Big Data in Railway Infrastructure

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RailTech® expert series

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Rhomberg Sersa Diagnostics

The Dream

The perfect railway infrastructure without the need of maintenance or renewal.

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The reality

Use the available money efficient on the right spots.

Maintain infrastructure forward-looking based on important factors as politics, timetable, type of trains, standards, …

Intensive usage of the infrastructure versus maintenance/renewal.

Actio = Reactio

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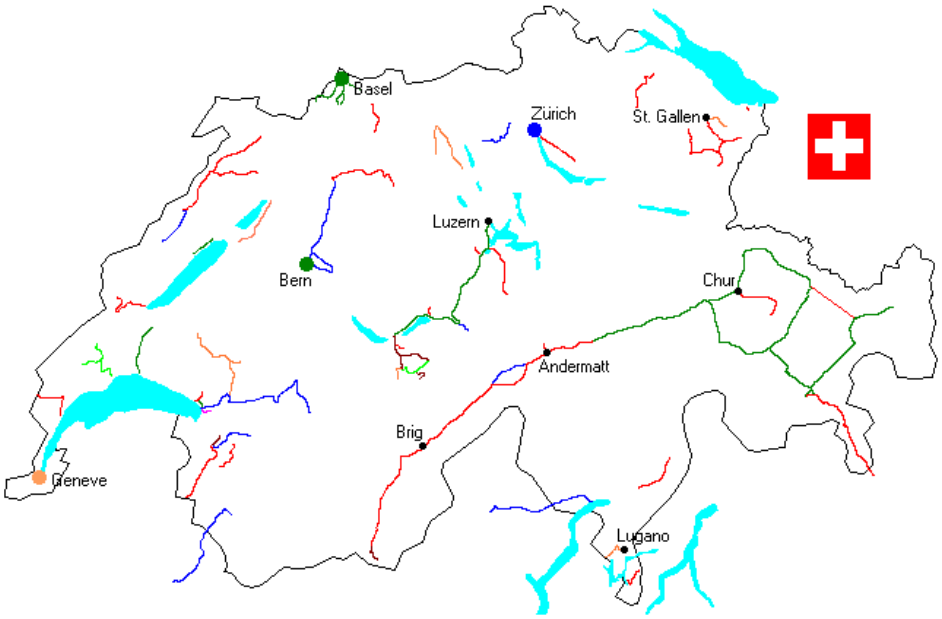
Our service

- Rhomberg Sersa runs a database for several customers (railways)
- The database is independent of measurement providers and systems
- We offer:
  - Instructions / Support
  - Execute measurings
  - Import and analysis of data
  - Create proposals and/or strategies for maintenance
  - Support railways for long term developement of infrastructure



> 50 railways narrow gauge
network of 1409 km
most railways isolated

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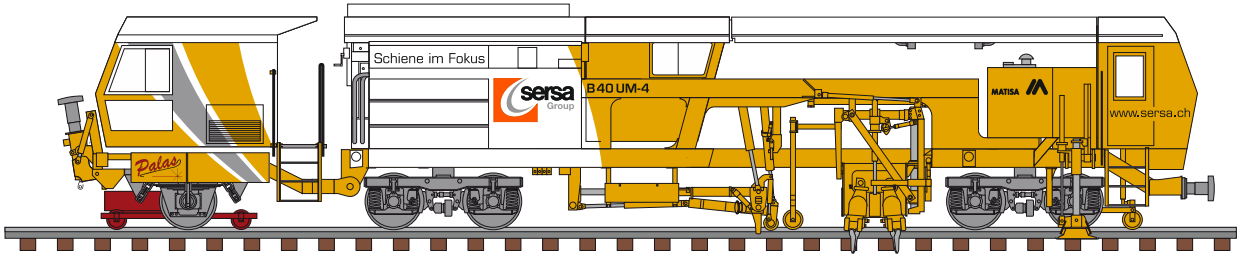
Production



- Rhomberg Sersa is able to execute measurements (tamping machine)
- Standard measured parameters:
  - geometry horizontal and vertical
  - crosslevel (cant)
  - twist
  - track gauge

- Expendable measured parameters (customer specific)
  - Fotos or videos of the route
  - Vertical and/or cross profile of the track
  - Rack-rail
  - Overhead line
  - Clearance

