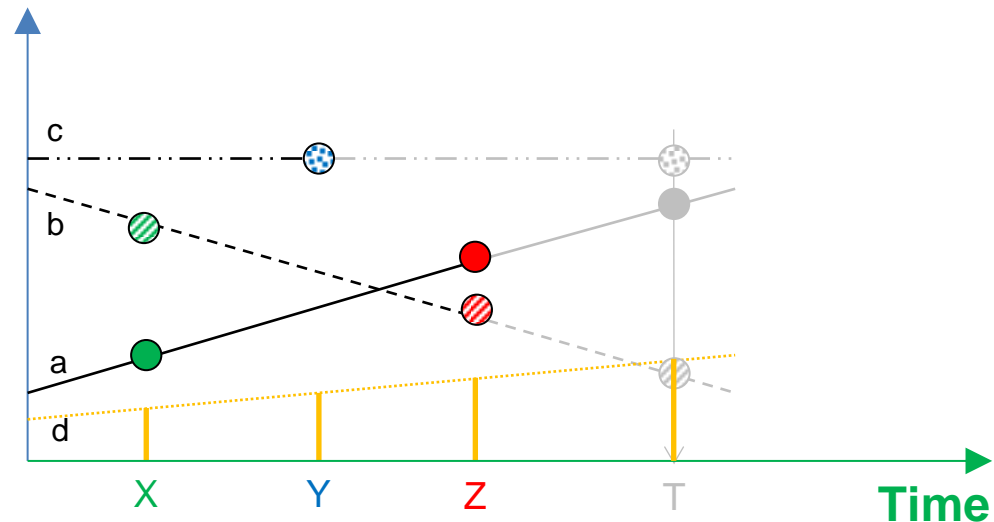
- Various additional calculations, computations and aggregations for measuring and asset data was executed



Result is an interdisciplinary data warehouse

- E.g. various possibilities for prognosis/forecasts

Condition



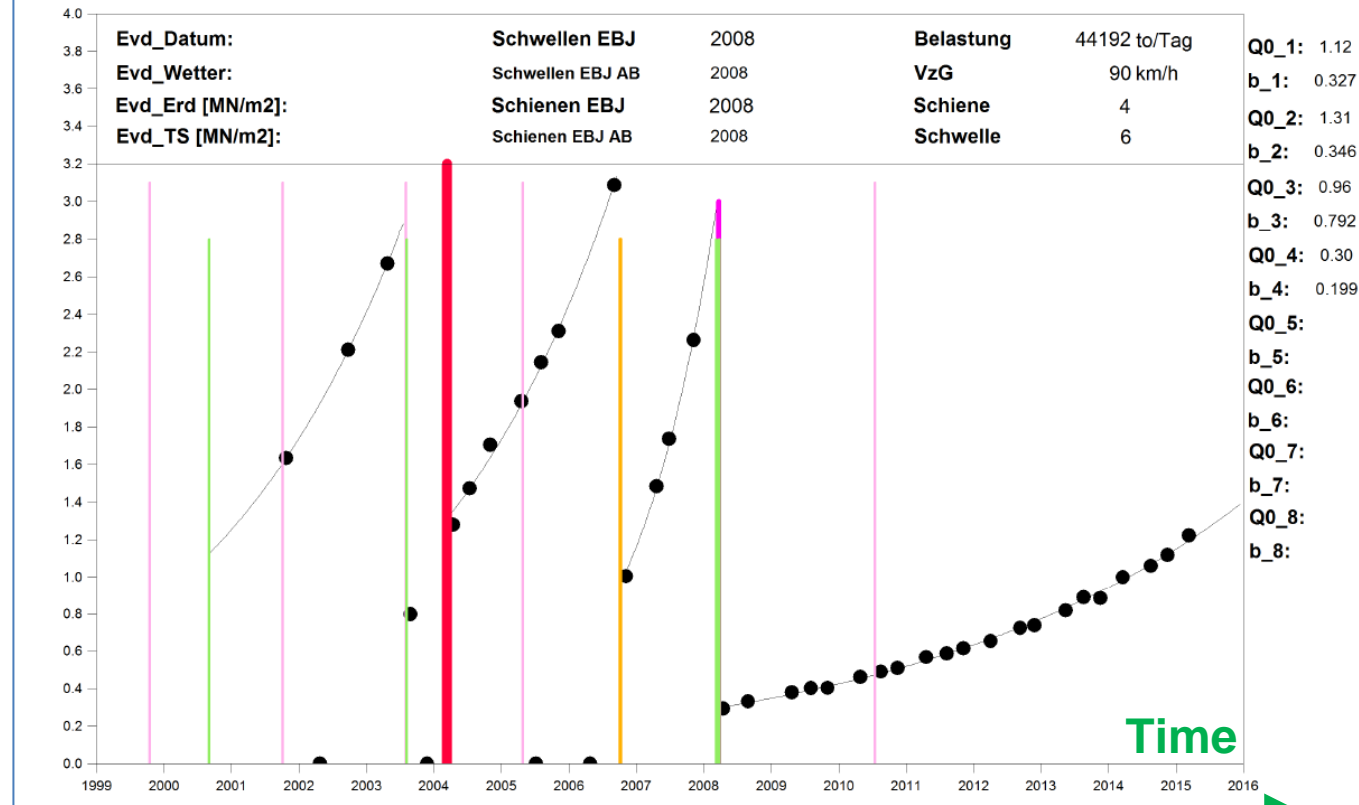
LCM Asset Application & Data Warehouse Presentation

