OPTRAM
Looking into the Future

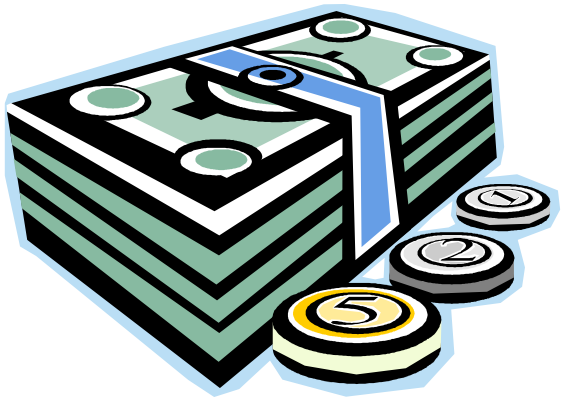
Bentley
Sustaining

Universal Truisms of Rail

Too much of:

Infrastructure Problems

Not Enough of:



Maintenance Budget

Highest Priority Issues

How Do You:

1) **Know where to work**
2) **Know what work to do**
3) **Prioritize work**
4) **Monitor work progress, costing and material**
5) **Extend asset life whilst avoiding run to fail**
6) **Demonstrate competence to operate**
7) ***Improve safety, reliability and Return on Investment***

Integration

Collect ***Interpret*** ***Analyze*** ***Disseminate***

Condition

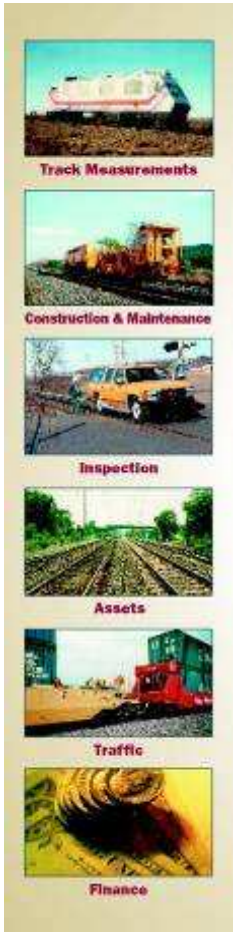
Work

Inspection

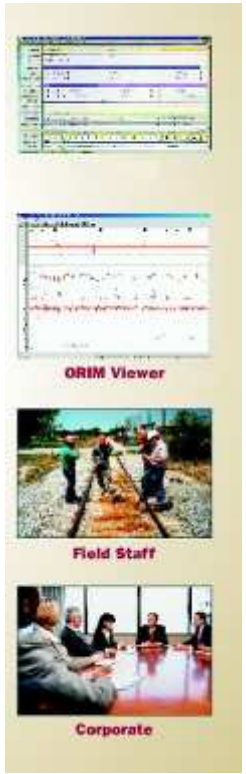
Equipment Location & Video

Usage

Finance



Optram



Workstation

Web (Java)

Handheld/ Tablet

Reporting

3rd party software:
EAM, Google, GIS, Etc.

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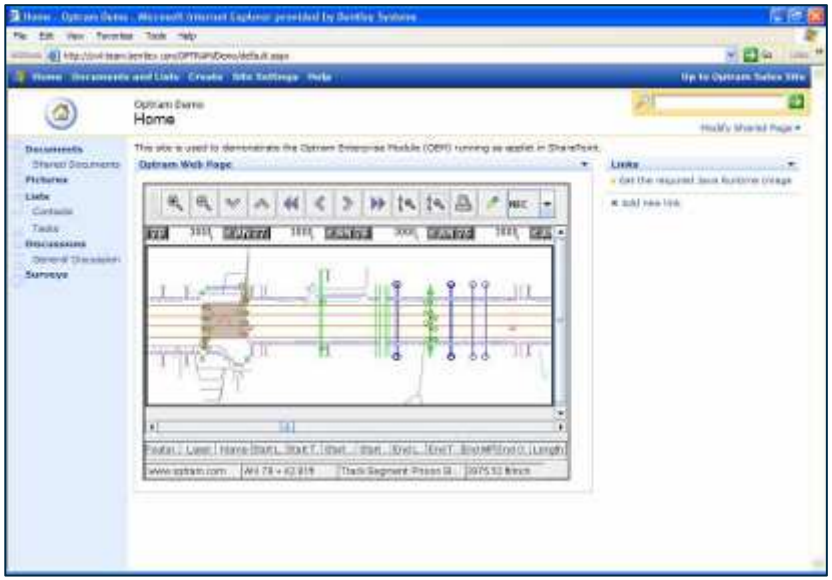
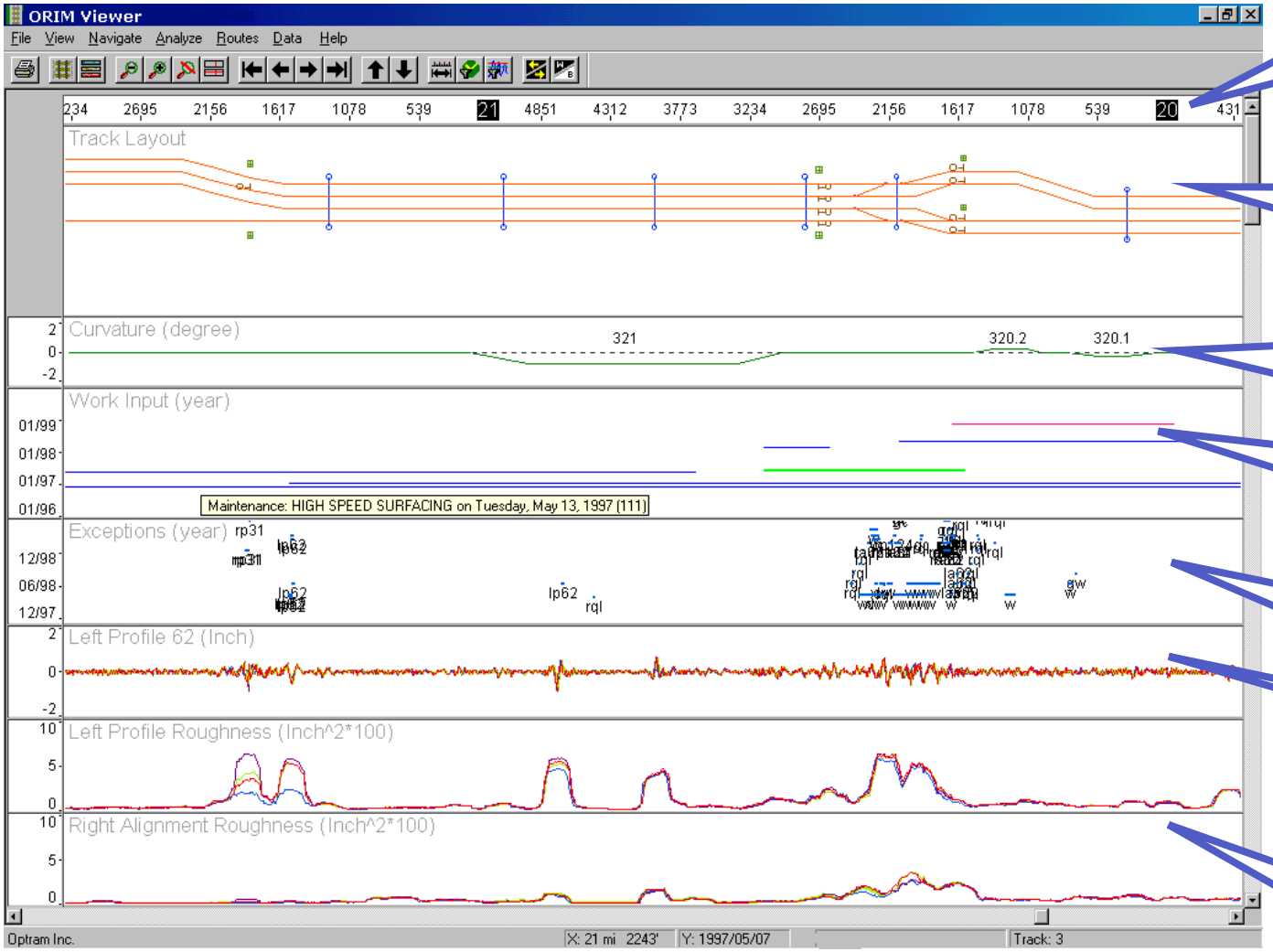
Vizualization