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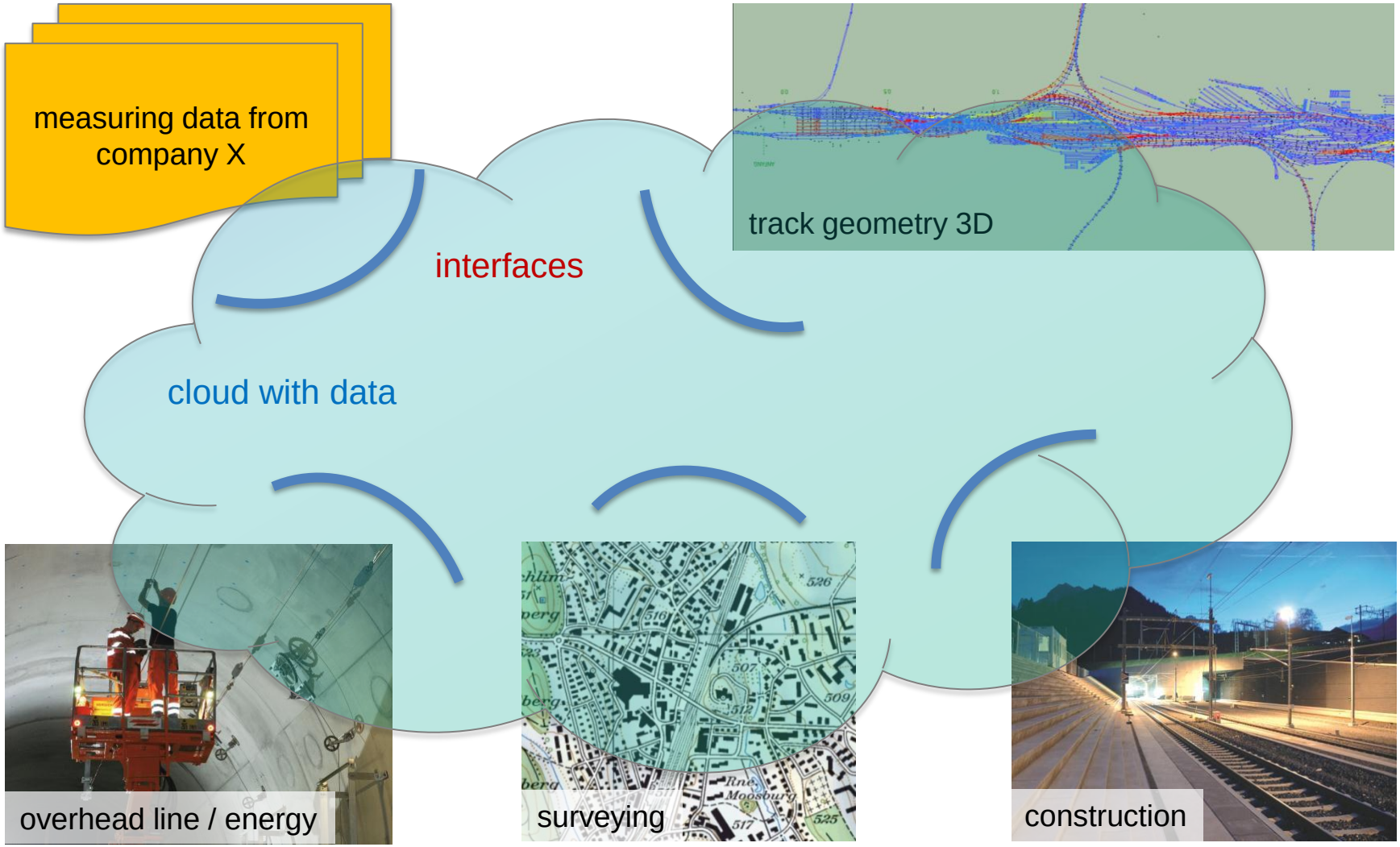
Interfaces



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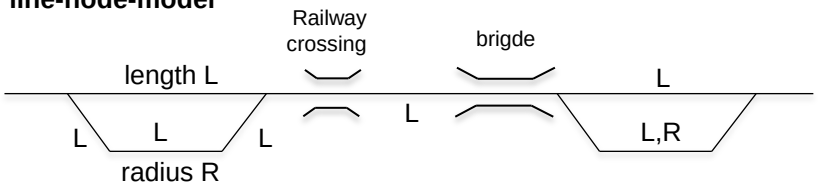
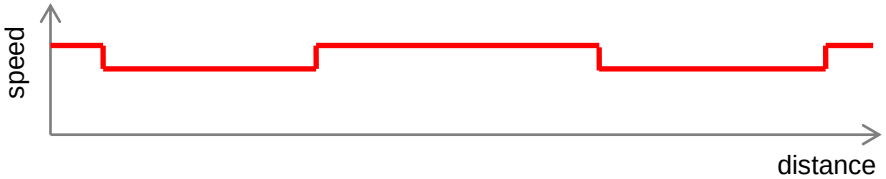
Geographic Information System GIS

track design (absolute geometry)

line-node-model

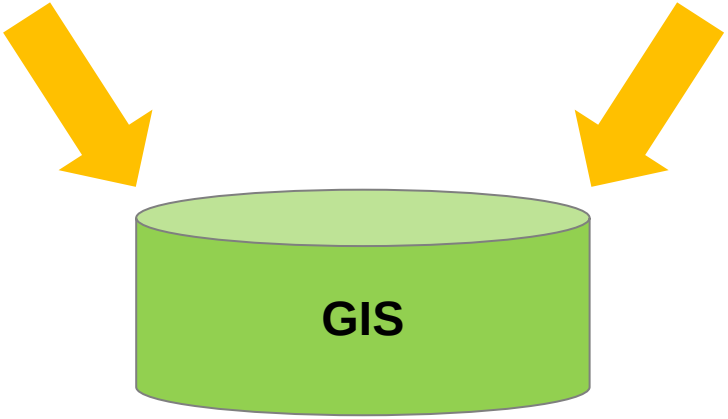


desing speed



additional infrastructure data

(tracks, sleepers, bridges, tunnels, fixed points, …)



