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A Direct Assessment Module for Pipeline Integrity Management at Gasunie

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23rd World Gas Conference
Transmission, WOC 3
Safety; Incident Databases

Overview

- Introduction PIMSlider
- External Corrosion Direct Assessment (ECDA)
- DA-module PIMSlider
- Conclusions
- Acknowledgements

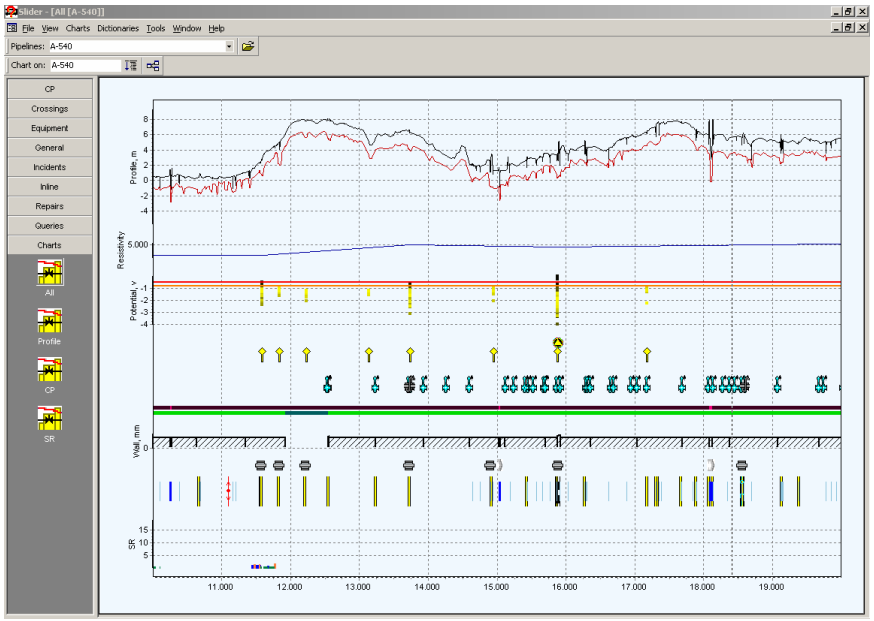
Introduction PIMSlider

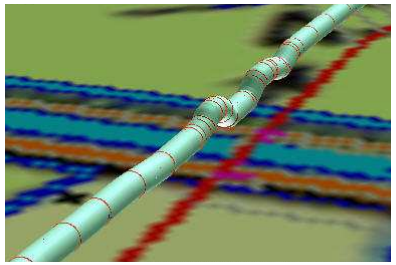
- Datamanagement

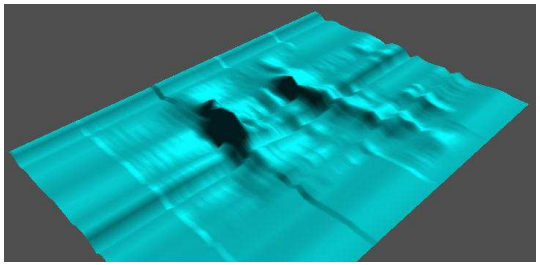
Introduction PIMSlider

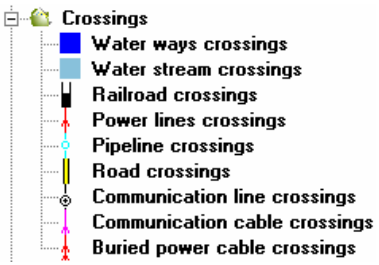
Full integration of all essential pipeline data:

- Earth profile, depth of cover
- CP posts and trend graphs
- Pipeline characteristics at any point
- Crossings
- Nearby objects
- Inspection data (MFL runs, surveys)
- Linked to GIS environment
- Raw data strength calculations
- Pipeline view (3D)









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- Datamanagement
- Presentation of topology