- Enterprise or departmental solution
- Present decision support information
- Unified view of infrastructure data such as:
  - Track layout
  - Asset information
  - Corridor assets
  - Work items
  - Condition data



Sample Optram Screen



Mile/KM Post

Track Layout

Designed & Measured Curve

Work History

Defect History

Geometry History

Roughness History

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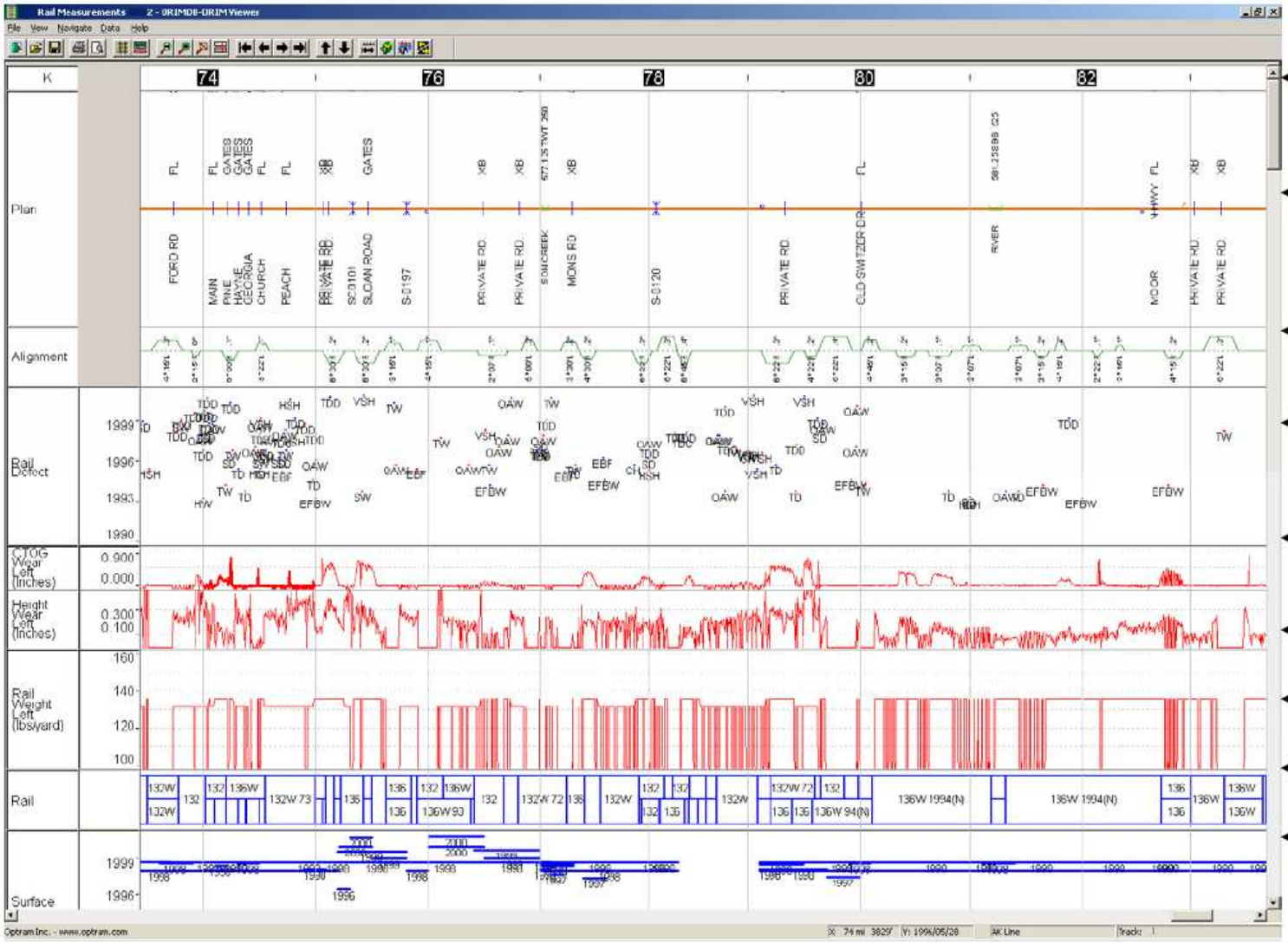


