GRID VISION®

Inspection Management for Overhead Lines

Today's
Environment

Overhead line inspection is an important activity to ensure that electrical grid assets are in proper working order to deliver high reliability of power, while keeping workers safe and electricity affordable.

Assessing and mitigating risks due to aging infrastructure, wildfire, storms and connecting Distributed Energy Resources (DERs) are some of the top objectives of T&D asset managers. Knowledge management challenges resulting from a retiring workforce as well as an increased commitment to worker safety brings additional challenges and places emphasis on how inspection data is collected, stored, and processed.

Typically, regulation requires that overhead lines must be inspected with different methods in different cycles, ranging from twice a year to every 15 years.

The management and maintenance of this infrastructure is more crucial than ever and to support this changing environment, grid operators can no longer rely on time-based traditional line inspection methods.
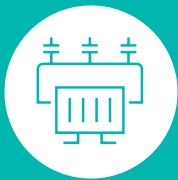
Reliability

92%[1] of outages on distribution systems are caused by aging infrastructure, severe weather events and vandalism.

Aging workforce

25%[2] of the utility workforce in the U.S. will retire in the next 5 to 10 years.

Aging infrastructure

70%[3] of transmission lines & large power transformers in the U.S are more than 25 years old.

33%[4] of distribution grids in the EU are more than 40 years old.

Limitations of Traditional Inspections

The challenge with the traditional way of carrying out line inspections is that they are opex-intensive, as the process is manual, time consuming and labor-intensive. Furthermore, they can be dangerous and the quality of asset information is often subject to errors and inconsistencies, and there is usually limited visual documentation.

Even when utility companies have moved over to image-based inspection, many still struggle to organise and efficiently analyse the vast volume of images.

1: Infrastructure Report Card 2021
2: The aging workforce will retire soon. Is the utilities industry ready? IBM 2018
3: "Failure to Act: Electric Infrastructure Investment Gaps in a Rapidly Changing Environment," 2020.
4: S&P Global Market Intelligence 2021

Our Solution

Empowering utilities to transition to virtual
and predictive asset inspections

Grid Vision® Inspection Management for Overhead Lines is an operationally-ready solution that is data-driven and provides a condition-based approach to infrastructure inspections, all managed from a single platform.

Grid Vision Inspect utilizes Collaborative Artificial Intelligence (AI), a method for combining the best qualities of deep learning, advanced software tools and human experts to achieve accurate and consistent inspections, while automatically training the AI for long-term efficiency gains.

**Reduced
Failure Rates**

**Reduced
Costs**

**Increased
Safety**

**Extended
Asset Life**

Grid Vision Inspect enables a truly virtual and digital inspection process and delivers automation from day one through the 30+ AI models that are already trained on over 3 million global images. Human experts have also logged tens of thousands of hours of operational virtual inspections utilizing Grid Vision, providing invaluable feedback to continually enhance time saving features that allow inspectors to focus on the highest-value activities.

We help utilities achieve improved efficiency, greater accuracy and consistency within their overhead line inspections.
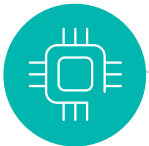
Why Grid Vision?

Extensive proven experience

- Partnering with 40+ utilities globally.
- 100,000+ km of T&D lines inspected.
- 3 million images annotated on overhead lines.

Mature world–leading AI

- 30+ AI models for overhead line defect detection.
- One of the largest global libraries of training dataset.
- Over 10 years' experience in AI.

Hardware–agnostic

Our energy industry digitalization experts have created Grid Vision to be decoupled from image capture hardware. This means we have the flexibility to work with any vendor in any location.

Purpose–built

- Designed and built by utility experts for T&D powerline inspections.
- Our entire team of over 100 passionate professionals are 100% focused on grid inspection only.
- Easy to use software that is designed for typical inspection workflows.

Built for scale

Proven experience at scaling virtual inspections with some of the world's largest grid operators.

Global partner ecosystem

Partnerships with some of the largest engineering and data capture firms for end-to-end inspection solutions, and with Microsoft as a close technology partner for global reach.

Collaborative–AI

Combines human intelligence with AI-based analytics to provide higher accuracy in defect detection and increase safety.

Unique asset–centric approach

Our asset-centric approach connects data to assets and catalogs defects accordingly.