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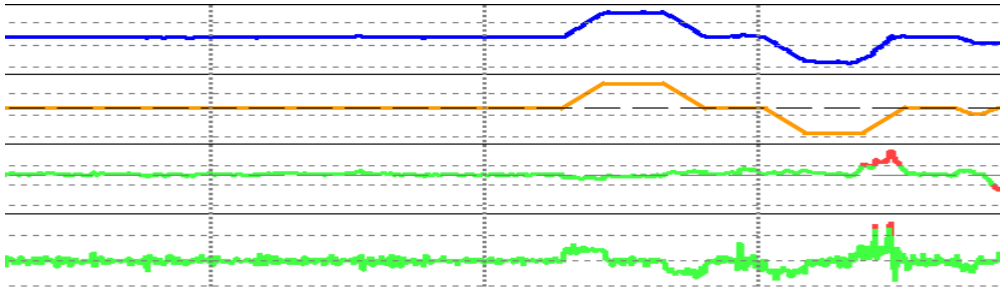
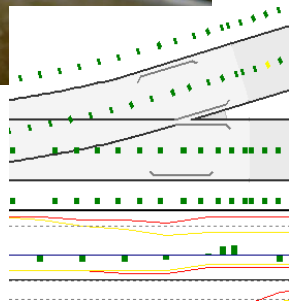
Measuring Database MD

measuring data (measuring vehicle)



inspection of infrastructure (bridges, tunnels, …)



Measuring Database

MD

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image data and virtual inspection

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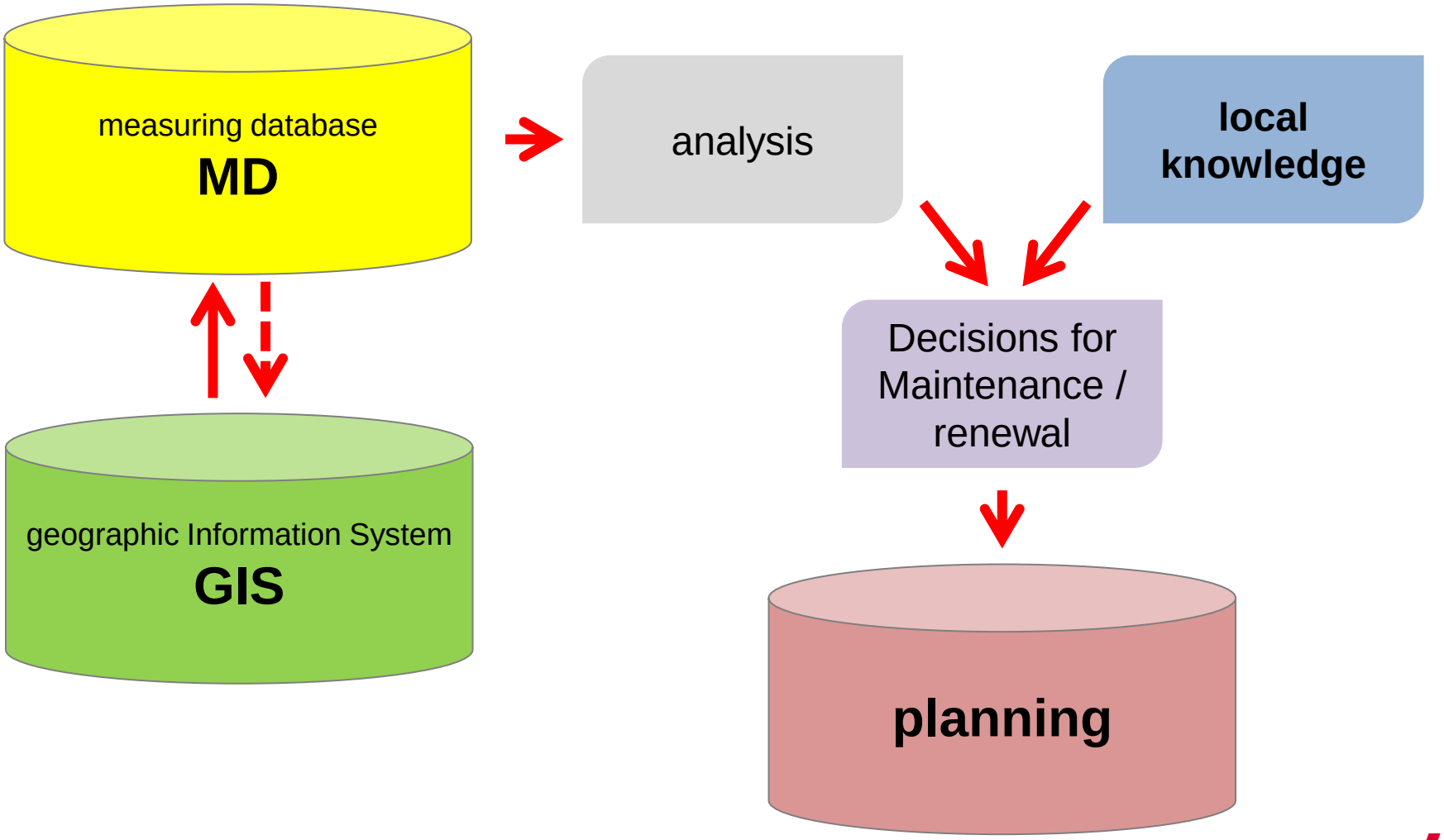
Analysis and planning