Milepost

Track Layout

Alignment

Rail Defects

CTOG Wear

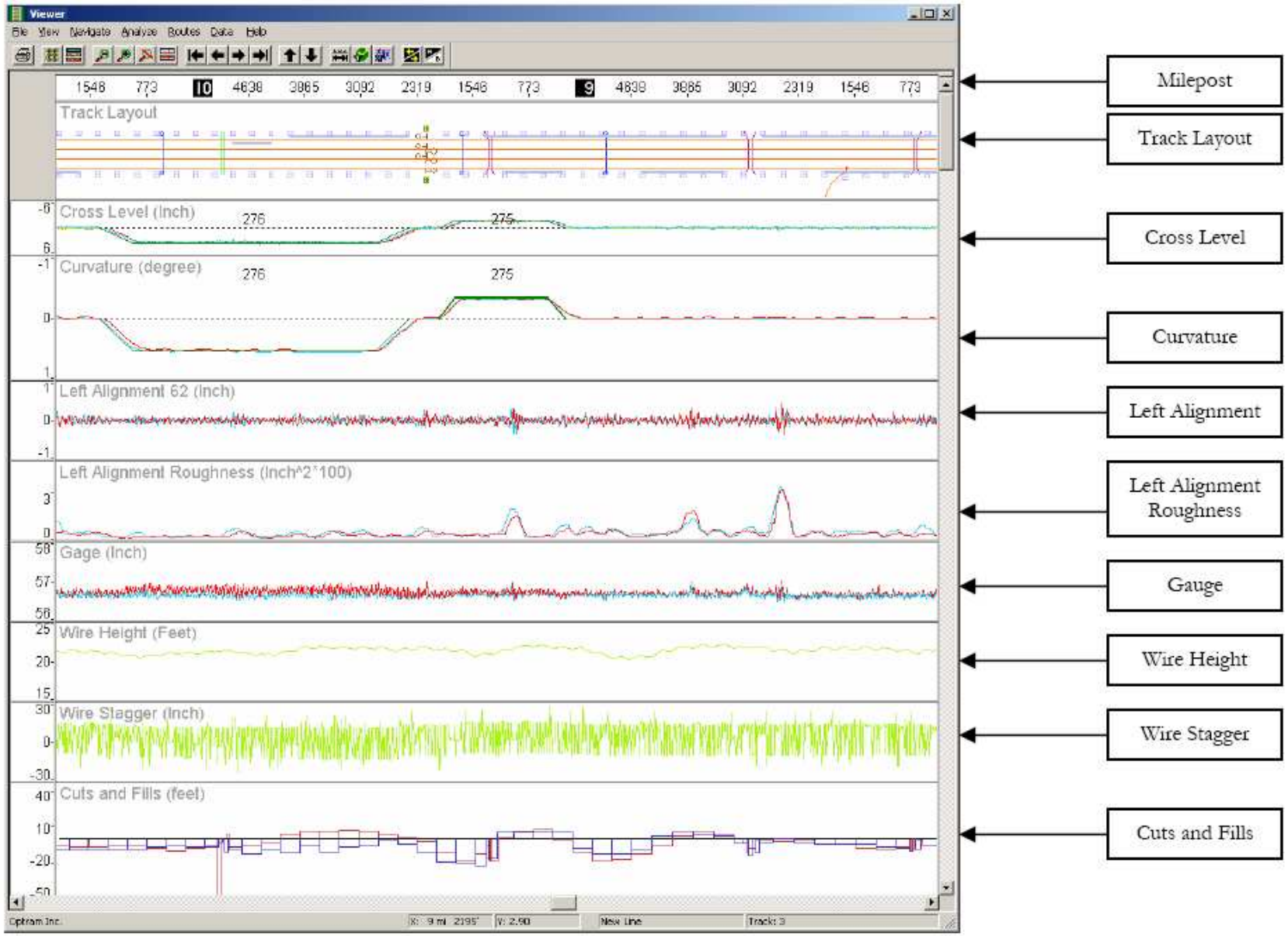
Height Wear

Rail Weight

Rail

Surfacing

Rail Geometry



Track Geometry with Roughness and OLE

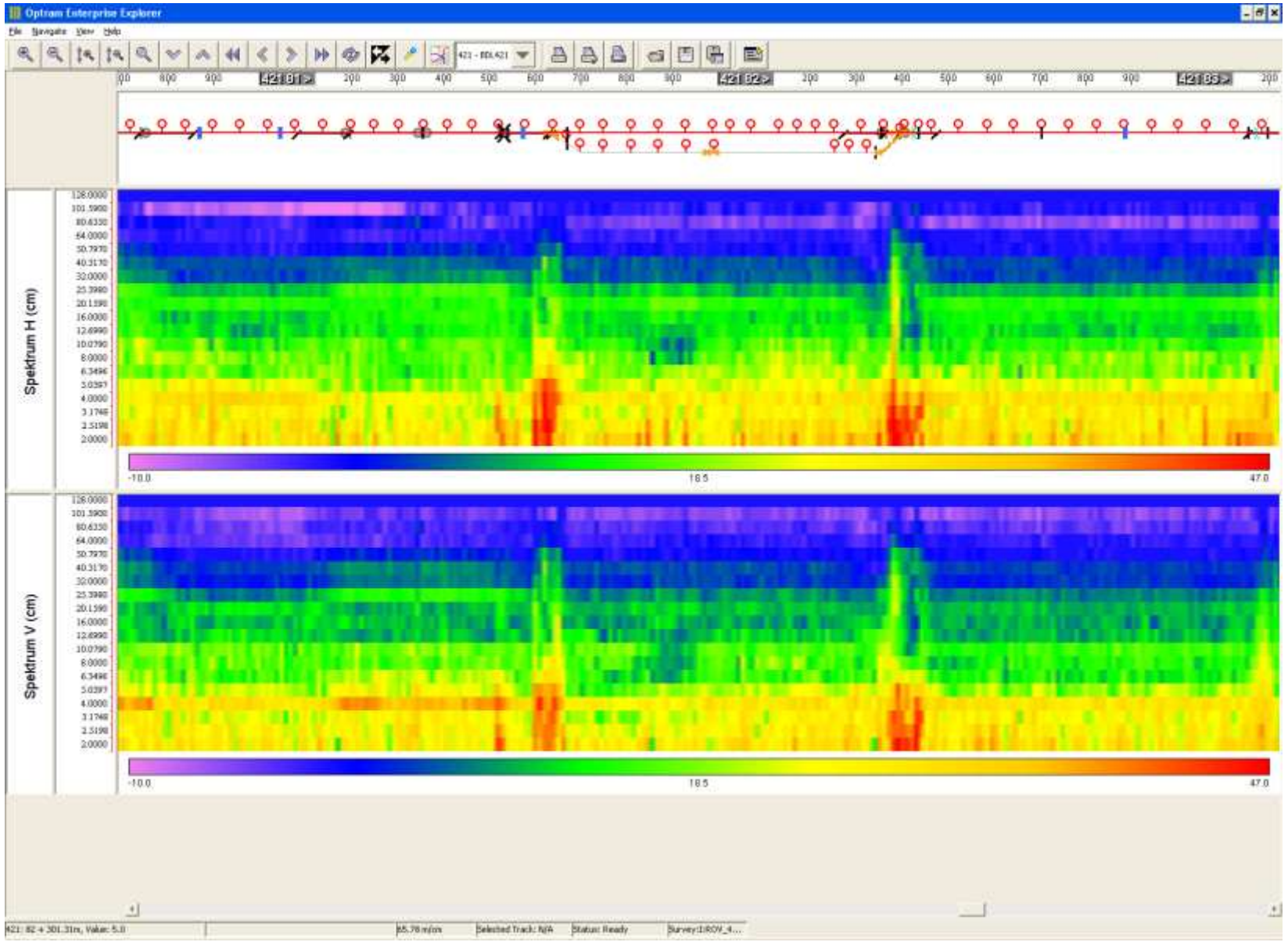
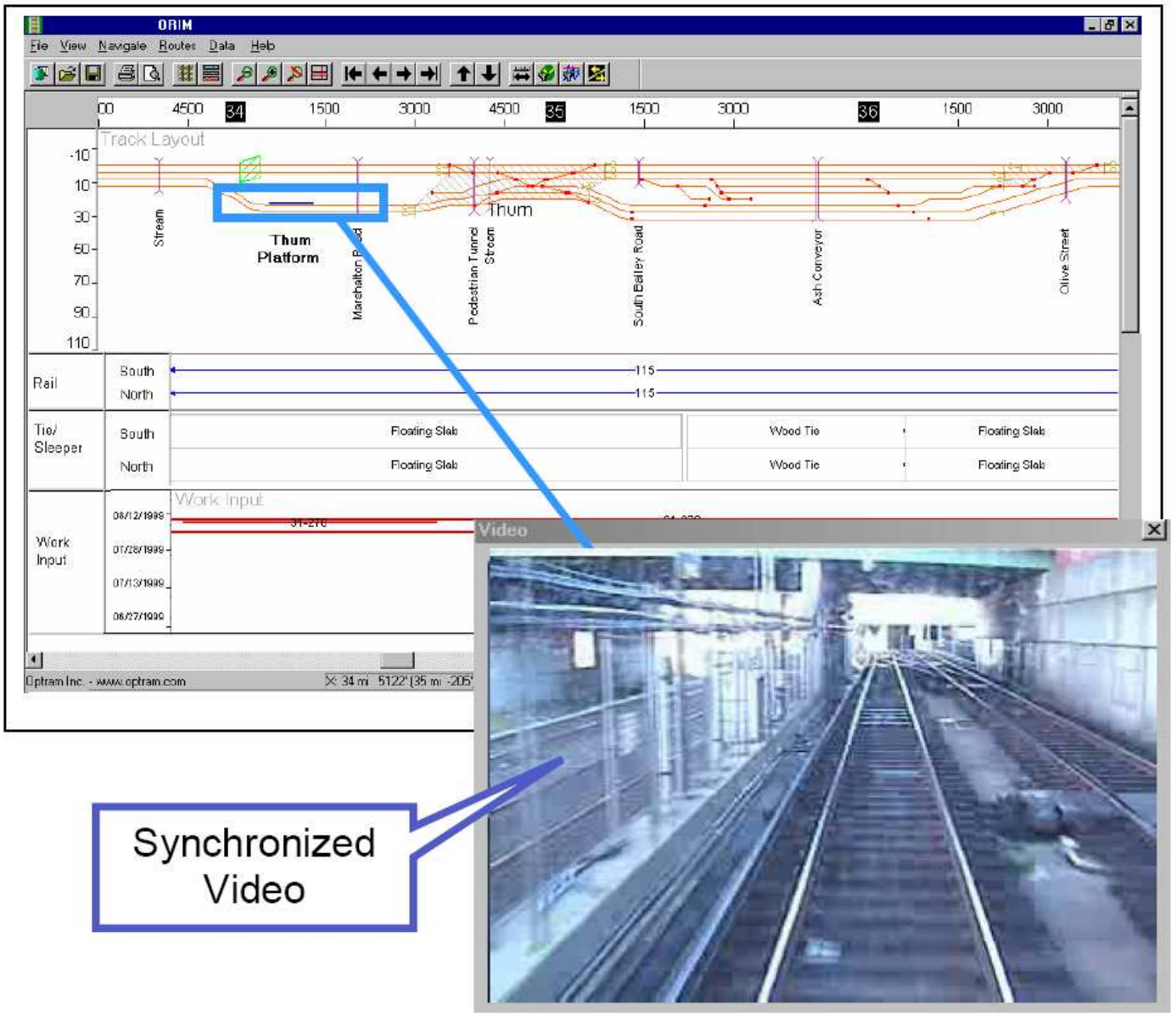
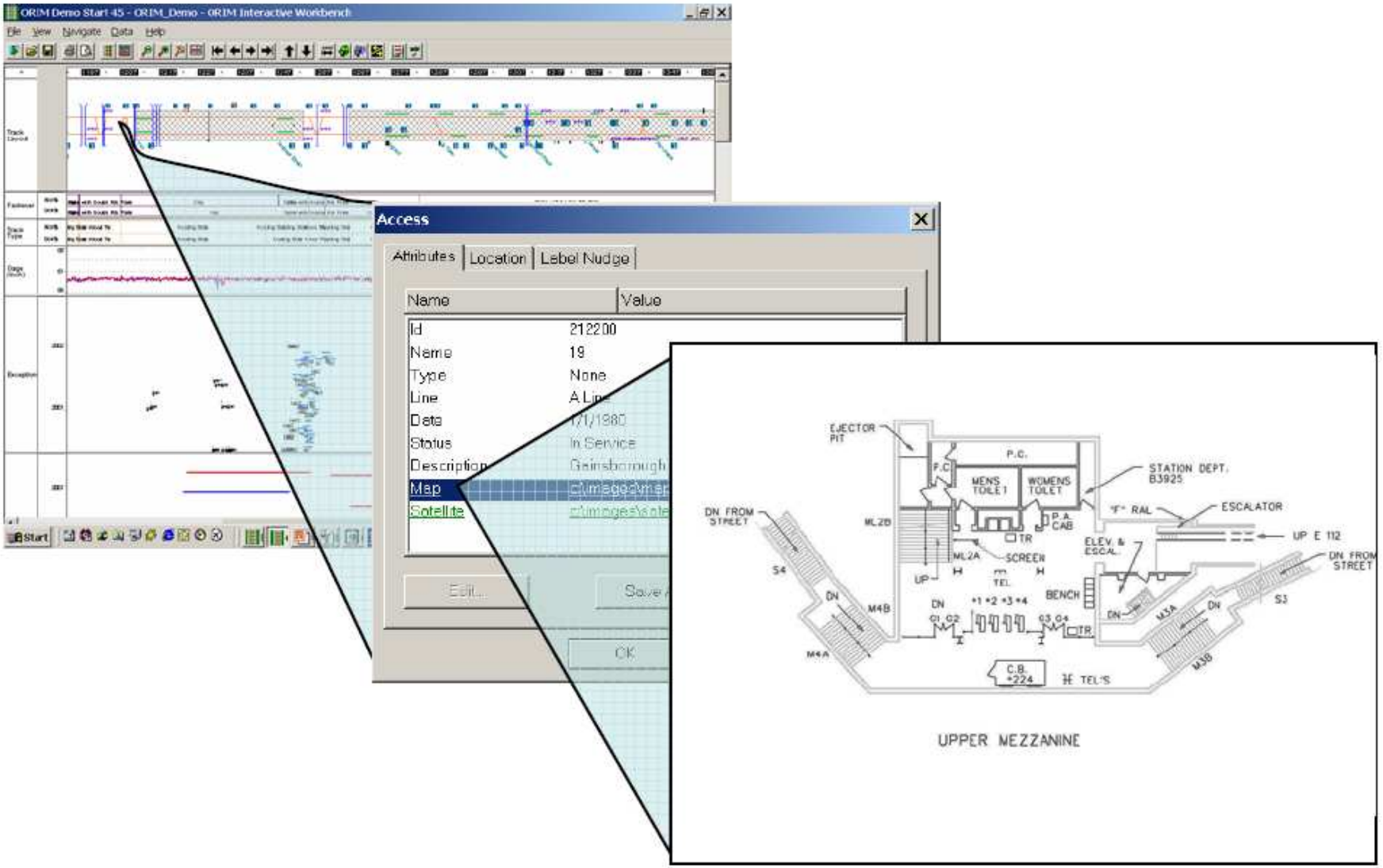


