3 practical business cases in asset and maintenance management

BRAIN CREATORS
digital inspectors

Introduction

Many infrastructure owners struggle to maintain optimal maintenance frequency due to their reliance on inefficient manual processes. The case studies over the following pages illustrate how artificial intelligence can streamline workflows and improve efficiency.

MapXact

For MapXact, our Digital Inspectors have directly impacted how the company operates by allowing it to continue to use the most effective method of mapping subsurface infrastructure.

MapXact's services help Infrastructure Developers and Managers ensure their projects don't interfere with underground cables and pipes. Ground radar produced detailed images, but each of the thousands of images generated at each site had to be viewed manually to distinguish between disturbances created by natural materials and those created by existing infrastructure.

By using Digital Inspectors to review these images, MapXact's Analysts can focus on more productive tasks while 'teaching' them to improve their analytical abilities.

Unihorn

Our collaboration with the infrastructure research and consultancy firm Unihorn has enabled the development of a Digital Inspector that can efficiently monitor road networks for indicators of degradation that require maintenance.

International consulting firm McKinsey has noted that fixed assets (such as roads) rarely have dedicated regional maintenance teams. Inspectors and workers therefore have to cover large areas with limited information on the work required at each location.

Unihorn's Digital Inspector INSPECH – powered by BrainMatter – removes the guesswork from this process by analysing camera images to identify sections of road that require maintenance.

Schiphol

The challenge at Schipol was to improve the performance of assets ranging from light fittings to wifi access points while eliminating costly and time-consuming manual inspections.

With more than 70 million passengers moving through the airport last year, a solution was required that could monitor thousands of different assets and flag up potential issues.

Digital Inspector's ability to identify and learn the characteristics of individual assets has enabled intelligent automation of these assets, allowing Managers and Inspectors to receive automatic notification of maintenance requirements, minimising downtime.

MapXact (VolkerWessels)

Before operating on subsurface infrastructure, contractors need information derived from ground radar scans to make decisions. However, the extent and quality of this information is often constrained by time pressure, potentially leading to catastrophic results from a safety and economic perspective.

At MapXact, employees who had already spent time driving a ground radar scanner over a site then had to work for three days to interpret the acquired scans. MapXact searched extensively for a solution that could accelerate this process before realizing that the answer lay in Digital Inspectors, based on artificial intelligence.

Digital Inspectors reduce the time required to analyze ground radar scans to just 15 minutes, enabling MapXact customers to focus on more productive tasks while incidents are avoided proactively.
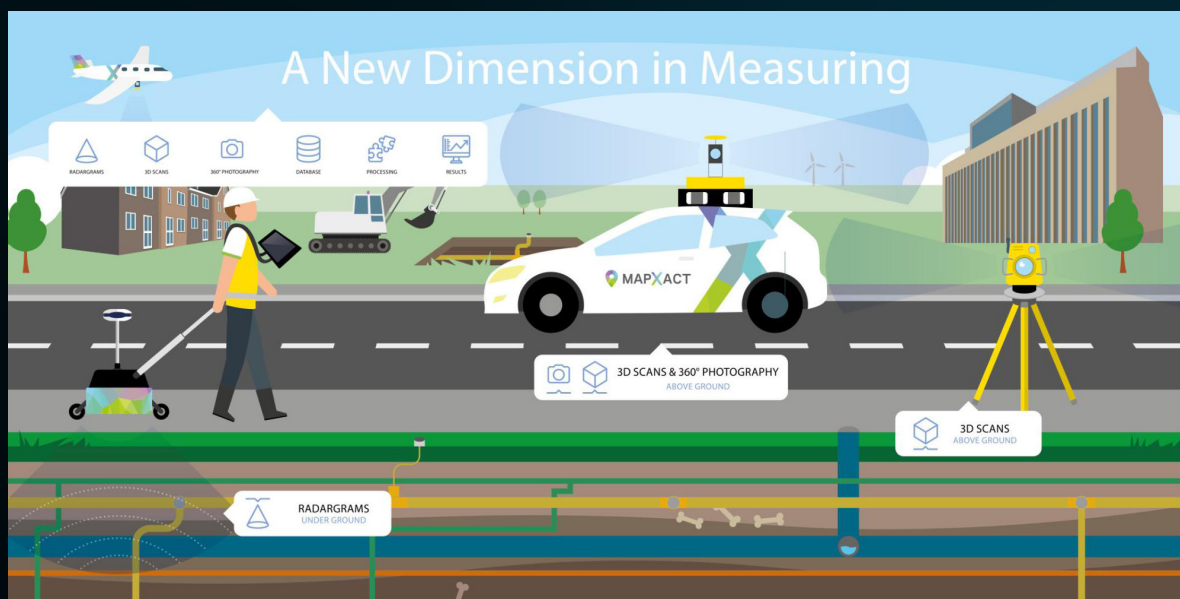
Intelligent automation is achieved when a machine learns to perform an expert task from examples and specific business rules. Examples to learn from were widely available in this case because human experts previously performed the task.

