Transforming Transportation

Reality Data and Artificial Intelligence

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Introduction

Road engineers are dealing with real-world data in their daily tasks to aid asset inspection and inventory management.

Nevertheless, they encounter challenges handling extensive datasets, large file sizes, and diverse formats from various capture systems.

Additionally, they are struggling to promptly update digital twins, which is crucial for asset safety and widespread accessibility of reality data.

Discover how to unlock data from silos and leverage the power of artificial intelligence to pave the way for safe and sustainable transportation infrastructure.

Reality Data Challenges Faced by Road Engineers

As reality capture experts, we understand you, and we know that you're daily dealing with many challenges, including:

Large Data Volume
Terabytes or petabytes of reality data captured over time are living on disk space or cloud storage, often not delivering their entire value.

Various Captures
There is a multiplicity of captured reality data (type, time, and system) and a struggle for how to combine it all together and extract the most intelligence.

Manual Work
Updating digital twins at the speed of data collection requires countless hours of manual and tedious extraction work.

Cold Data
Beyond data capture and feature extraction, granting easy access to relevant information to all stakeholders is also a real concern. Data is usually on hard disks for privileged use.
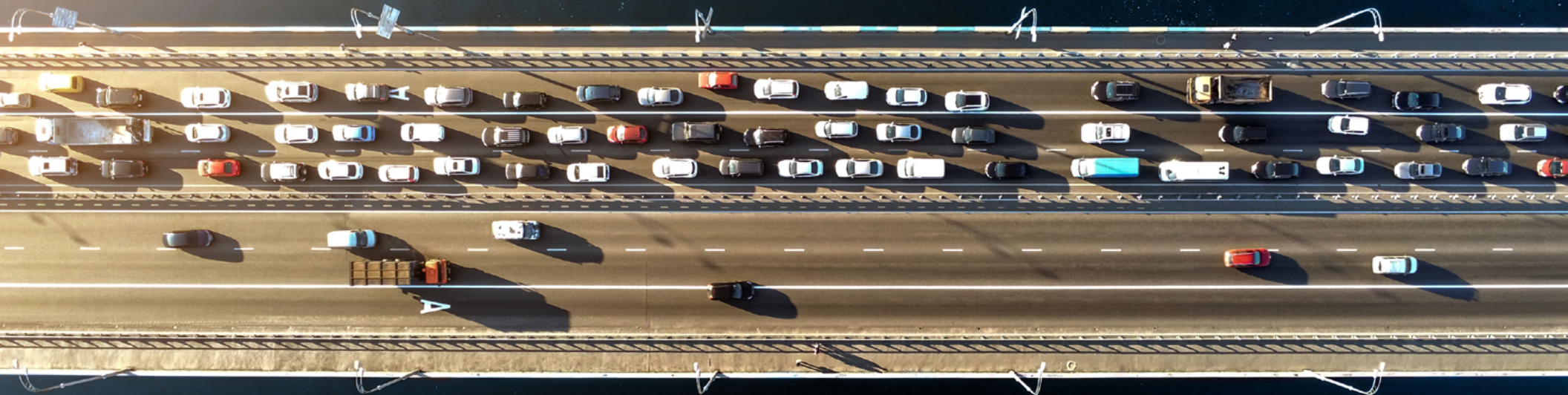
Make Your Real World Easier with iTwin Capture Cloud Services

With iTwin Capture Cloud Services, you can continuously update your digital twin with valuable information extracted from reality data—such as photos, point clouds, and reality meshes—leveraging automated analysis capabilities.

iTwin Capture Cloud Services democratizes reality capture and enables any infrastructure practitioner to access reality capture capabilities to model, manage, analyze, and share reality data to add reality data and real-world insights to digital twins.

This common reality data environment serves as a single source of truth to advance infrastructure workflows, using a data-centric approach for multiple users and applications.