Image Plot



Video Synchronisation



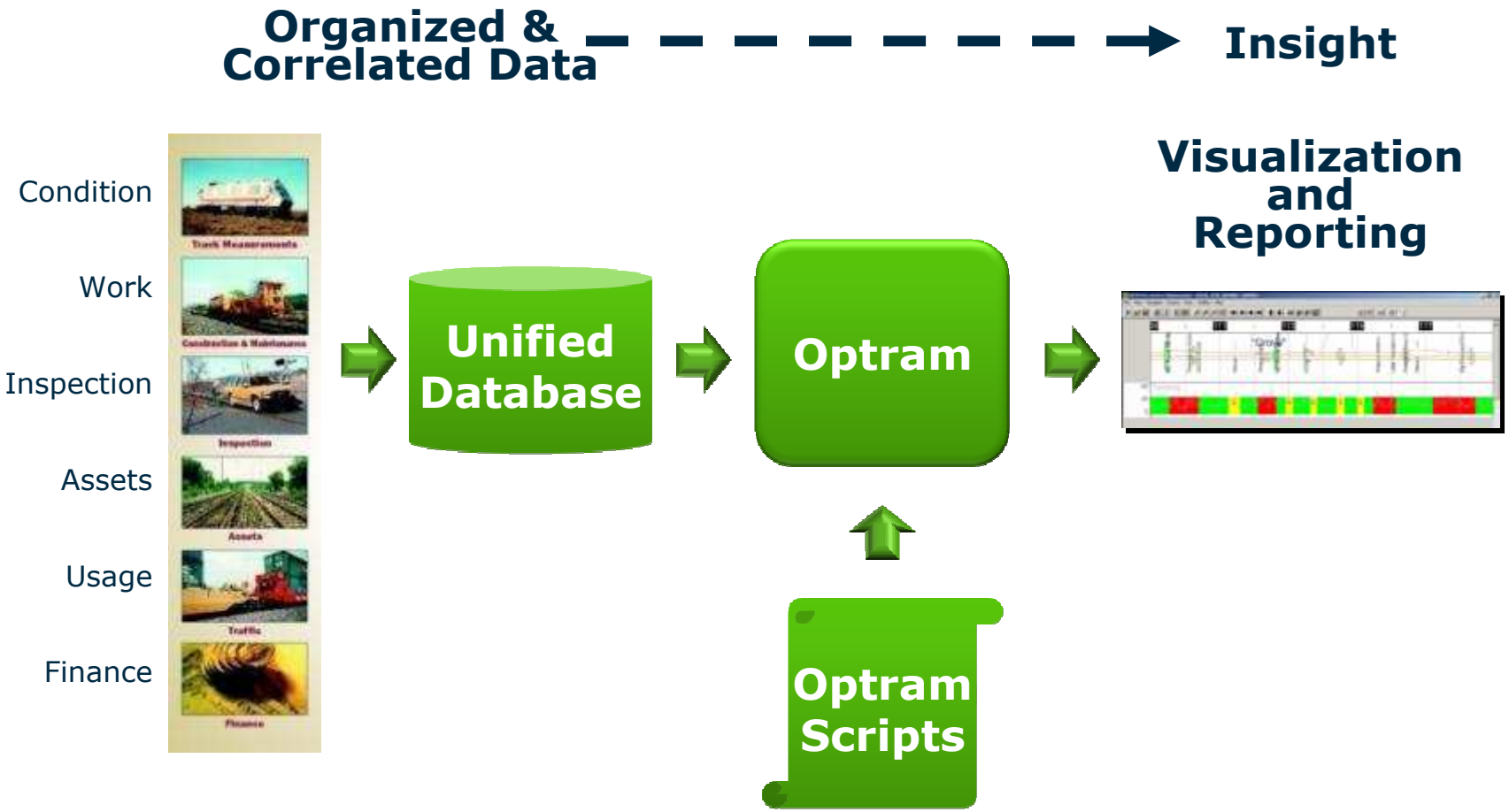
Links to Documents and Drawings

Looking into the Future
Analysis and Forecasting

An analytic engine built to *automatically* turn large amounts of railway data into prioritized actions like:

