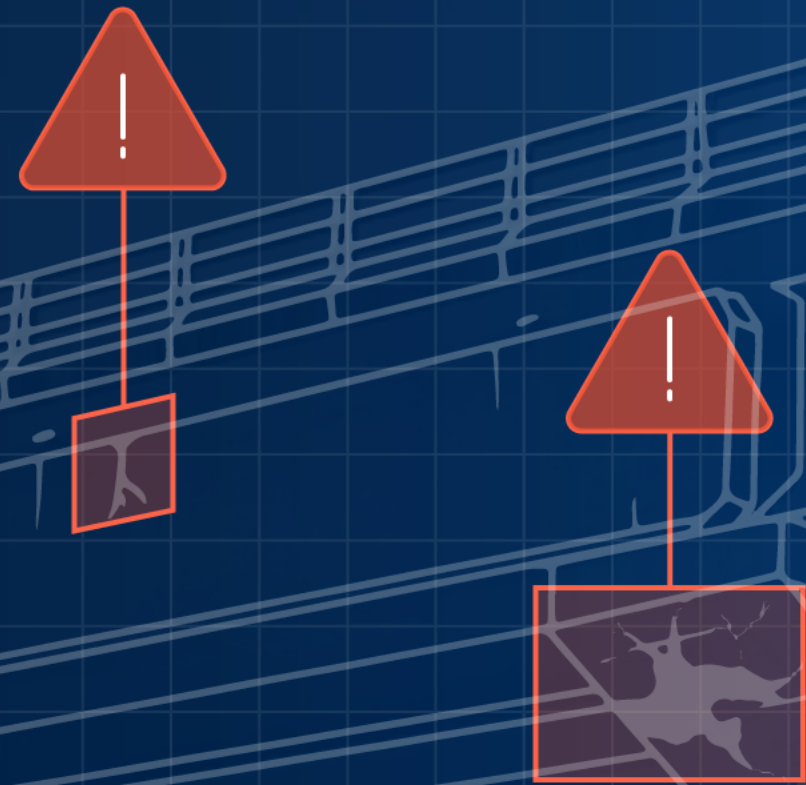


Applied AI: Civil Infrastructure & Risk



Applied AI: Civil Infrastructure & Risk

- Intro & overview
- Why
- What
- Applied AI specifics
 - Safeguarded AI
 - “Off the shelf” solutions
- Additional resources
- Questions



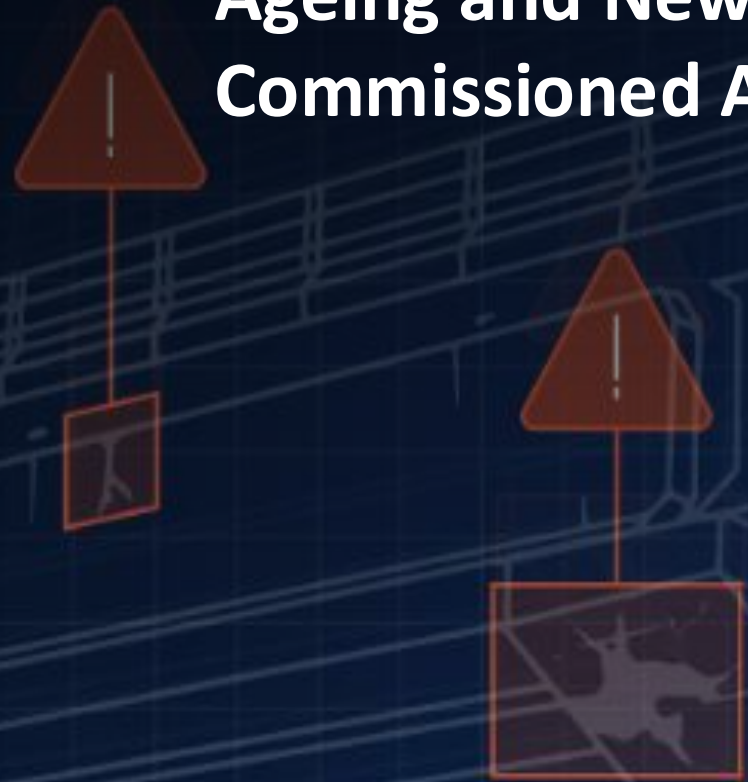
Mind Foundry is an Oxford University company.

Operating at the intersection of innovation,
research, and usability, we empower teams with
AI for high-stakes applications.