Image courtesy of Singapore Land Authority
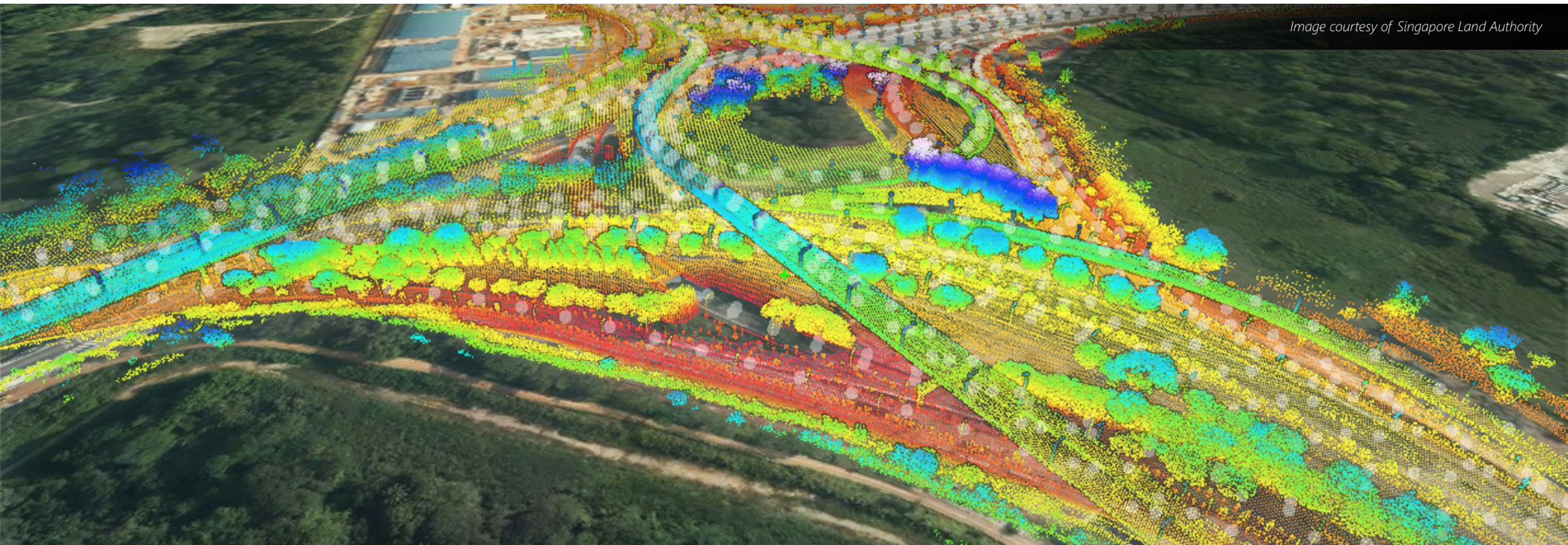
iTwin Capture Cloud Services

iTwin Capture Cloud relies on three main services:
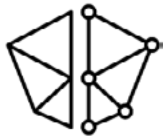
Reality Modeling
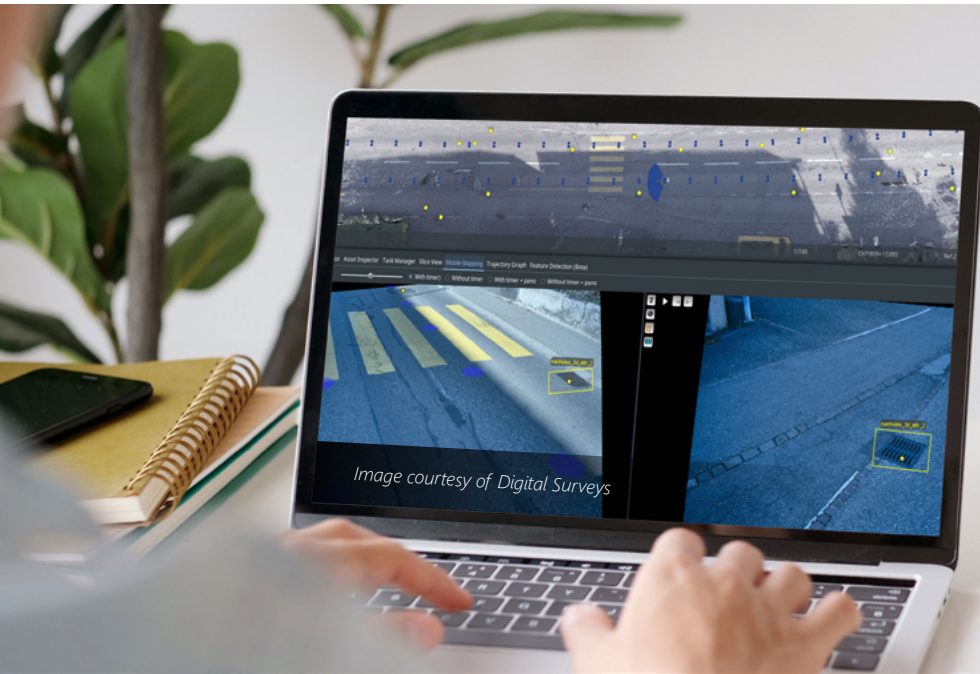Turns images or point clouds into meshes.