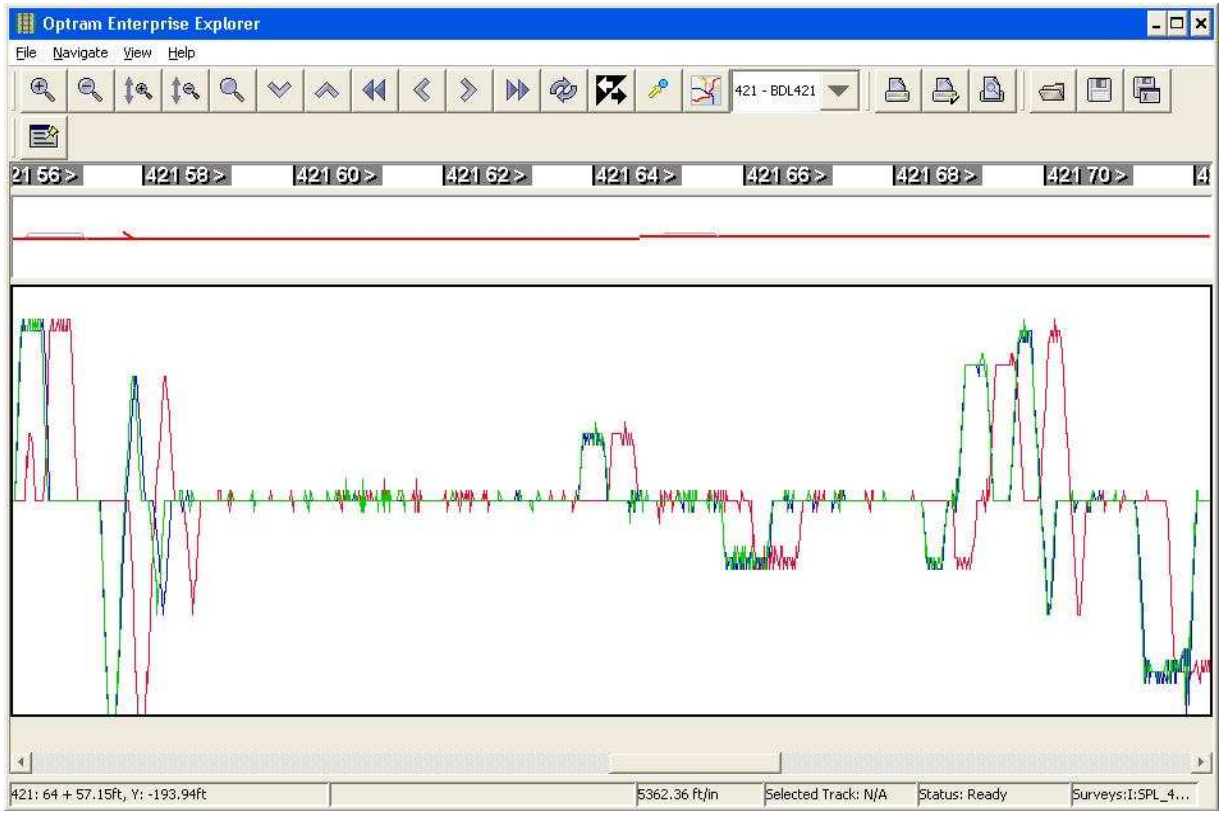
- Prioritize and plan work
- Identify areas of rapid deterioration or instable condition
- Evaluate work effectiveness
- Calculate quantitative measures of condition
- Do preventive maintenance by predicting failures
- Plan quarterly/monthly instead of annually
- Forecast when conditions will go out of tolerance

Optram Analysis and Forecasting



Measurement Alignment

- Automatic



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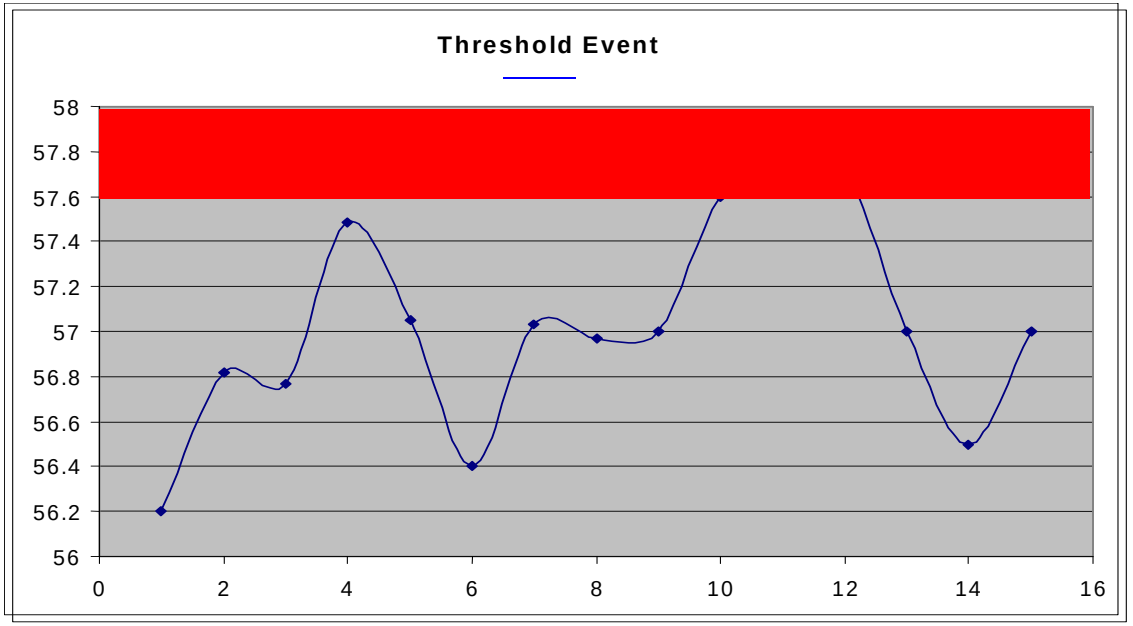
Measurement Thresholds

- Create event list based on threshold values in measurement data
- Output – event data



Track Tolerance

- Use look up tables for defect thresholds for different track types
- Tables held in database
- Works on event sets

If track type = Class 1 then Gauge Threshold >57.6

If track type = Class 2 then Gauge Threshold >57.2

If track type = Class 3 then Gauge Threshold >56.8

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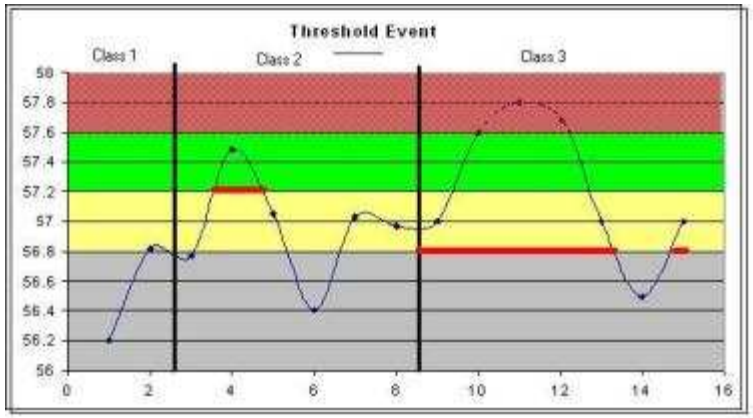
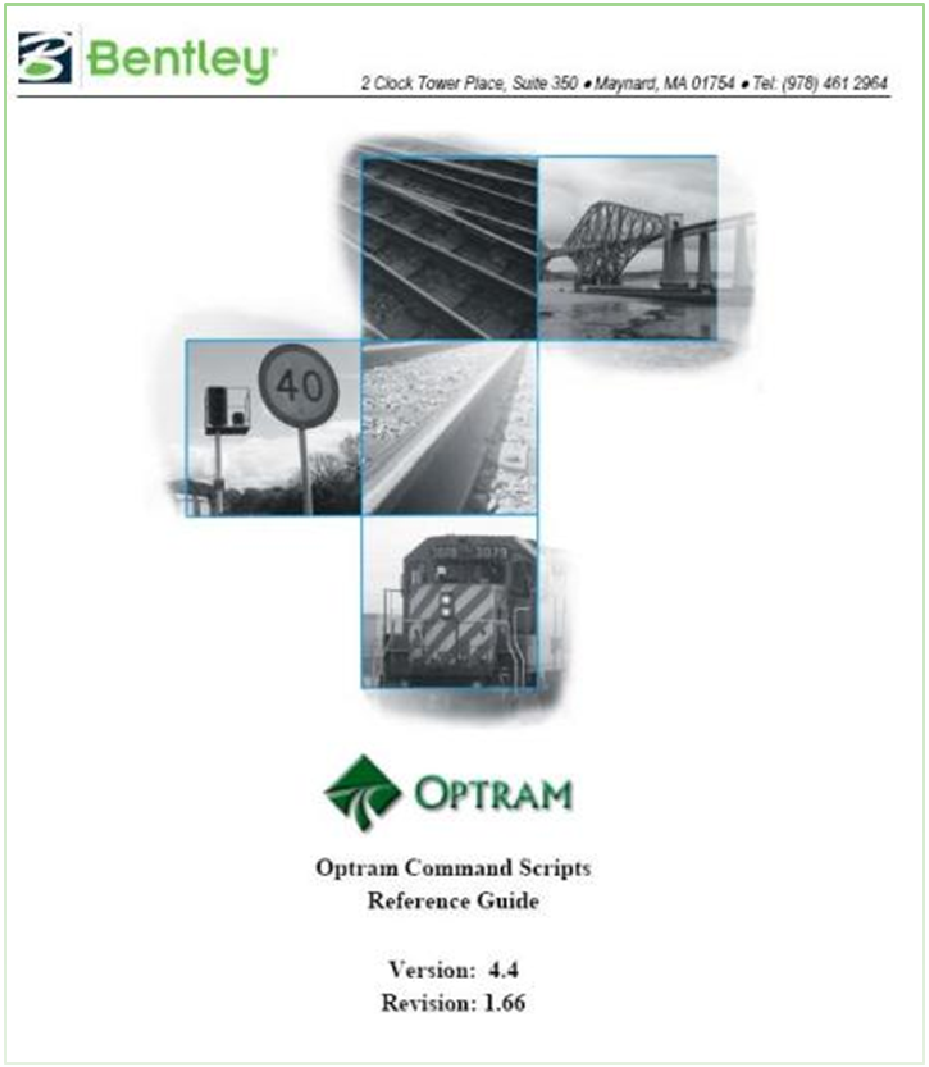