Presentation

- Measuring and asset data are available in a readable and easy interpretable way



Condition



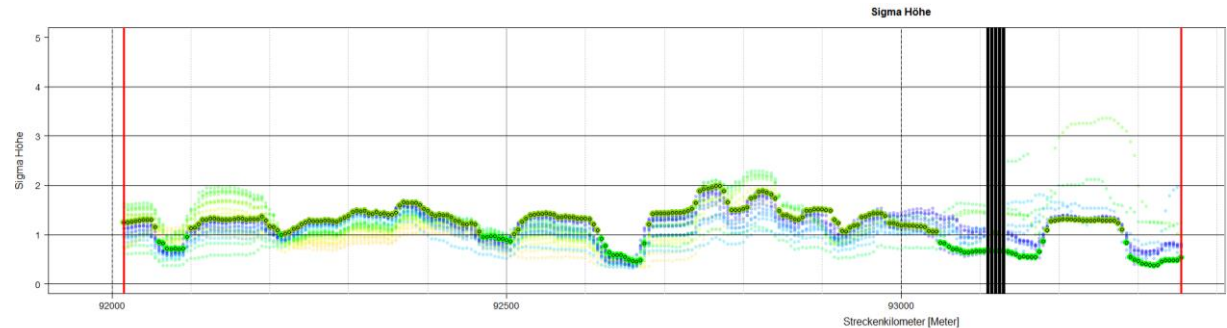
LCM Asset Application & Data Warehouse Presentation