The business rules define how the information extracted from the radar scans is visualized in a 3D representation of the underground infrastructure. Once engaged, Digital Inspectors keeps learning on the job, leading to better performance in an even shorter time. Eventually, Mapxact will offer a real-time underground analysis in an augmented reality interface.

Unihorn

Road inspections are very labor-intensive and time-consuming tasks. Moreover, they produce subjective results because they're based on the individual judgement of multiple inspectors. The high degree of manual work drives costs up, but in the past it was considered too difficult to automate these inspections due to the variety and complexity of road defects.

Unihorn decided to collaborate with BrainCreators to build a Digital Inspector for visual road inspection called Inspech. Inspech provides immediate insight into road segments that are due for maintenance and for what reasons.
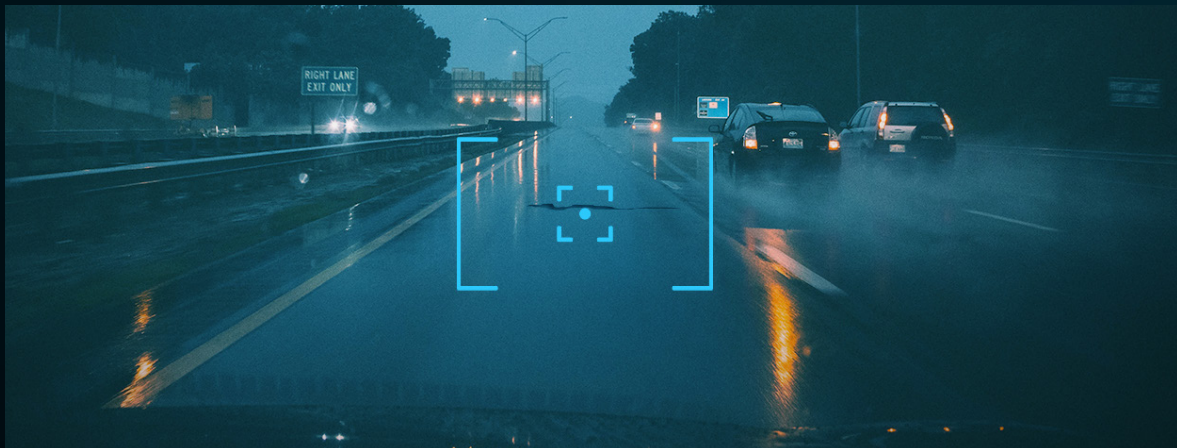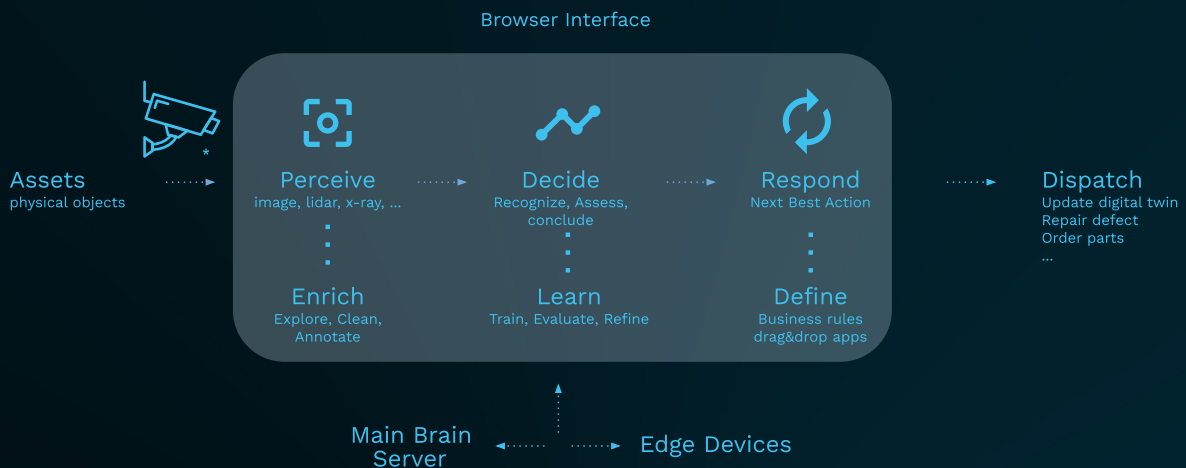

The BrainMatter-powered Digital Inspector detects damage on road surfaces using a designated camera car. It uses intelligent automation to t inspect every part of a road and locate a wide variety of defects, regardless of orientation and size.