Script Commands



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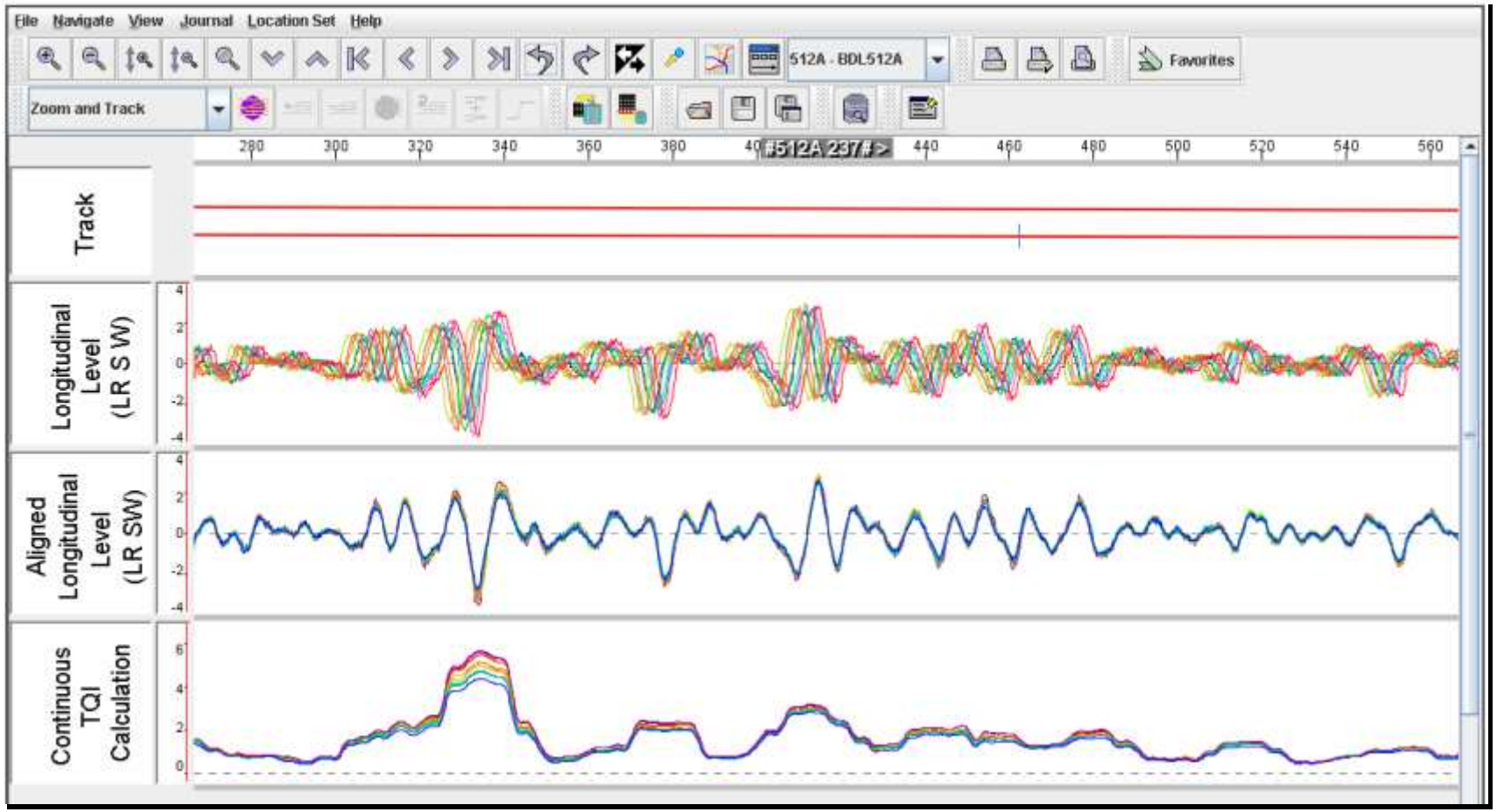
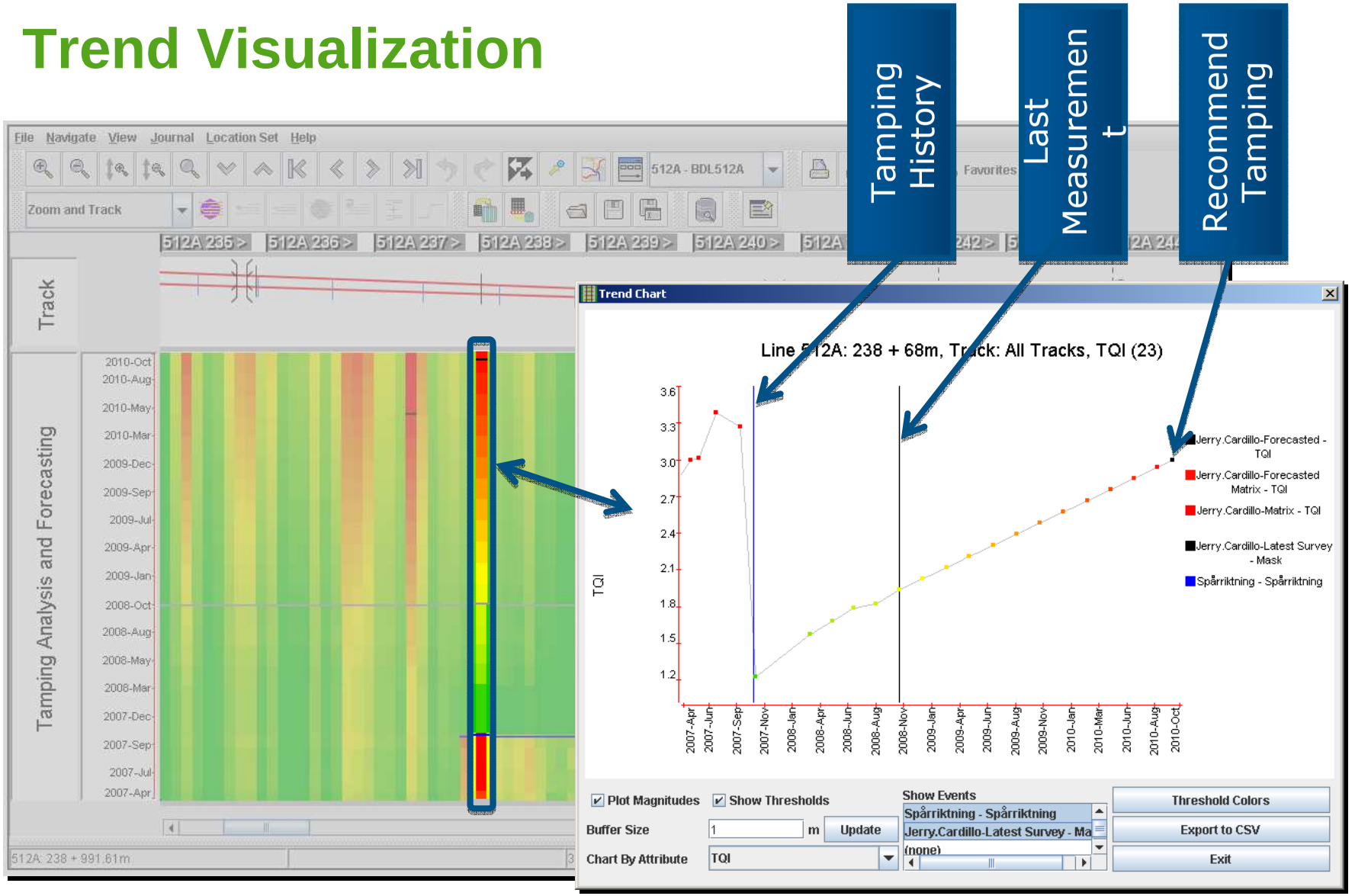
Example: Forecast Tamping