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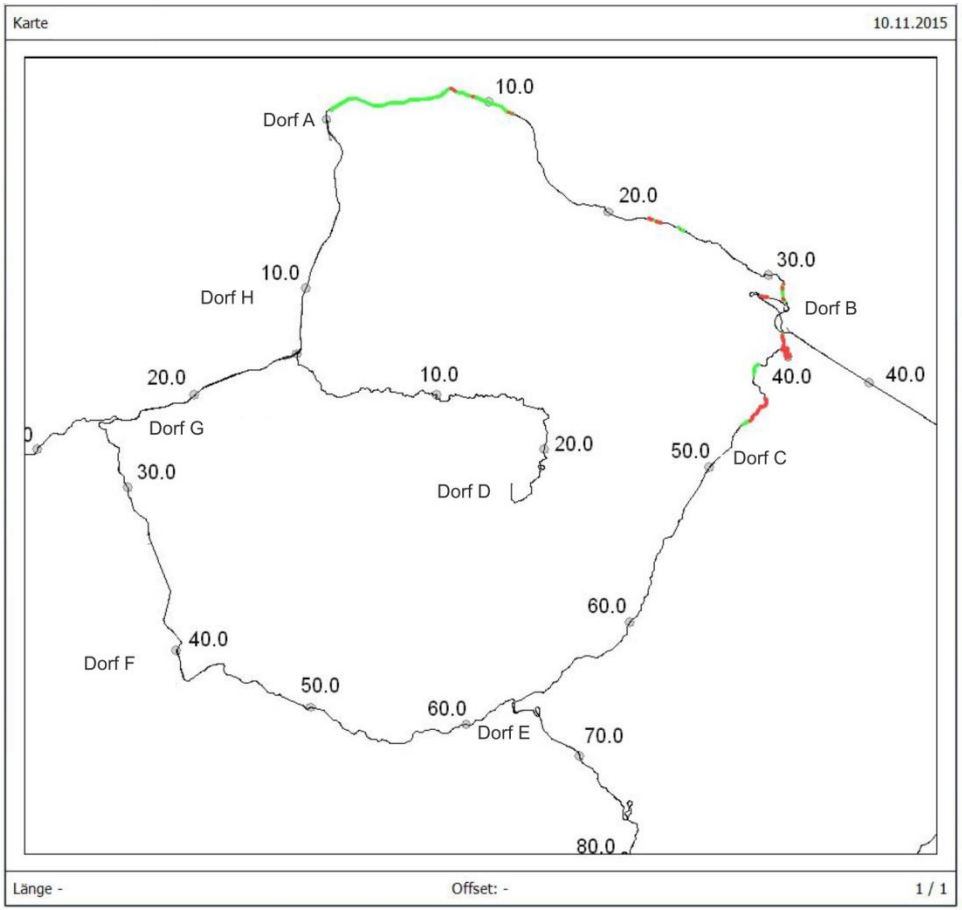
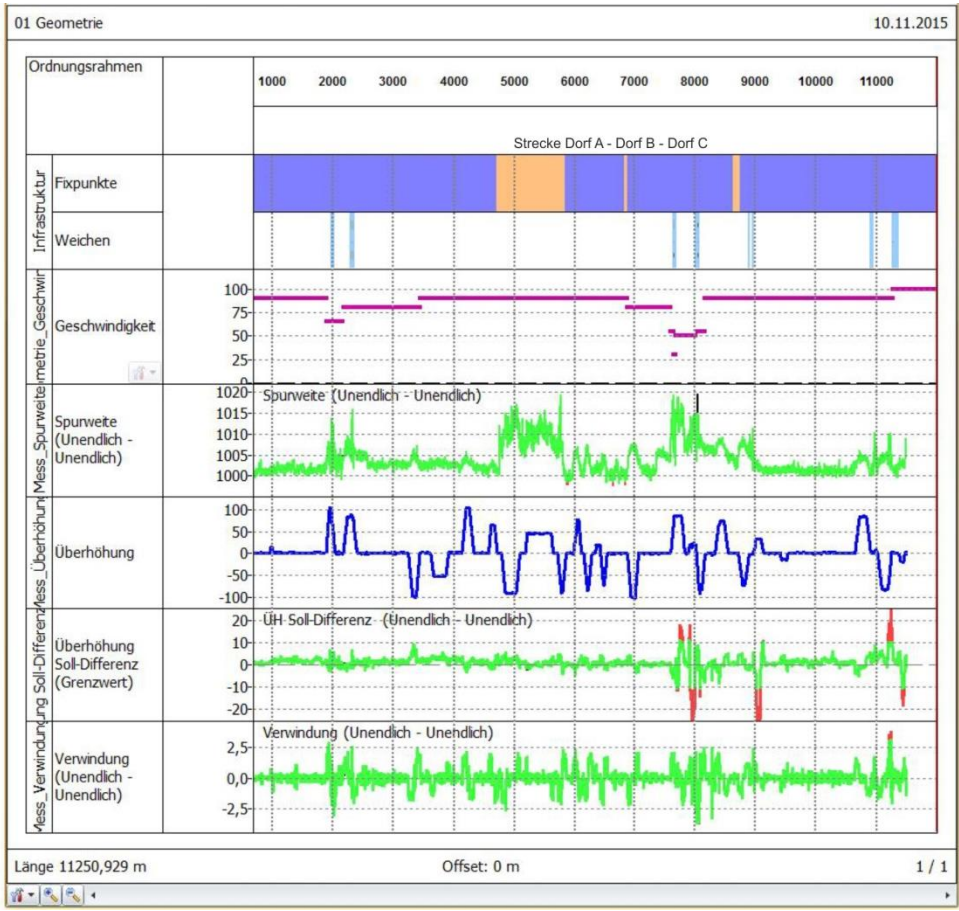
Measuring Database: Map and diagrams