Detections are exported as GIS files and displayed on an interactive map. For the road as a whole, an extensive report is generated to assess quality and degradation at a glance.

Inspech is trained by turning the knowledge of experienced road inspectors into a formal set of examples. Inspech ingested a large collection of manually executed inspections, which were quickly cleaned and validated by the inspectors. Next, the Digital Inspector was fine-tuned to detect variants of defect classes and output results in a map viewer.

As a result, a typical Dutch highway can now be inspected with consistent results in roughly a fifth of the time, enabling Unihorn to speed up its services by a factor of five.

| infrastructure

Unihorn

Browser Interface

Assets
physical objects

Perceive
image, lidar, x-ray, ...

Decide
Recognize, Assess,
conclude

Respond
Next Best Action

Dispatch
Update digital twin
Repair defect
Order parts
...

Enrich
Explore, Clean,
Annotate

Learn
Train, Evaluate, Refine

Define
Business rules
drag&drop apps

Main Brain
Server

Edge Devices

Results

Road Inspection | 550 kilometers

Digital Inspectors ingest 550 kilometers of captured road video taken by a specially modified car equipped with a camera for visual road inspection.

Damage recognition | 12 segments

Digital Inspectors learn to recognise 12 segments of road surface conditions based on the guidelines of CROW or road authorities in days versus weeks.

Initiate immediate action | In seconds

Inspech users can define rules to initiate follow-up actions when a damage has been recognized, e.g. a notification or signal to an asset management system.

"Thanks to the collaboration with BrainCreators, we have acquired an innovative technology with Digital Inspectors on the BrainMatter platform that enables us to launch our visual road inspection solution, "INSPECH", together with our partners."

- Jeroen Bleeker, Manager at Unihorn

Schiphol Airport

The challenge at Schiphol airport was to use technology to leverage point cloud representations, camera images, BIM, and GIS models to deliver new or improved products and services.

BrainCreators set out to show how Digital Inspectors could empower Schiphol and its contractors to achieve on-time performance for asset management during the airport's physical assets' life cycle while reducing operational costs. As a result, Schiphol improved its overall customer experience in a safer environment.
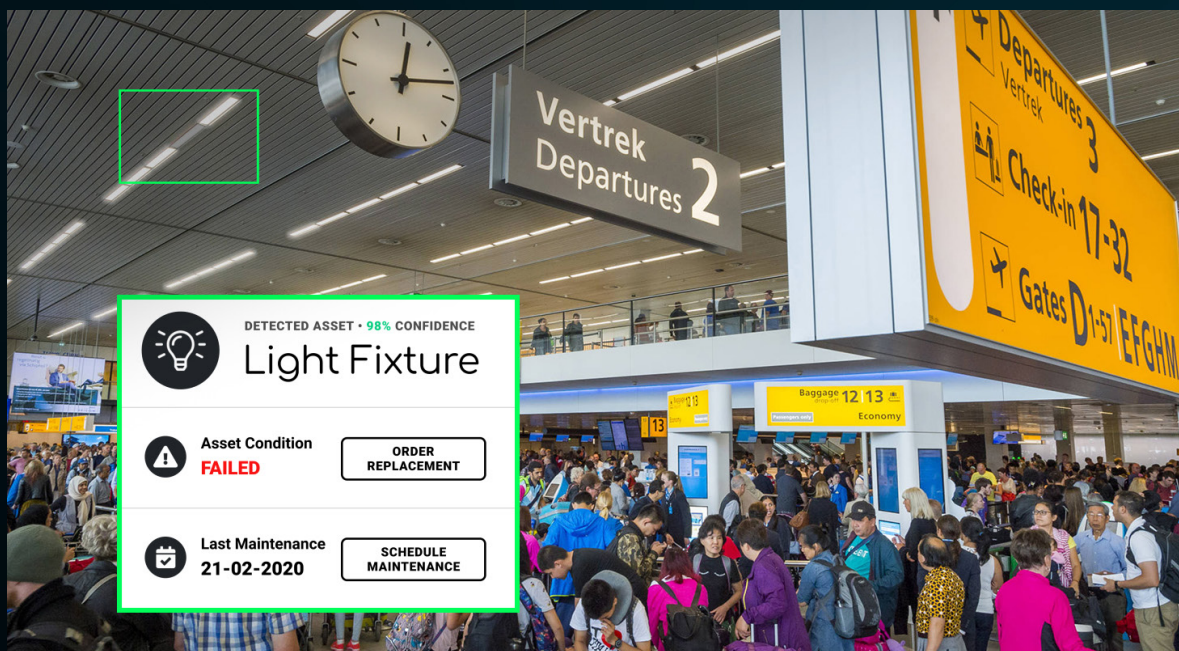
Over the course of a single week, a Digital Inspector learned to recognize and assess the state of assets in generic overview images of the airport terminal. Assessable objects ranged from light fixtures, sprinklers, and trash bins to emergency exit signs, smoke detectors, and security cameras.