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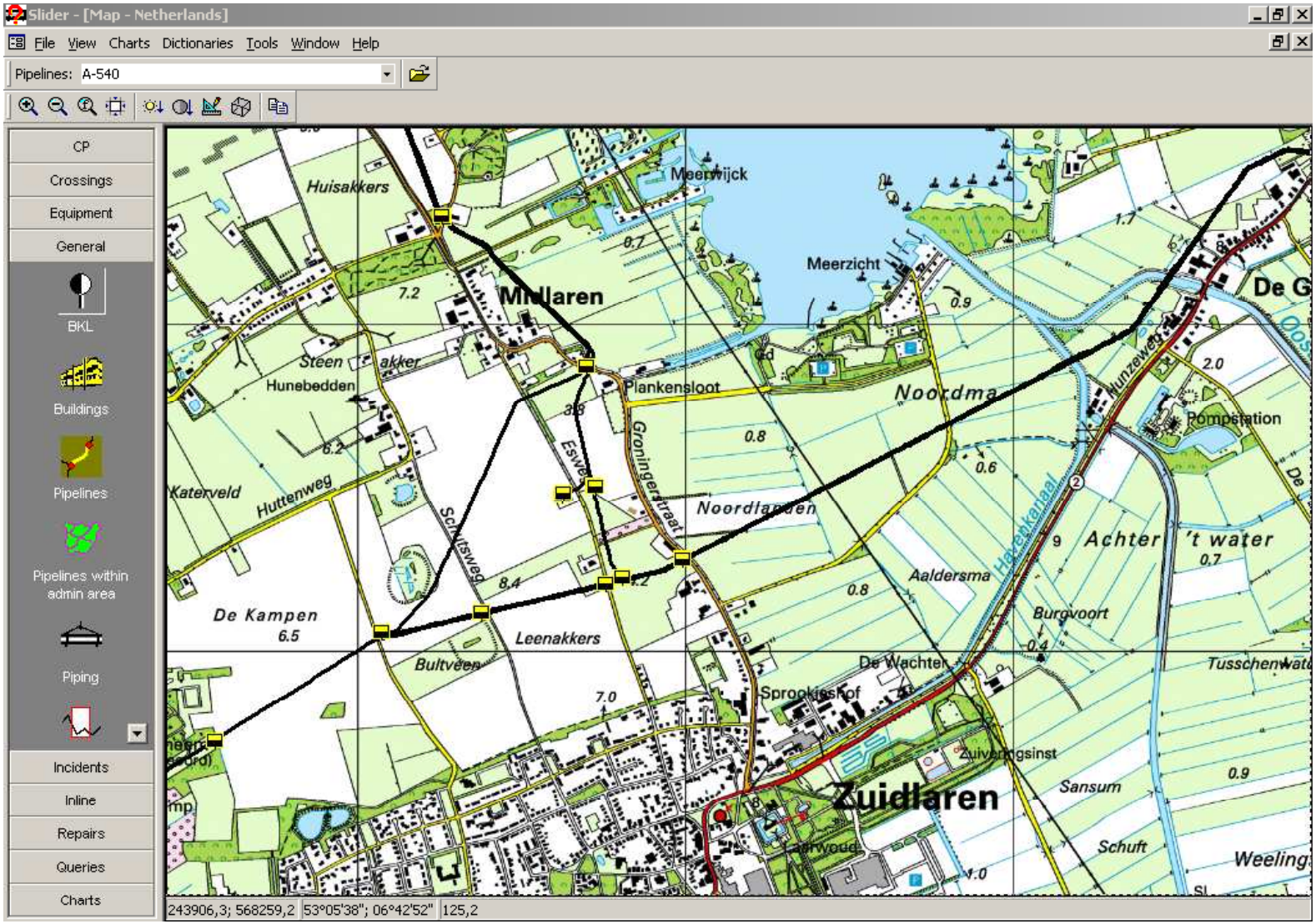