Reality Management
Hosts and manages access rights to reality data, including importing and converting.

Reality Analysis
Executes automatic feature extraction from reality data.

Image courtesy of Digital Surveys

Learn more about iTwin Capture Cloud Services >

Advance Your Infrastructure Workflows with Reality Modeling Service

Capture, create, and enhance reality data

- iTwin Capture enables you to create and enhance engineering-ready reality data—such as reality meshes, classified point clouds, anonymized images, and orthophotos of any size and resolution—using any digital camera, scanner, or mobile mapping device.

- Leverage on-premise or cloud processing capabilities to scale your production and fit your business needs.

Image courtesy of Teccon
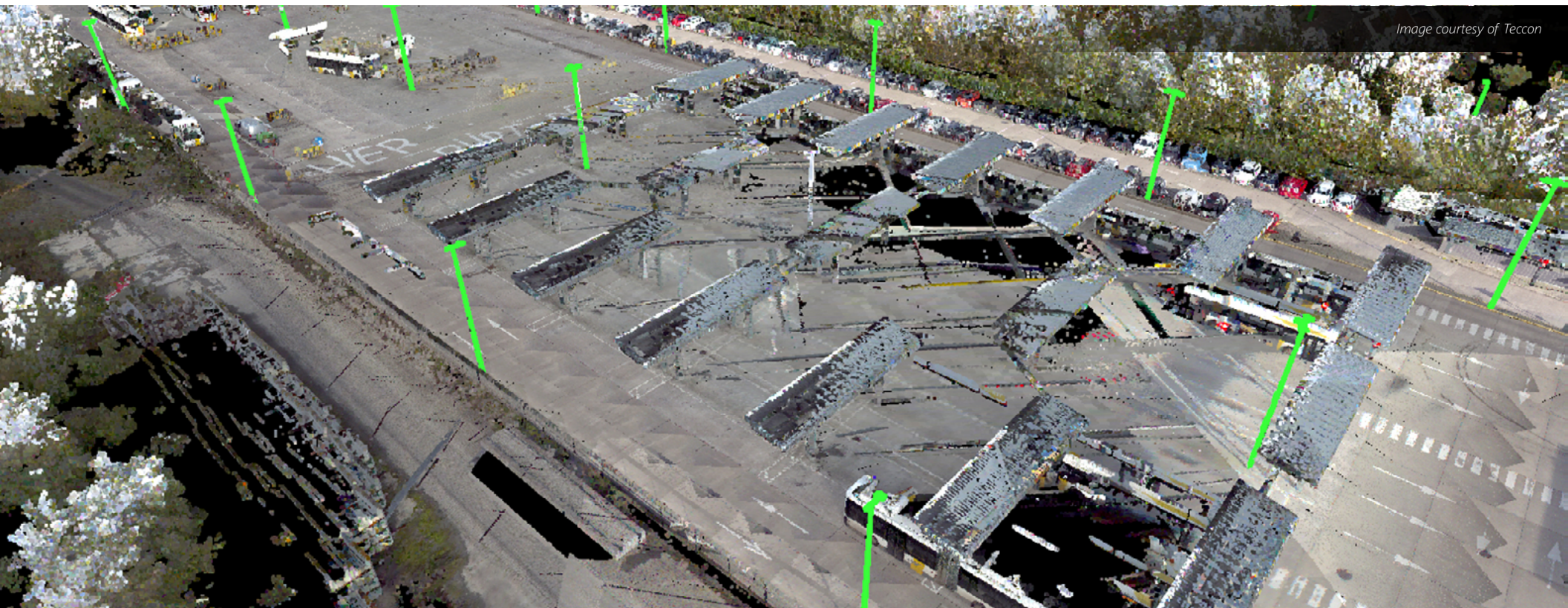
Advance Your Infrastructure Workflows with Reality Management Service

Manage, catalog, and share reality data

- Federate all your reality data into a common reality data environment. Use an unlimited number of reality data of any size and type, such as ground or aerial-captured point clouds or photos.

- Organize, catalog, and index your reality data to enable effective search and accelerate your workflow.

- Easily and securely make data accessible to any authorized stakeholder on any device.