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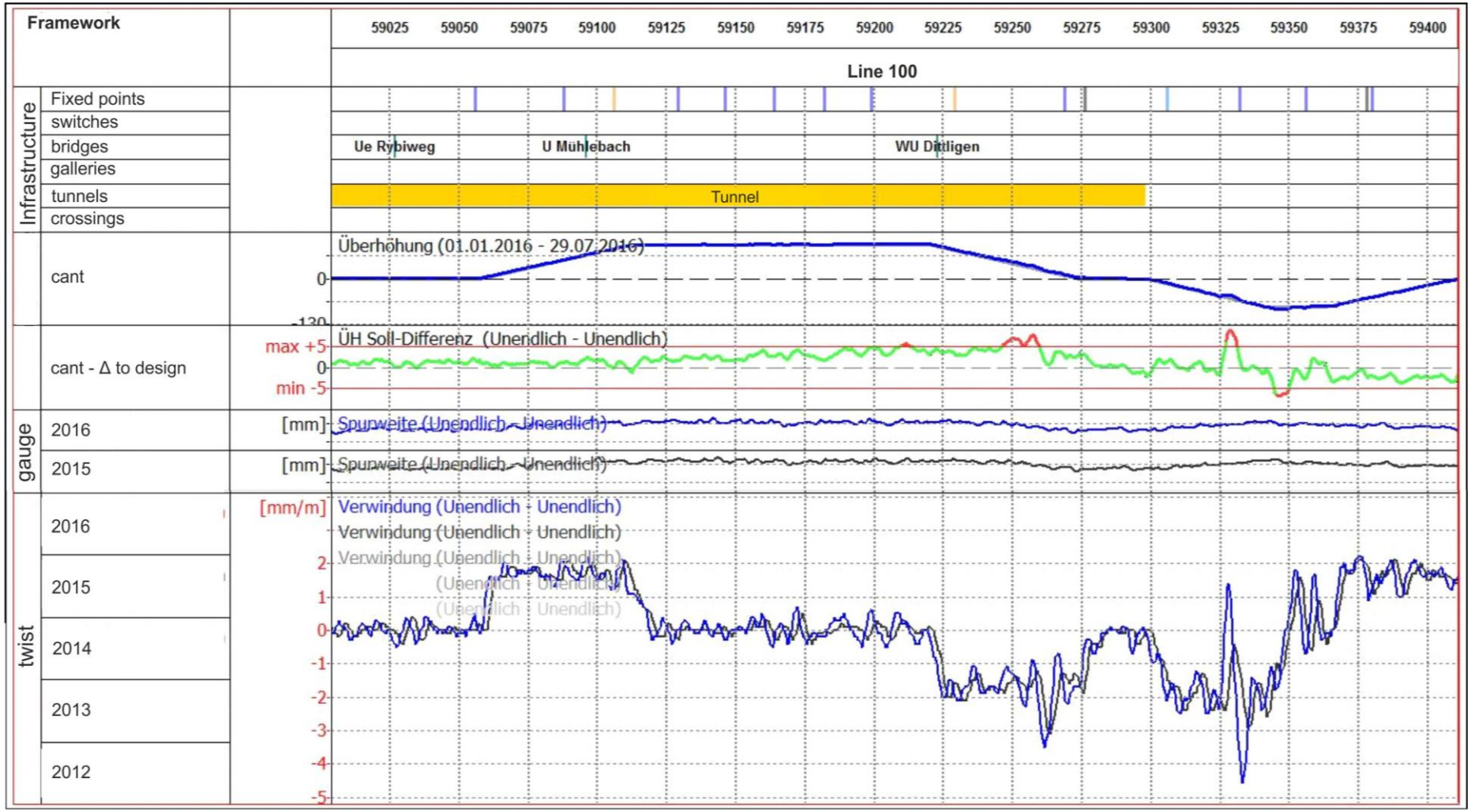
Comparison of historical data



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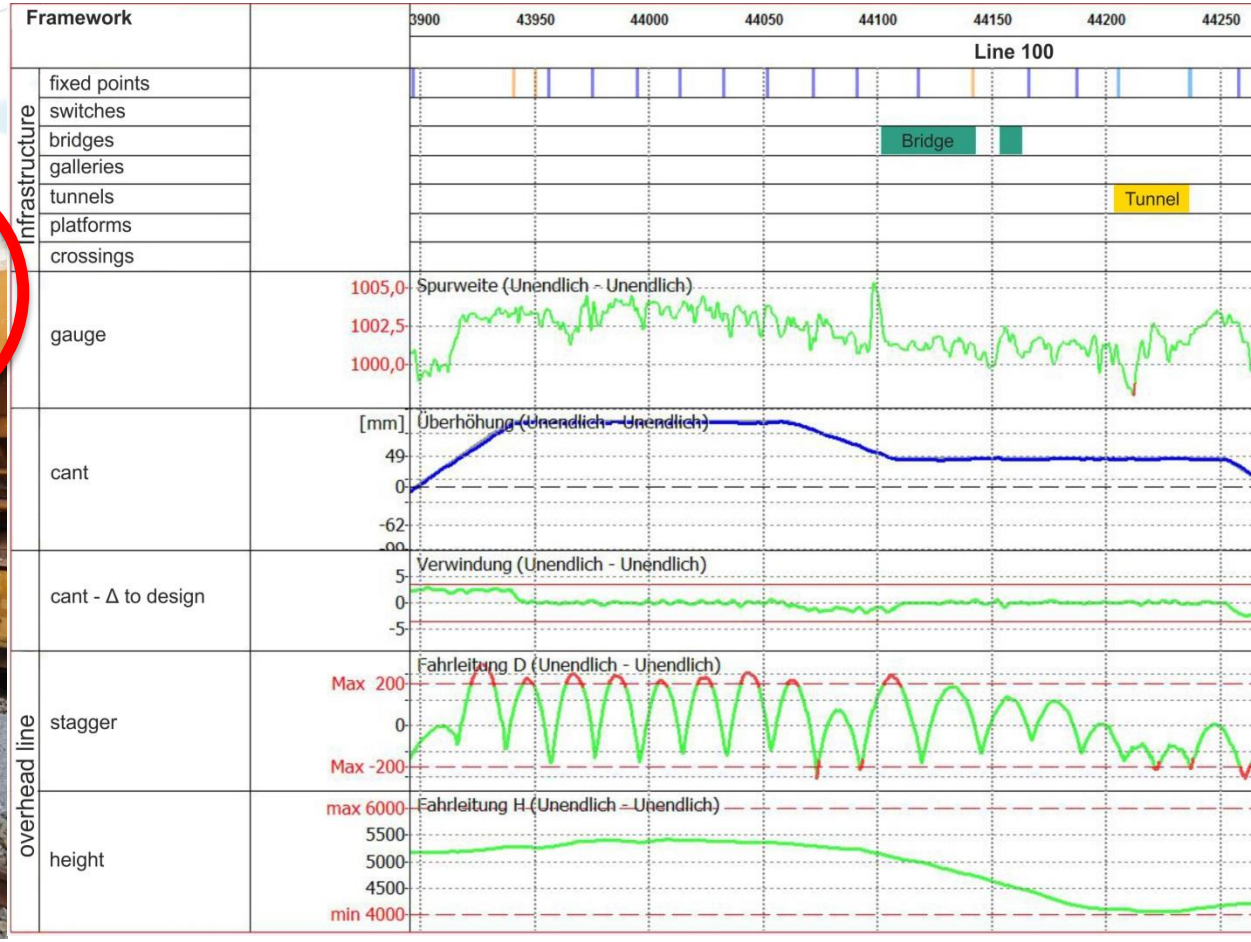
Overhead line measurements (stagger, height)