- Forecasts where and when tamping required
- Optram automates 4 steps:
  - Aligns track measurements
  - Calculates historic quality indexes every 100m
  - Extrapolates when tamping is required
  - Presents results graphically
- Makes prediction over large railways practical

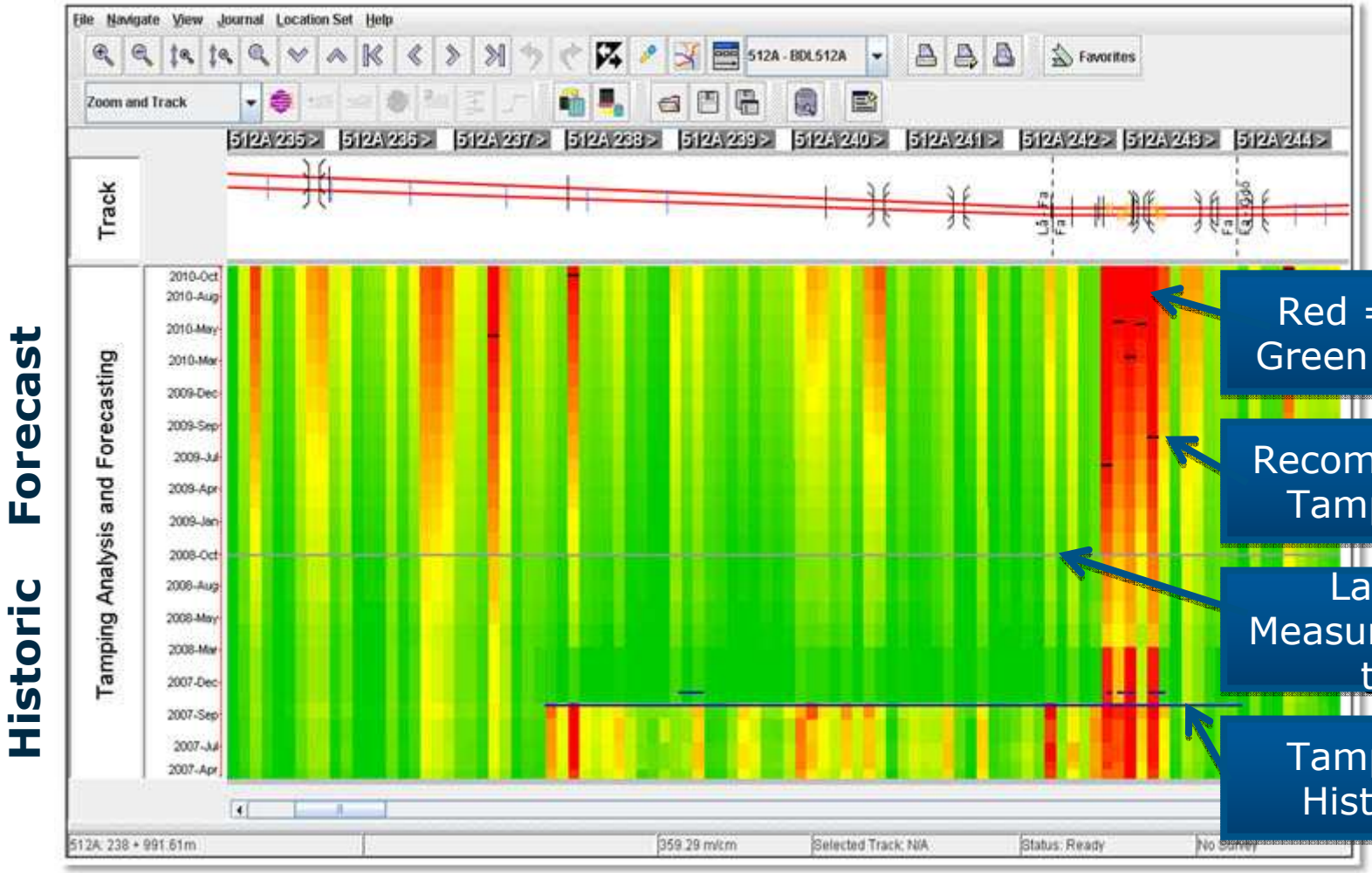
Aligns Track Measurements



Trend Visualization



Forecast Visualization



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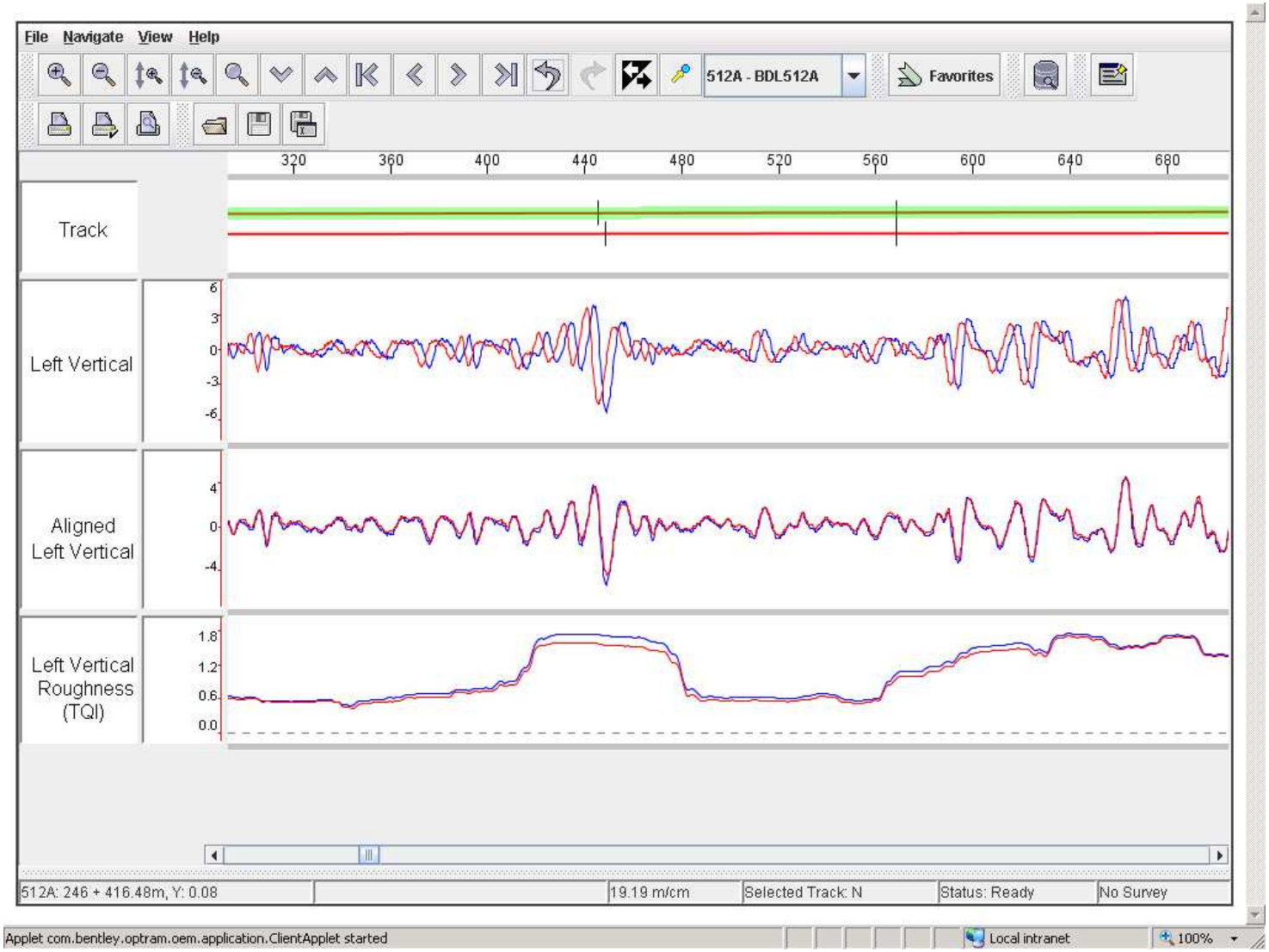
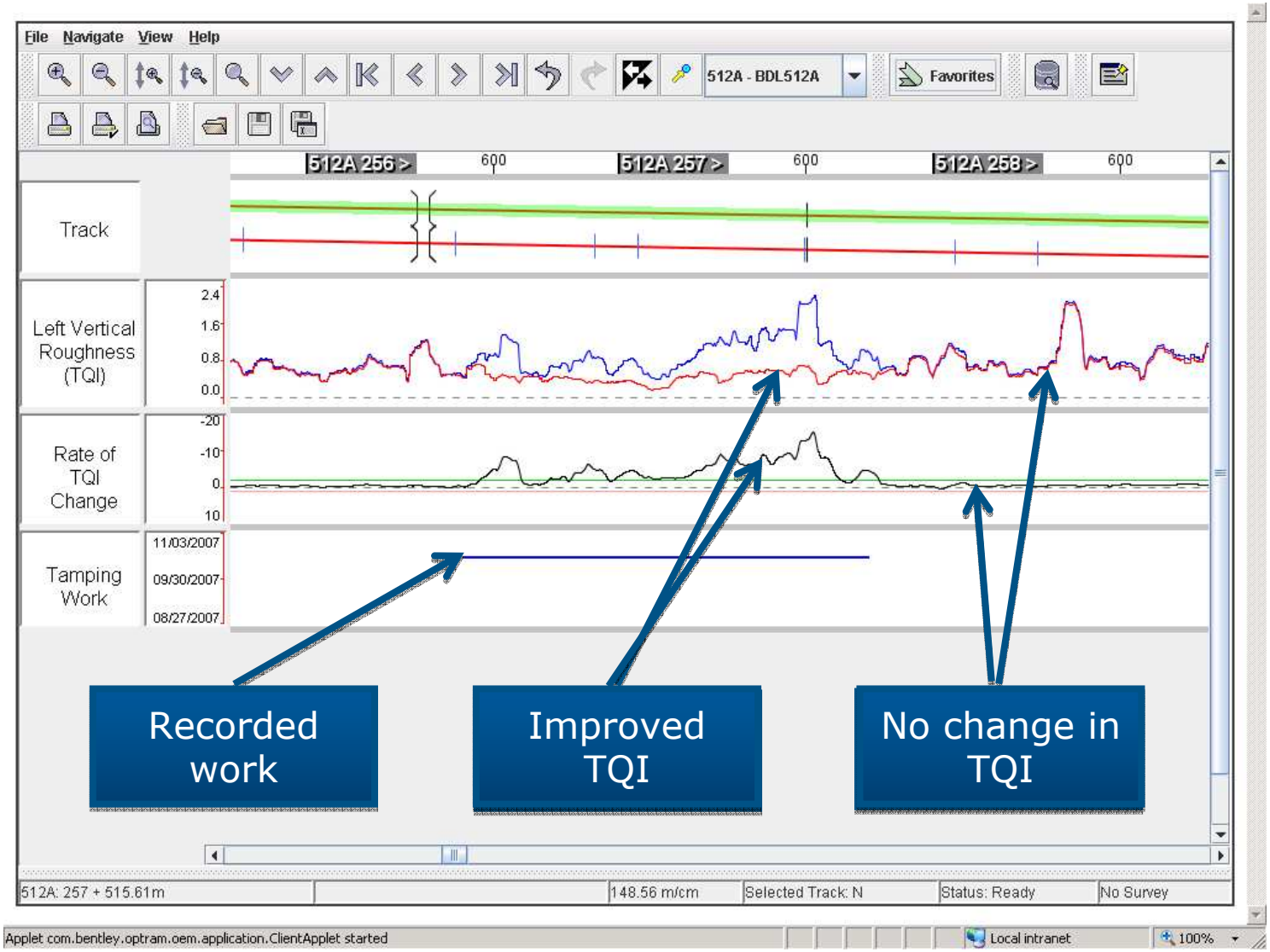
Example: Work Analysis