Image courtesy of Yunex
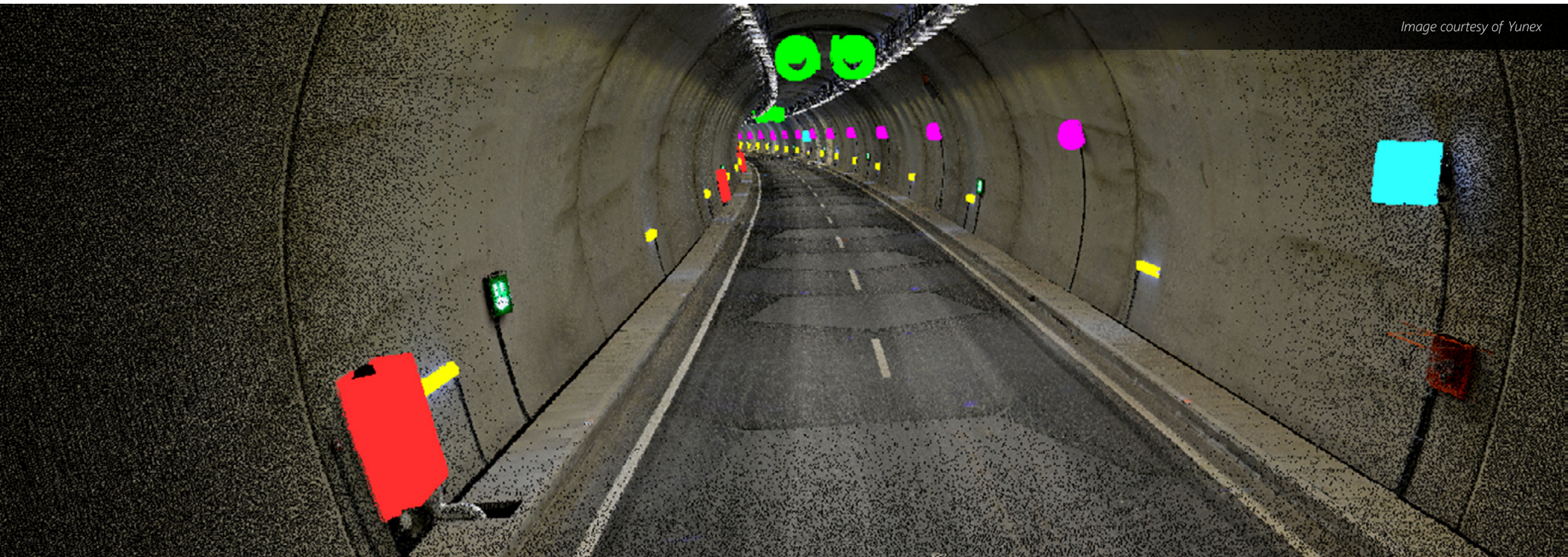
Advance Your Infrastructure Workflows with Reality Analysis Service

Validate, extract insights, and deliver

◆ Easily make data actionable so that any stakeholders get the right information at the right time to make more informed and timely decisions.

◆ Visually assess the quality of your reality data that is optimized for streaming and web publishing, control alignment, and dimensions with dedicated capabilities before handing it over to engineering and operations teams.

◆ Leverage automatic feature extraction and machine learning to turn reality data into field truth insights for data-driven decisions.

◆ Get the most of your reality data to serve as a key component of your digital twins using the iTwin Platform or any third-party software.

Image courtesy of Slovak Road Administration

Generate Real-world ROI with AI

Artificial intelligence accelerates feature extraction from reality data. By replacing long and tedious manual operations, it helps save time and improve productivity. It also helps increase safety and reduce expensive on-site visits.

Artificial intelligence is mainly used in the transportation industry for inspection and asset inventory.

Defect Inspection

Identifying early critical flaws in infrastructures (road, bridge, or rail) is key to ensuring their sustainability. To enable more frequent inspections, leverage AI-driven detection of:
- Cracks
- Corrosion
- Spalling