Presentation

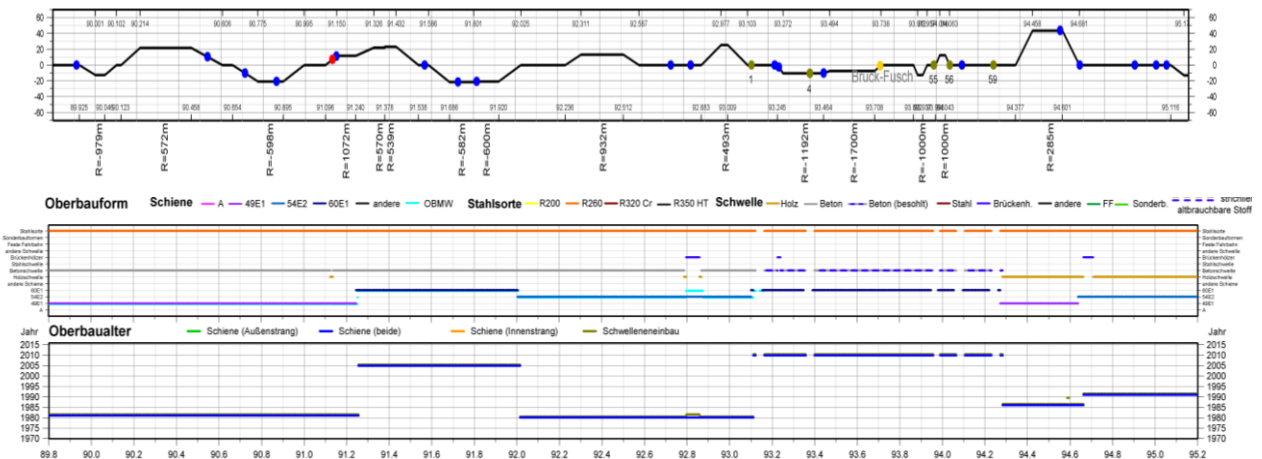
- Measuring and asset data are available in a readable and easy interpretable way



Condition



Position



Asset information

LCM Asset Application & Data Warehouse

Further Developments / Visions

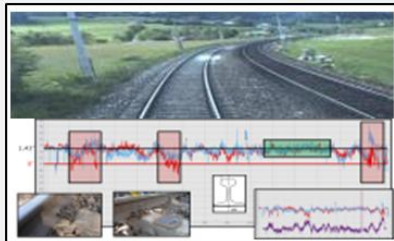
What do we achieve with the LCM Asset Application & Data Warehouse?

- Step by step we receive a solution for objective planning of technical actions in the assets life cycle
 - After this process we calculate our LCC and define, what's the right action at the right time
- The vision is to develop the ultimate asset management
- Combination of both – detailed technical prognosis and automatic economic evaluations

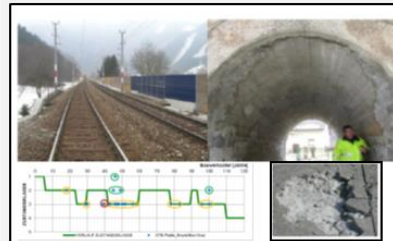
LCM Asset Application & Data Warehouse

Further Developments / Visions

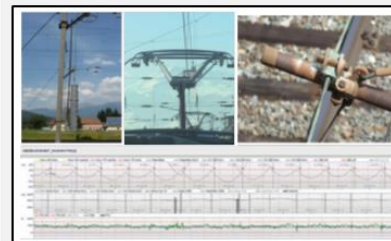
Track



Civil Engineering



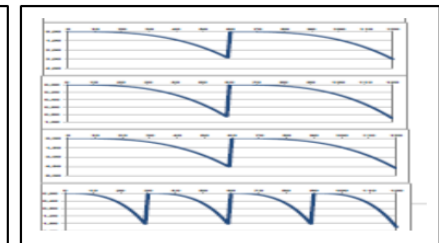
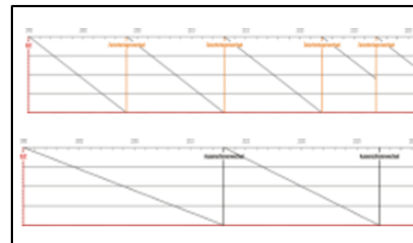
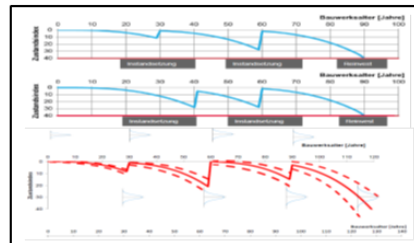
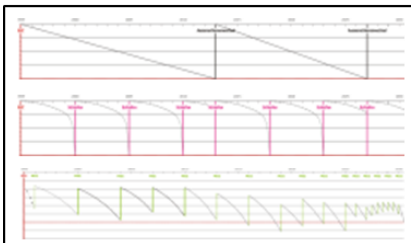
Catenary