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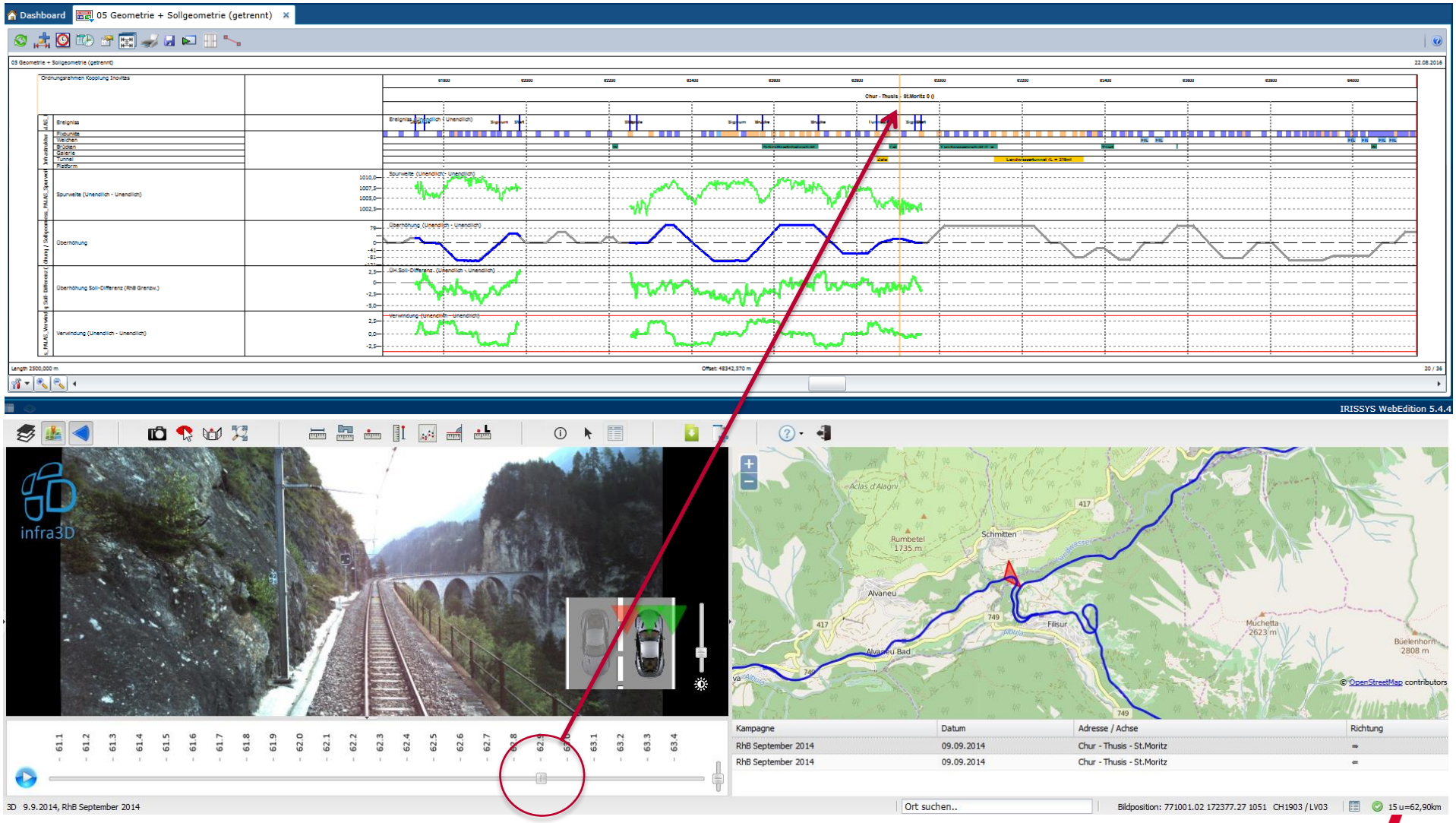
Interfaces to third parties (iNovitas infra3DRail)