- Analyzes where tamping work was effective
- Optram automates 4 steps:
  - Aligns track measurements
  - Calculate a Track Quality Index for each survey
  - Determine where Track Quality improved
  - Compare improved Quality locations with recorded work
- Summarizes amount of
  - Productive and unproductive work
  - Unreported work

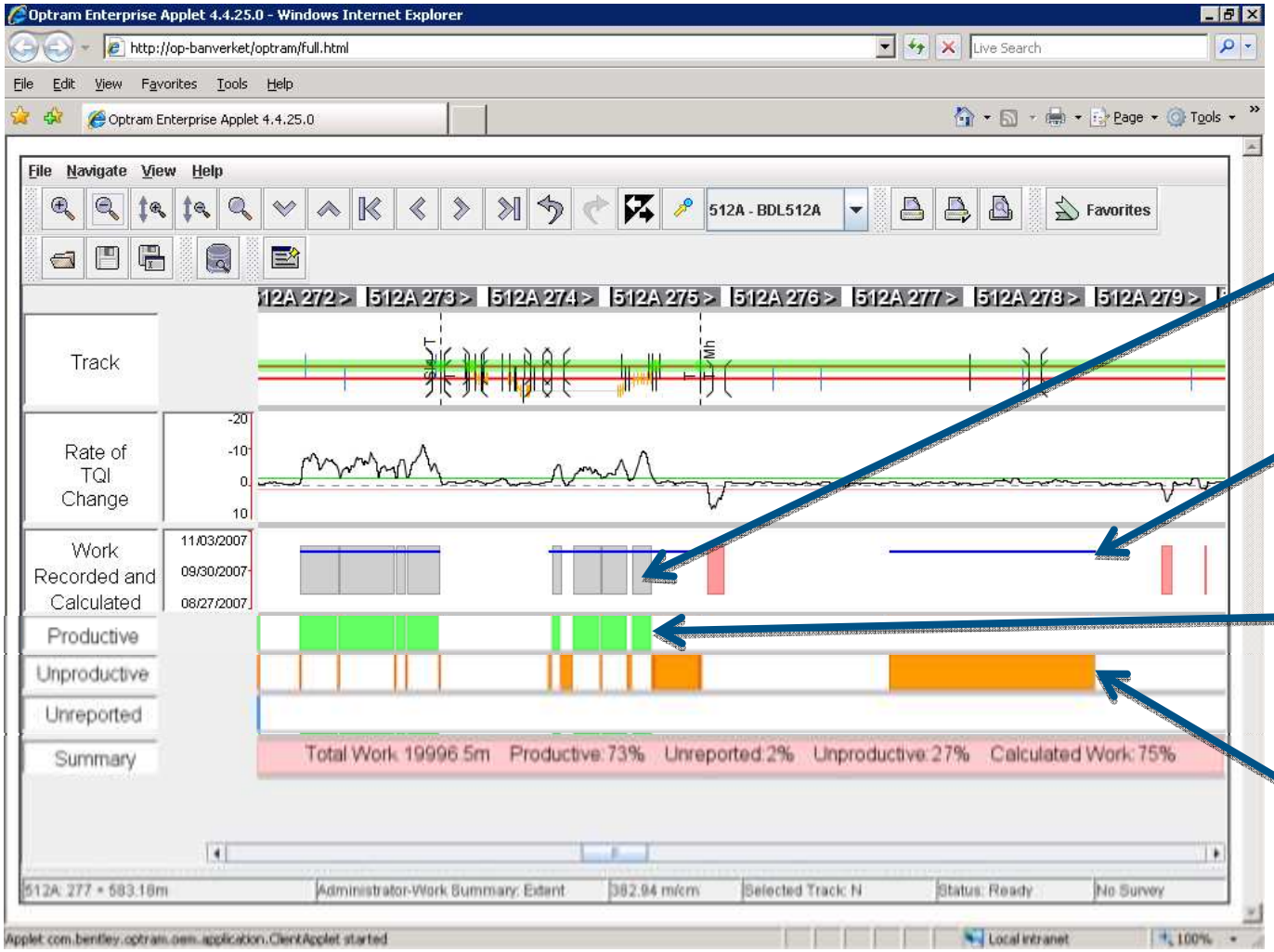
Optram Aligns Track Measurements



Optram Forecast Visualization



Optram Work Analysis Visualization



Change in Track Quality

Recorded Work

Productive work

Unproductive work

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Other Example Scripts Available

- Data Correlation
- Segmentation Creation
- Segmentation Analysis
- Quality Calculation
- Rate of Change
- Prediction
- Alert Limits
- Channel Derivation
- Channel Filtering

Plus whatever the user wants to write

Look into Future Development Roadmap

- Field Data System
- Linking to GIS
- Data upload from Bentley Rail design products
- Display and edit survey routes
- Integration with Bentley Platform

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