In practice, the intelligent automation of asset inspection and monitoring allows for a much faster response to incidents. Images can be captured by existing camera installations or by equipping vehicles with cameras. The images are immediately analyzed, and issues are automatically turned into trouble tickets for the existing contractors. Hence manual inspections can be minimized by adding more assets to Digital Inspectors on the fly.

That's not all. Regular automated processing of spatial imagery also allows for the detection of changes over time. When combined with a digital twin of the environment, this results in automatic updates of the digital twin with changes in reality. A win-win situation for Schiphol and its contractors with a direct upside for its customers.
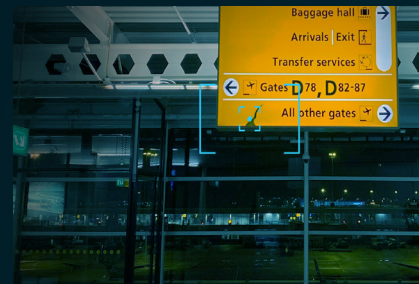
Schiphol Airport

Results

The Digital Inspector learnt to recognize and assess eight asset classes out of 25,000 relevant identified assets in just 7 days. The assets included light fixtures, sprinklers, wifi access points, trash bins, wayfinding signs, emergency exit signs, smoke detectors, security cameras.

7 DAYS
25,000 assets
8 CLASSES

BrainCreators scored the highest number of points with the judges for showcasing immediate value to Schiphol and it's main contractors, alongside high feasibility and applicability, a scalable and intuitive user interface, and a strong commercial approach. Intelligent inspection was demonstrated for eight assets and is soon to be expanded across all assets at Schiphol.

This level of automation means Asset Managers and Quality Inspectors no longer have to carry out manual inspections and will instead be notified via tickets when assets such as lighting, smoke detectors and surveillance cameras require maintenance. This allows Schiphol and its main contractors to intelligently automate asset monitoring, improve first-time fix rates, increase information exchange, reduce costs and improve risk identification.

"As field technicians become more efficient, they can manage more assets with high quality, spend less time on inspections, and reduce operating costs"

Outcomes include

- Immediate identification of assets
- Signaling of broken, loose or missing assets
- Direct notification and action initiation
- Integration with existing asset management systems (IBM Maximo)
- Reduced risk of hazards to the public
- Higher customer satisfaction as a result of the quick resolution of issues
- Significant cost-cutting through faster processes with fewer staff on the floor
- More stable planning through proactive handling of issues

| Conclusion

We hope these examples of Digital Inspectors trained with BrainMatter inspire you to find processes to automate in your organization. Digital Inspectors have helped clients in different industries address asset management and maintenance challenges.

It doesn't have to be challenging to optimize asset management and maintenance functions, particularly in capital intensive industries where the pressure is on operations teams to ensure consistent availability and quality of assets.

The tasks involved are traditionally labor-intensive and repetitive. Maintenance teams work on schedules based on coarsely predicted events or slowly react to incidents.

Worst case, misalignment between planned work and incidents can cost infrastructure owners massive amounts. Issues that could have been mitigated if assets had been automatically monitored.

This is where Digital Inspectors deliver real value, performing real-time identification of assets and detection of anomalies. It optimizes the utilization of resources and allows for cost-effective infrastructure maintenance. It eliminates manual processing with the attendant risk of human error, ensuring inspections are undertaken at optimal frequency and in compliance with regulatory requirements.

Operations managers can receive an accurate assessment of asset conditions at every stage of their life cycle, allowing them to reduce inspection costs while supporting on-time maintenance and ensuring repairs are made before incidents impact customer service and safety.

About BrainCreators

digital Inspectors to accelerate your business

BrainCreators builds intelligent digital inspectors on their BrainMatter platform to automatically perform repetitive tasks, enabling companies to scale more effectively and cost efficiently.

The company was founded in 2016 by three entrepreneurs who studied Artificial Intelligence together at the University of Amsterdam.

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More information about BrainCreators and its solutions can be found via: *www.braincreators.com*

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