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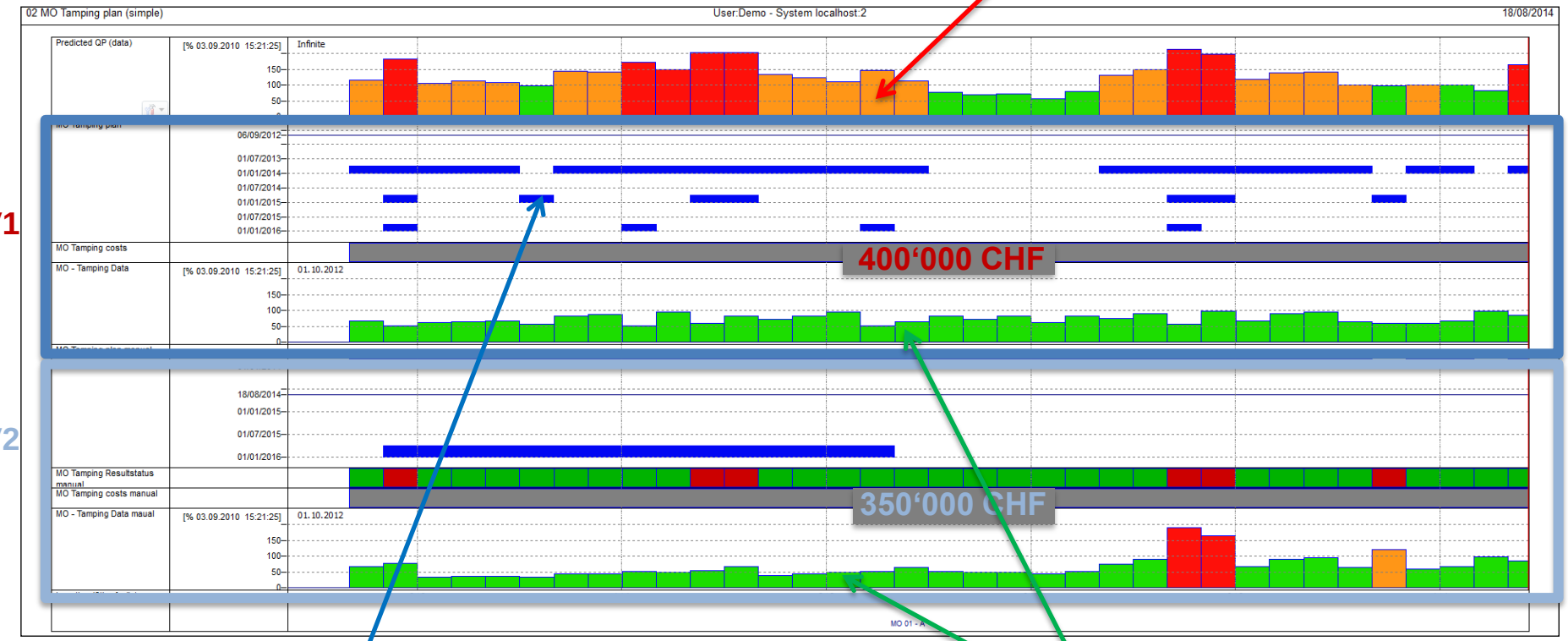
Evaluate different maintenance strategies

Current standard deviation of a specific section



V1

V2

maintenance (tamping) for next 4 years to improve quality of section

Standard deviation after 4 years (forecast)