Asset Inventory

When performing large-scale design or maintenance operations on transportation infrastructure, it is important to have an accurate and up-to-date knowledge of the existing environment. Leveraging advanced AI-technology, reality analysis service automates your answers to these questions:
- Where are my assets? (signals, poles, maintenance holes, etc.)
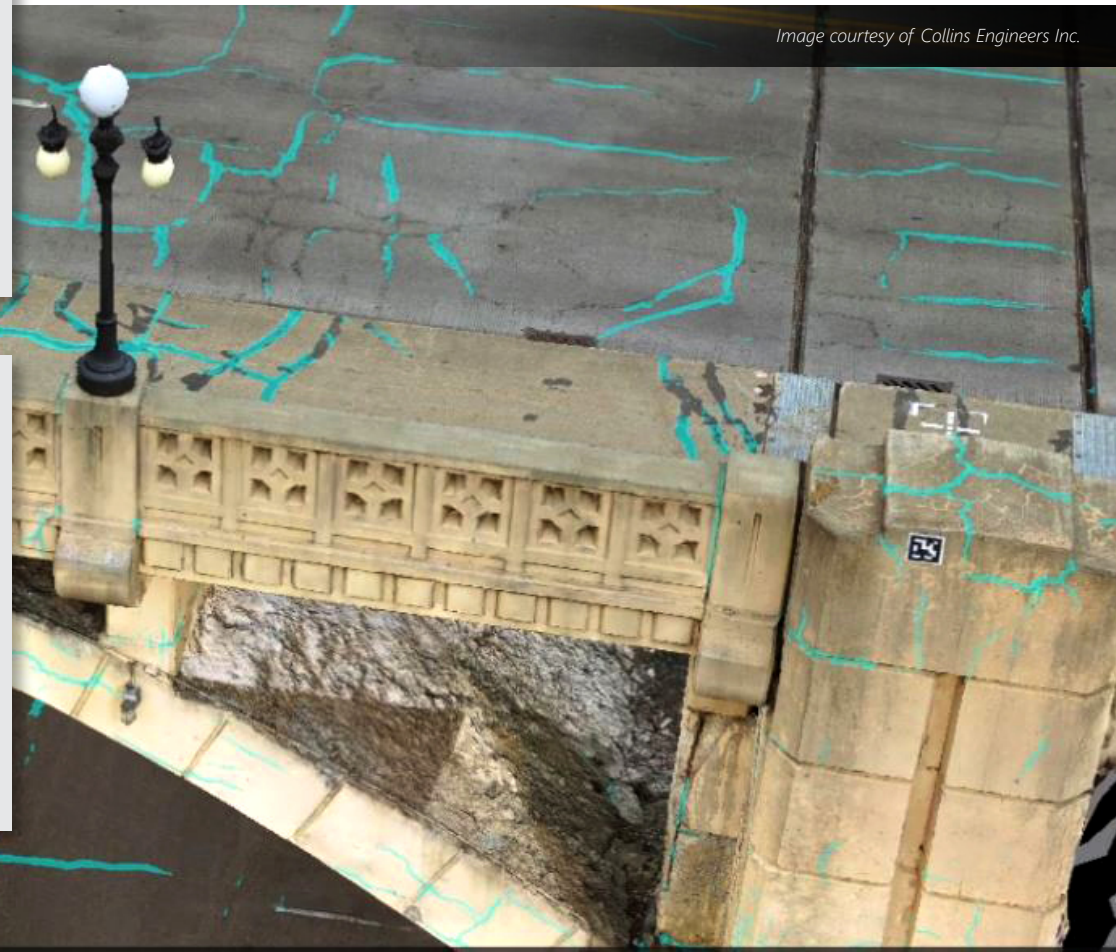- How many assets do I have?
- What is the status of my assets?

Image courtesy of Collins Engineers Inc.

AI in Reality Data Workflows

iTwin journey

01 Capture and manage reality data.
Any type, any size.
- Images
- Point clouds
- Meshes
- Orthophotos
- Video

02 AI-analysis:
- Automatic feature detection driven by custom machine learning models.

03 Actionable insights available to all stakeholders in an updated view of infrastructure's condition.

04
- Time saved
- Productivity gains
- New workflows enabled
- Safety increased

Image courtesy of Benesch

Use Case
AI saved 75% in Manual Field Work

Benesch

AI/ML-driven Pavement Crack Detection | *United States*

Most public agency assets include pavement and, therefore, require crack detection survey and maintenance. Given that traditional pavement assessment practices and technology are time-consuming and inaccurate, Benesch explored integrating artificial intelligence and machine learning (ML) into their field data collection workflows, targeting crack detection in pavement. However, they faced challenges closing the gap between digitally identifying cracks and classifying the cracks based on condition assessment. Therefore, they sought to develop their pavement crack detection technology solution.

They selected Bentley's iTwin Capture Modeler, AssetWise®, and iTwin to pilot their digital innovation at three active project sites in the United States, creating digital twins of the sites. Bentley technology harnessed the power of AI and ML, streamlining the crack detection process and feeding the data into a digital twin for analysis. The solution automates digitization of the crack linework data and saves 75% in field time, and is expected to save USD 144,000 in 100 airport inspections without impacting traffic and/or airport operations.

Project Playbook: AssetWise, iTwin, iTwin Capture, MicroStation®

Read the full case study

Getting Started

Ready to unlock data from silos and leverage added value from artificial intelligence?

iTwin Capture Cloud Services

Learn more