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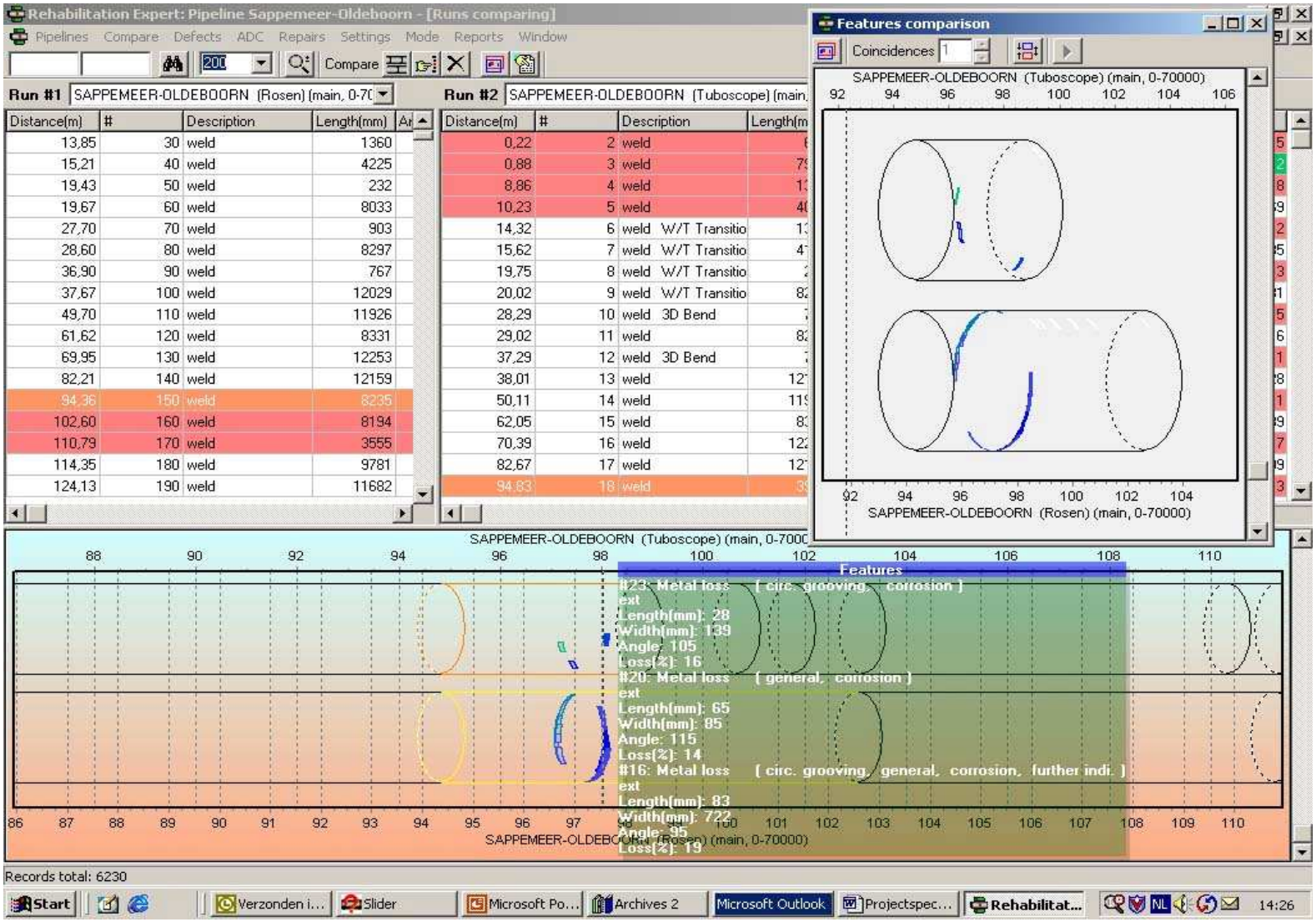