Our **Approach**

We help utilities digitalize overhead line inspections by building a joint vision and business case tailored to their needs, based on our global experience of delivering digitalized asset inspections. We deliver our solution as Software as a Service (SaaS) or Inspection as a Service (IaaS).
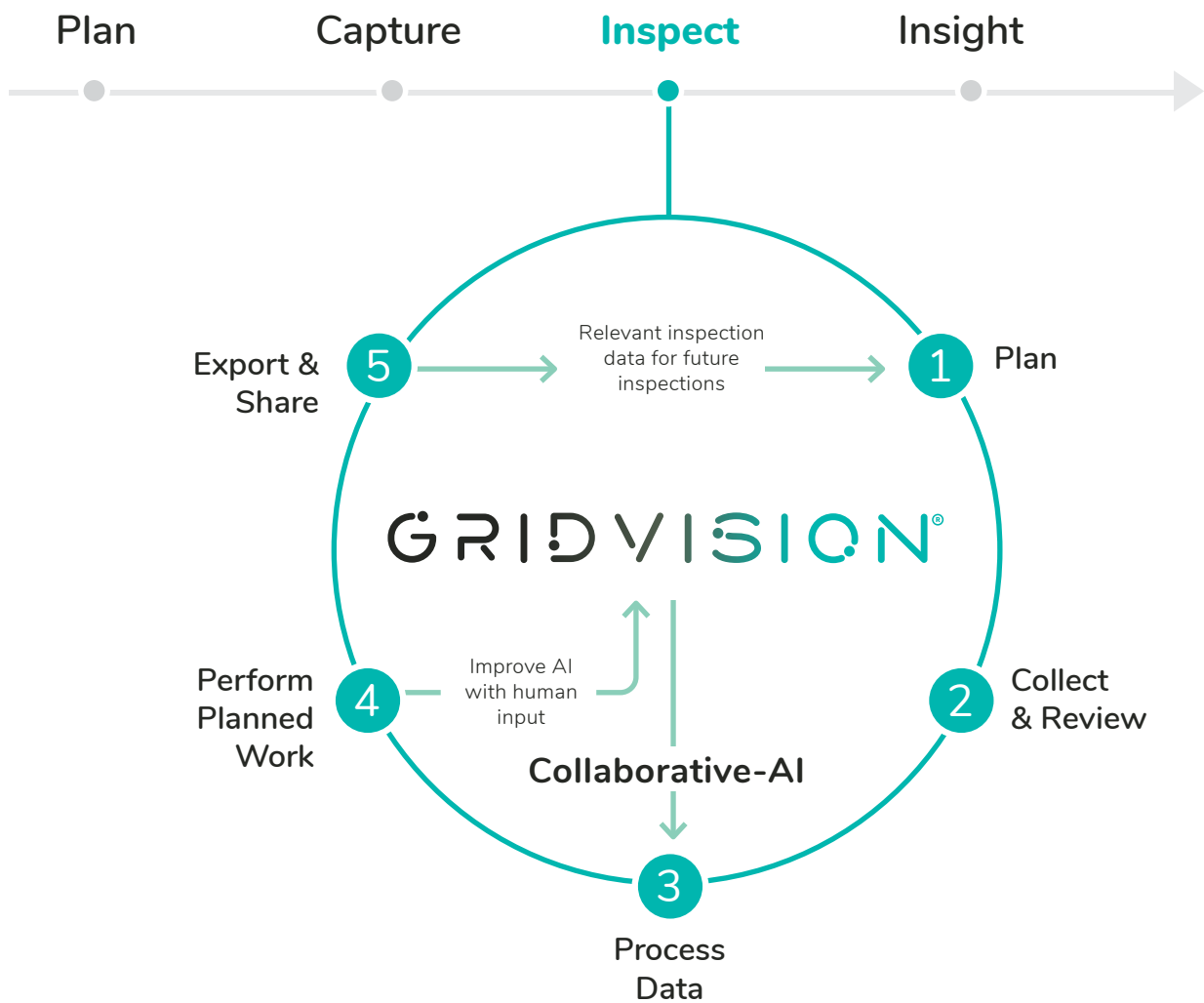
In our approach we can cover the full end-to-end process from Plan, Capture, Inspect and Insight depending on your requirements.