Other Assets

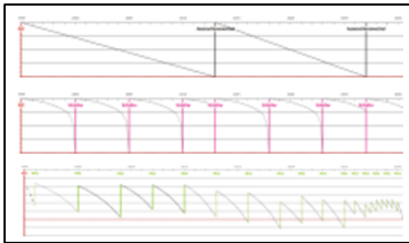


Technical prognosis based on measuring data, asset information, mathematics and statistics to receive deterioration for each component of every asset

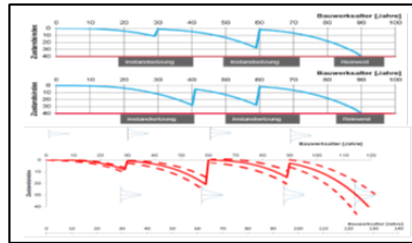


LCM Asset Application & Data Warehouse Further Developments / Visions

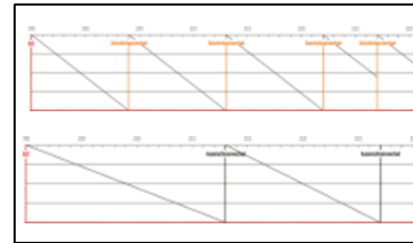
Track



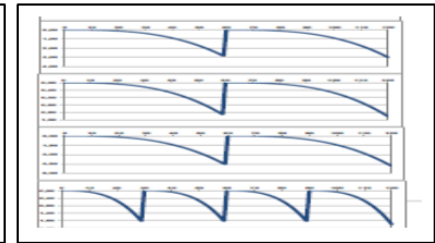
Civil Engineering



Catenary

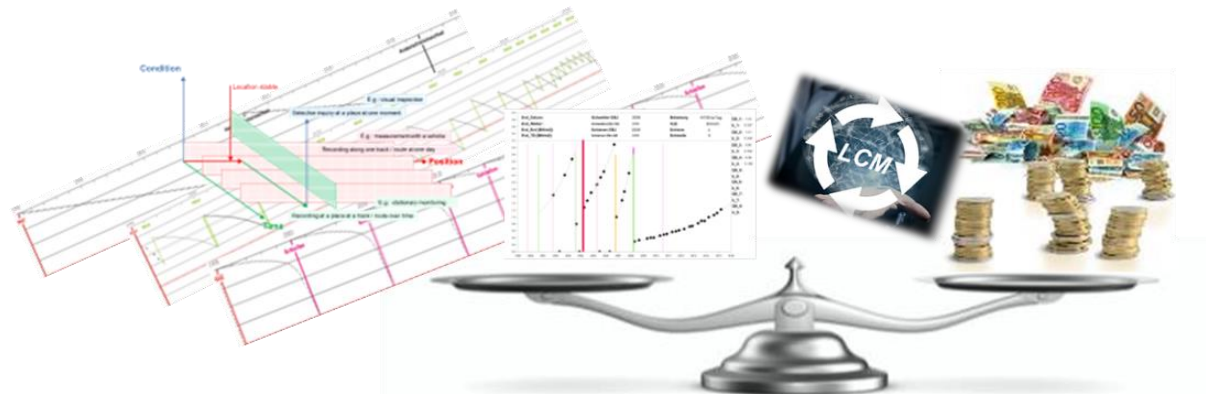


Other Assets



Technical risk based Life Cycle Engineering completed with railway-operation data to include costs of non-availability of the assets

Resulting in overall Life Cycle Cost based economic evaluations we receive the most sustainable asset management



LCM Asset Application & Data Warehouse

From Registration of Assets to LifeCycleManagement

*If we don't think many steps ahead, we won't
develop in the right direction!*

Georg Neuper | ÖBB-Infrastruktur AG
georg.neuper@oebb.at