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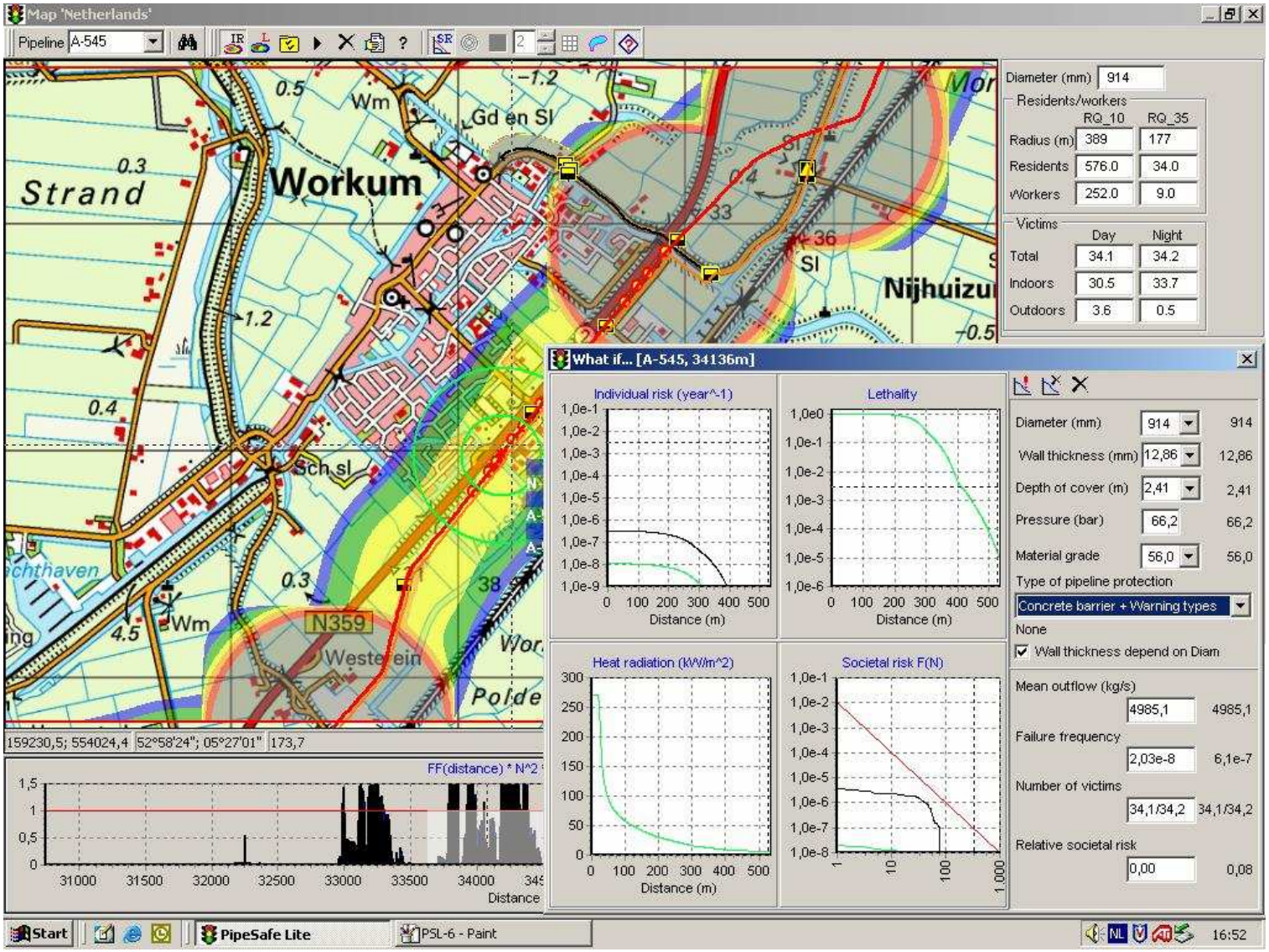

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- Direct Assessment
- Optimization of business economics

External Corrosion Direct Assessment

- Total length gas transmission grid 11,600 km
  - HTL: 40-66 bar, > 18”, piggable 6,000 km
  - RTL: 8-40 bar, ≤ 18”, not piggable 5,600 km
- NACE RP0502-2002
- Goal: to prevent external corrosion defects from growing to a size large enough to impact the structural integrity of a pipeline
- The ECDA process consists of 4 steps:
  1. Pre-Assessment: collect and review historical and current data of pipeline
  2. Indirect Inspection: perform aboveground surveys to determine where threats to pipeline integrity exist
  3. Direct Examination: excavate locations identified in step 2 to determine and characterize the extent of corrosion anomalies
  4. Post Assessment: determine mitigation activities and future inspection intervals

External Corrosion Direct Assessment

- Data collected in ECDA is subject to uncertainties:
  - Number of defects (DA-techniques versus ILI)
    - Probability of detection
    - Probability of false indication
  - Corrosion rate / size of defects
  - Tolerance of pipeline to defects
- Quantitative methodology (SRA) to account for uncertainties associated with ECDA
- Pipeline integrity is quantified by calculating and updating the **failure frequency**
- Cost effective: minimize number of excavations