Inspection Requirements

Inspection Results, Maintenance Requirements, Inventory Updates

Maintenance Management

Inspection Process

Plan
We work with you to decide what lines to inspect to best meet your goals.

Capture
We can provide IaaS or work with 3rd party vendors with our SaaS offering.

Inspect
We perform virtual inspections and digitize asset inventories with Grid Vision Inspect.

Insight
Grid Vision Insight provides users the ability to drill down into inspection data and conduct conditional assessment.

Collaborative–AI

Gradual automated inspections

Our software is powered by Collaborative-AI and advanced analytics. This model combines AI and human work, and is incorporated in the core-process flow of Grid Vision Inspect. The AI identifies defects and makes recommendations. The engineers review and verify the AI's recommendation. The AI learns from the engineer's verification, and this is what we call Collaborative-AI. The training of the AI by human experts brings precision to automated defect detection over time. It further helps to create reproducible results, that are comparable over time.

Plan   Capture   **Inspect**   Insight

Export & Share → 5 → Relevant inspection data for future inspections → 1 Plan

GRIDVISION®

Perform Planned Work — 4 — Improve AI with human input

Collaborative-AI

Collect & Review — 2

Process Data — 3

Grid Vision Inspect

can be summarised in the following five steps
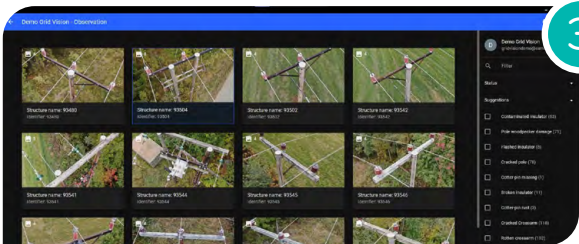

1 Plan

- Set the scope:
  - Decide which assets to inspect.
  - Define the type of inspection.
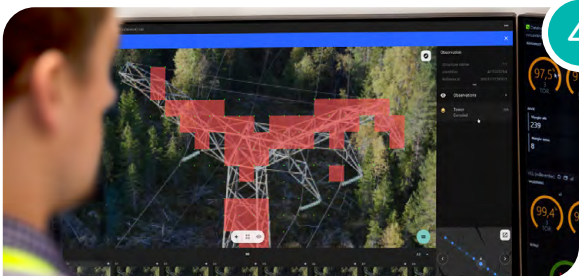

2 Collect and Review

- Collect relevant data from various sources to optimally perform the inspection.

3 Process Data

- Sort the assets.
- Link images to assets.
- Run Grid Vision's AI.

4 Perform Planned Work

- Conditional assessment of power lines.
- Digitize assets (inventory).
- Human experts review suggestions provided by Grid Vision AI.


5 Export and Share

- Export results from the inspection to your systems.
- Relevant inspection data is made available through Grid Vision Insight for other users and future inspections of the same assets.

Grid Vision Insight

Empowering teams with the right data

Grid Vision Insight is a web-based application that enables multiple users to drill down into asset inspection data on multiple devices.

Grid Vision Insight unlocks additional value to the inspection process by empowering organizations to make better data-based decisions for asset maintenance investments and focus on assets that are a high priority.

Plan   **Capture**   **Inspect**   **Insight**
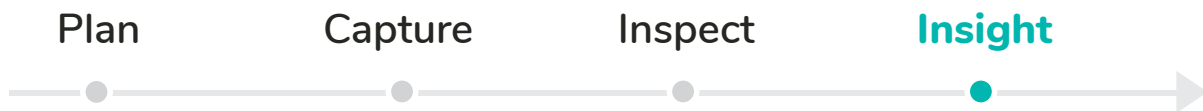
Key Features

Conditional Assessment
Assess how asset has changed over time.

Interactive Map
View assets and defects on the interactive map.

Customizable Dashboards
Manage inspection information based on the data you need in an easy to use application.