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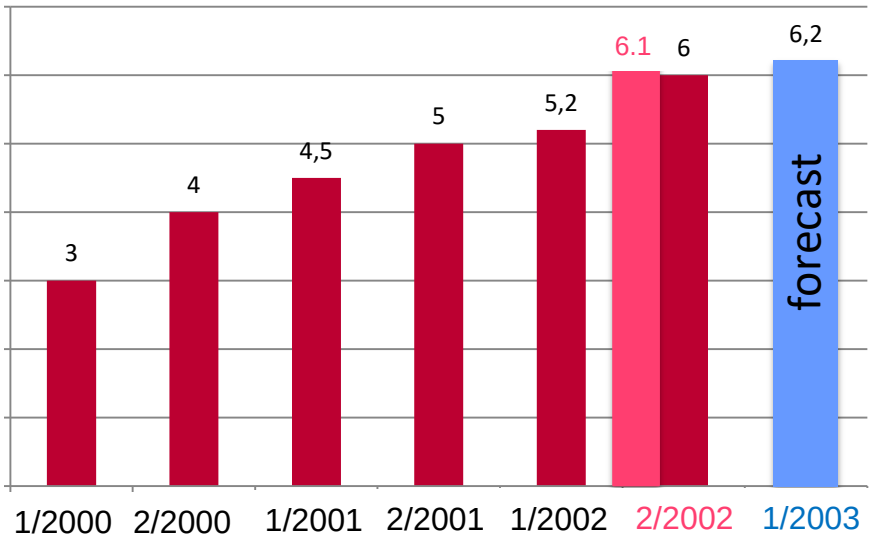
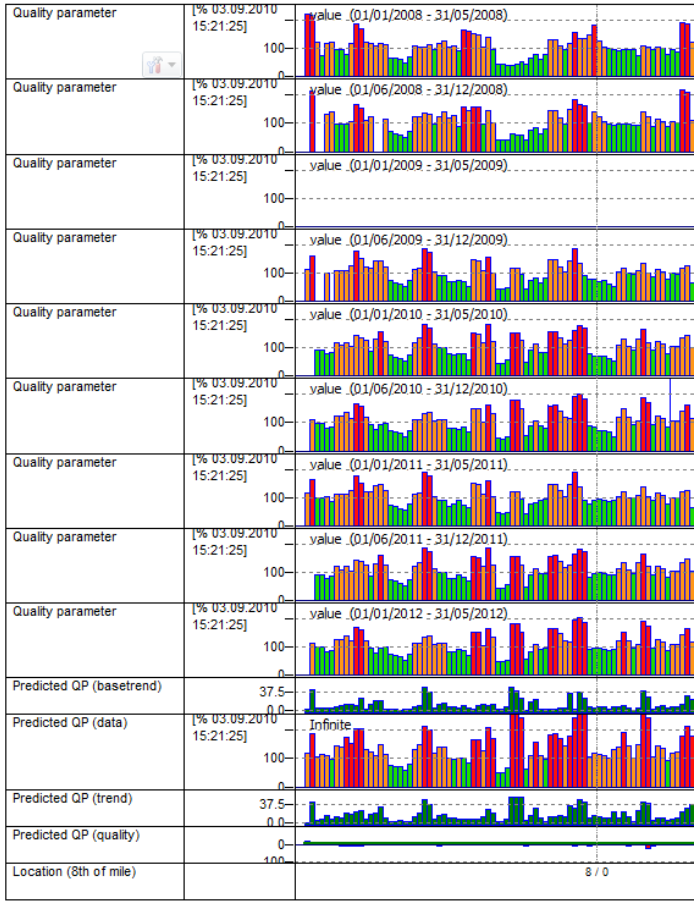
Forecast





1. Predict value 6 out of 5 measures and compare value 6 with the measured value 6

2. If the difference between measured and predicted value 6 is small enough: → Predict value 7

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From big to smart data

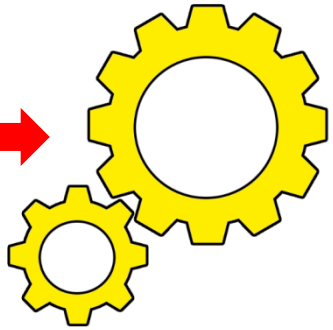
Big Data

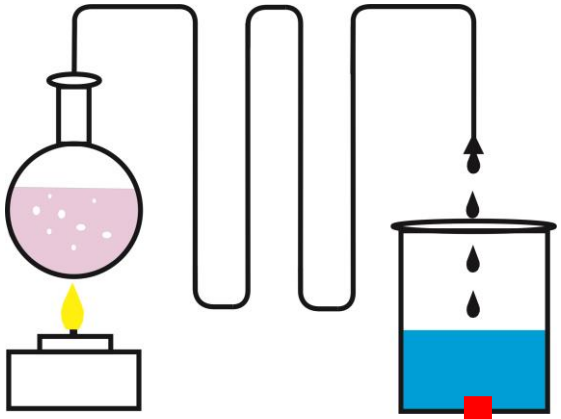
0 1 0 0 1 0 0 1 0 0 0 1 1
0 1 0 0 1 0 0 1 0 0
0 1 0 0 1 0 01

„Intelligent Data Reduction“

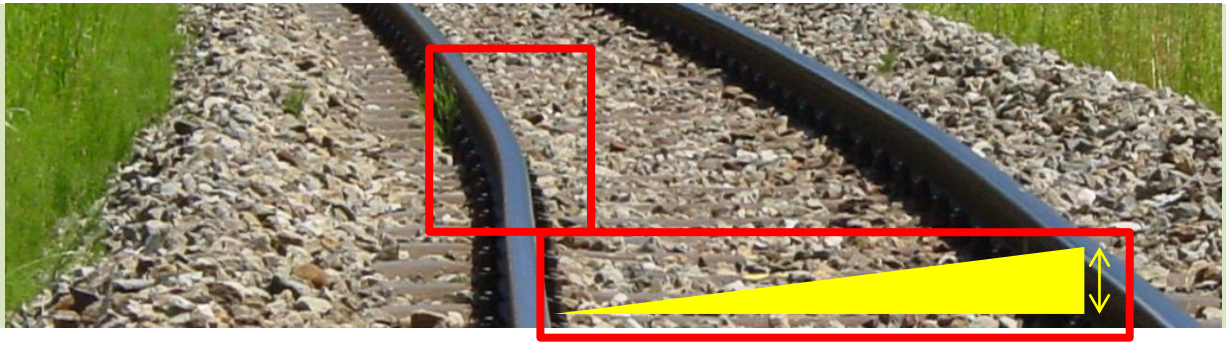
$0^{1^{0}}$ $0^{1^{1}}$ $1^{1^{0}}$

1 1 1





Smart Data



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Combination of errors

description	status
track speed high	no
gauge too small	no
twist out of limit	**yes**

action ⇨ inspection

description	status
track speed high	yes
gauge too small	**yes**
twist out of limit	**yes**

action ⇨ immediate repair

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Conclusion

- digital data are the key for railway infrastructure
- design of the data warehouse is mission criticial
- collecting data is not very difficult today
- getting smart data needs clever concepts
- development in this topic never stops

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MERCI
THANK YOU
GRACIAS
DANKE

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