DA-module: pre-assessment

1. Data collection and visualization

DA-module: pre-assessment

Category	Data elements
Pipe-related	• Material and grade • Diameter • Wall thickness
Construction-related	• Year installed • Year of route change/modification • Locations of valves, clamps, supports, taps, couplings, insulating joints etc. • Locations and material of casings • Depth of cover • Underwater sections; river crossings • Locations of river weights and anchors
Soils/environmental	• Soil characteristics/types, including ➢ Type of soil (e.g. presence of peat, anaerobic soils) ➢ Electrical influence (e.g. proximity of DC railways, AC power lines) ➢ Pollution • Drainage • Land use (e.g. paved roads)
Corrosion control	• Locations of rectifiers • Test point locations • Type of coating • CP survey data/history
Operational data	• Pipe inspection reports, excavation reports • Repair history/record (e.g. repair sleeves, repair locations) • Data from previous aboveground surveys • Inline inspection data

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   - corrosion history and/or future corrosion conditions
   - indirect inspection tools

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   - defect depth
   - corrosion rate
   - material properties, geometry pipeline etc.

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☺ Automatic retrieval of data from pipelines with similar specifications or environmental conditions

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3. Priority list for excavations
4. Update condition of pipeline
   - Number of coating and corrosion defects
   - Bayesian statistics

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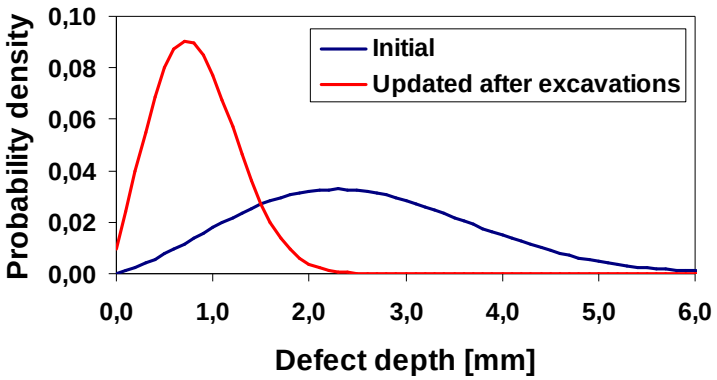
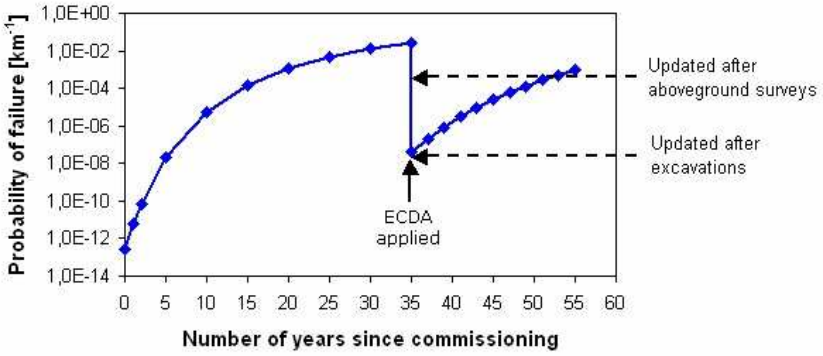
2. Update condition of pipeline
   - Survey characteristics
   - Number of coating and corrosion defects
   - Defect depth and length
   - Corrosion rate
   - Failure frequency





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1. Calculate failure frequency for all failure modes considered
2. Assess overall effectiveness of ECDA
3. Define reassessment interval

Conclusions

- SRA & Bayesian statistics enables quantification of ECDA:
  - Prior knowledge of Integrity
  - Update knowledge based on survey data
  - Update knowledge based on excavations
  - Establish strategy for collection of further data (more excavations) if required
- The DA-module enables automatic updating of numbers and sizes of defects after surveys and excavations
- Updating after each excavation, thus minimizing overall cost
- Implementation finished in December 2006

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For more information please visit the Gasunie stand…

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