Collaborative Working
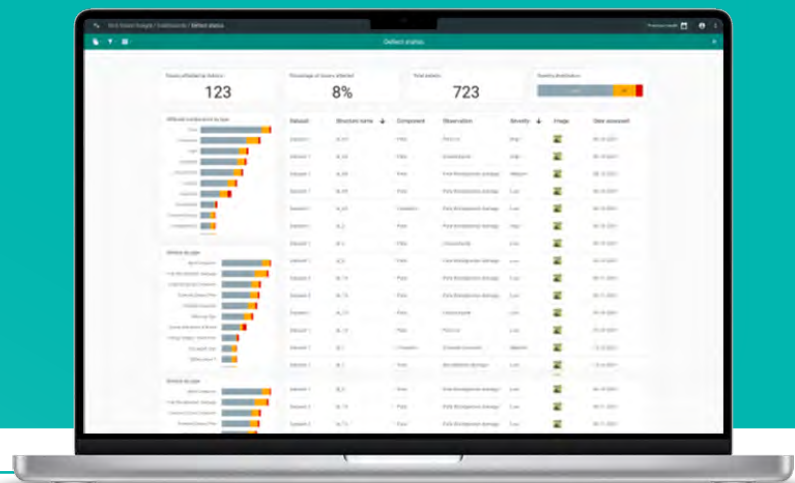Share your dashboards with wider teams.

Defect Report
View, group, and annotate on results based on component, asset type, severity or defect.

QA Workflow*
Annotate and feedback on inspection results.

Customer Case Studies

We are working with 40+ global transmission and distribution customers.

Xcel Energy

Improving safety within current inspection process.

Partnering with EDM, Phoenix Air Unmanned and XP-RS to help Xcel Energy reimagine transmission inspection, asset management and planning.

Solution: Grid Vision presents inspection work plan along with AI suggestions to EDM´s Subject Matter Experts. These experts work in Grid Vision to audit and augment the inspection results, providing the most up-to-date inspection results and refining algorithms for increased accuracy. This approach is deployed for Xcel Energy's entire transmission system.

Benefits:

- Increase the accuracy and consistency of inspection and inventory asset data.
- Increase safety and efficiency of inspections at scale, featuring unmanned aircraft.
- Produce a baseline of data that will drive enhanced outcomes, including predictive maintenance and enhanced capital planning.

Case Studies

Customer Case Studies

Case Studies

Axpo

Improving the efficiency of end-to-end powerline inspections.

AXPO's Grid 4.0 program aims to accelerate digital transformation within their grid business. New solutions are rolled out if they have success potential.

Solution: Grid Vision was used to inspect several powerlines as part of the 10-year control inspection program. Several AI models were deployed including conductor strand damage, broken insulators, contaminated insulators, flashed insulators, cracks in concrete crossarms and cracks in concrete poles. The Grid Vision export feature was used to create automatic reports summarizing the inspection results.

Benefits:

- Improved inspection workflow efficiencies by providing asset-based review and automating the organization and analysis of images.
- Demonstrated potential for lower operating costs by using AI to assist subject matter experts during their inspections.
- After a successful pilot, Axpo is now preparing to roll-out the solution on a larger scale.

Customer Case Studies

USA Transmission Utility

Testing the potential of integrating analytics into business operations.

A seven state transmission operator wanted to test how leveraging AI and machine learning to analyze images could possibly improve asset health, business operations and drive more efficient inspection processes.

Solution: Grid Vision was utilized to manually inspect assets and an R&D project was conducted to explore C-hook wear problem. Additional training data was provided in the form of computer-generated synthetic images of C-hooks.

Benefits:

- Demonstrated potential for lower operating costs by using AI to inspect structures in a matter of hours.
- Provided an overview of the corrosion status of a chosen line.
- Explored the AI capabilities to detect C-hooks and C-hooks wear.

Case Studies

Customer Case Studies

MITNETZ STROM

Testing the efficiency of fully autonomous inspections.

Mitnetz Strom wanted to test the possibility of a fully autonomous inspection, associating autonomous drones and AI-enabled image recognition.

Solution: The drone recordings were uploaded into Grid Vision utilizing API. The inspection images were processed through Grid Vision's Artificial Intelligence, that detected defects on the components. The recommendations were shared with Subject Matter Experts.

Benefits:

- Drastic reduction in time spent reviewing inspection data, while achieving better detection accuracy.
- An opportunity to rapidly improve inspection processes and reduce costs.
- In the future, Mitnetz wants to establish the automated use of drones in addition to the use of helicopters. The data will be processed with the help of Artificial Intelligence.

Case Studies

GRIDVISION®

Powered by eSmartSystems