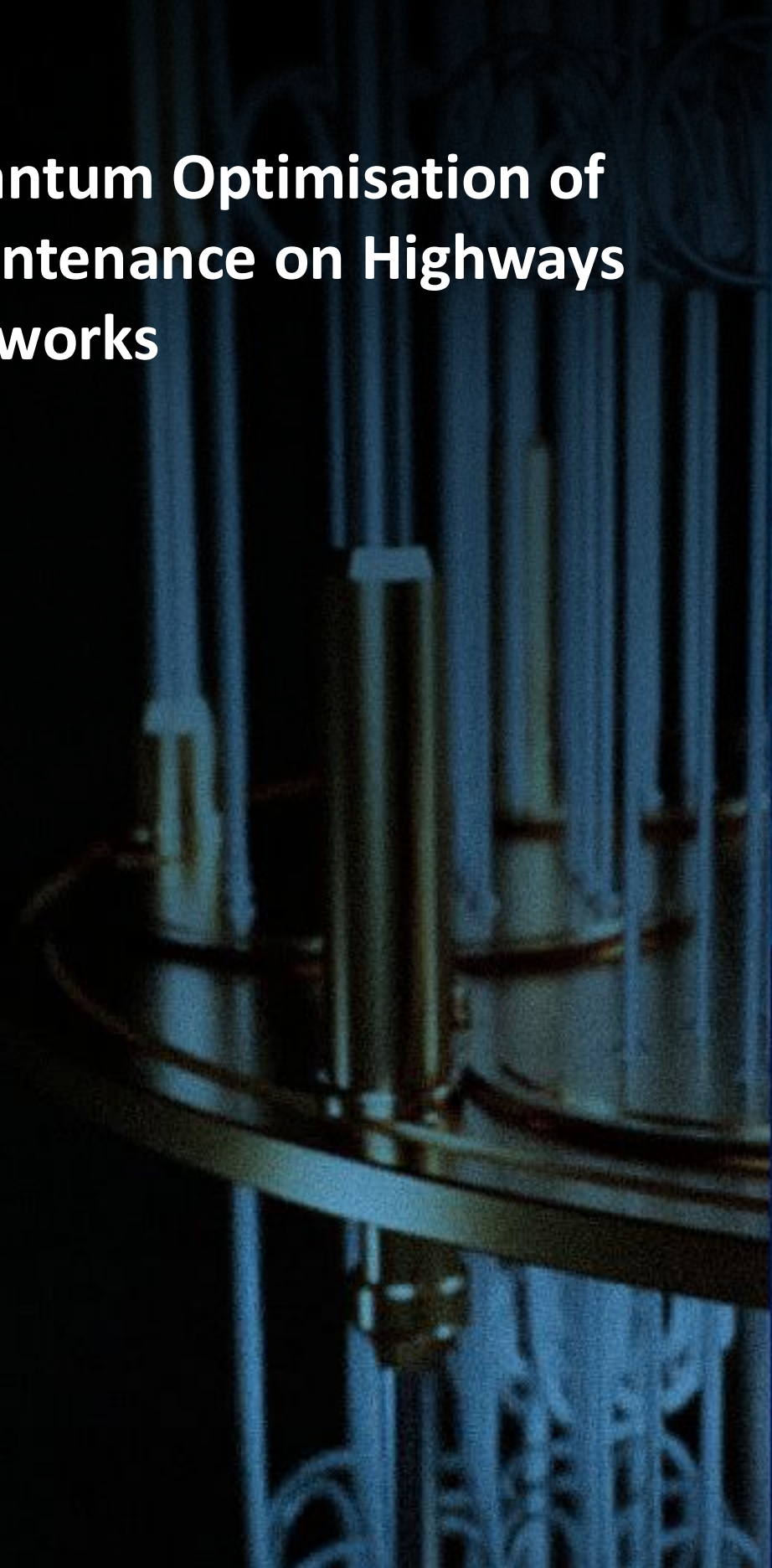


AI for High Stakes Applications

Condition Intelligence of Ageing and Newly Commissioned Assets



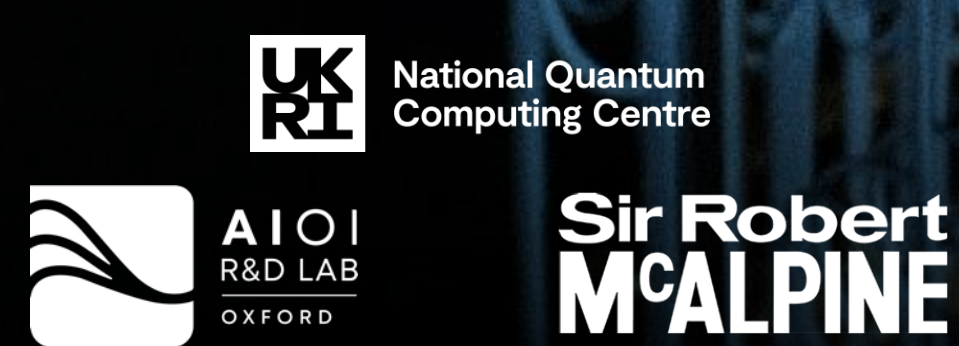
Quantum Optimisation of Maintenance on Highways Networks



Detecting changes to the Earth's surface from orbit



Fraud Detection That Improves Over Time





CHALLENGE

INFRASTRUCTURE AT A TIPPING POINT



MULTI-SECTOR

INCREASED PRESSURES

SERIOUS CONSEQUENCES



CHALLENGE

INFRASTRUCTURE AT A TIPPING POINT



We have a mass of ageing assets across sectors requiring risk management

What is the right intervention?

When is the right time to make this intervention?

How do we present a compelling case?

DATA IS VITAL



Why this matters now

- Diagnosis is a key part of engineering on existing assets a skillset with growing importance
- To know what's happening & why requires more than a single snapshot in time
 - Need to understand trends
 - Need reliable, scalable data

Where does AI fit in this?



Download Vision Paper



Mind Foundry are developing AI solutions to address asset condition management at scale

Four capability areas:

1. **Improve data quality** and efficiency of inspections when they're needed
2. **Understand change over time** to quantify deterioration and predict failure and recommendation windows
3. **Optimise and prioritise maintenance** across large portfolio and balancing long- and short-term benefits
4. **Reduce reliance on inspections** as the primary way to monitor the health of structures as we make a robust system

Mind Foundry are developing AI solutions to address asset condition management at scale

1. Improve data quality

- Analysis of areas of uncertainty in historic data/reports
- Real time data quality analysis on site as data is being captured*
- Automatic creation of inspection reports*

Mind Foundry are developing AI solutions to address asset condition management at scale

2. Understand change over time

- Computer vision analysis of inspection images*
- Predicting future recommendations from historic report & works orders
- Asset-specific deterioration models

Mind Foundry are developing AI solutions to address asset condition management at scale

3. Optimise and prioritise maintenance

- Scaling asset to portfolio deterioration prediction
 - Traditional Decision Support Tools use Markov & loose asset granularity
- Scheduling optimal time for works (attempted on the A219)
 - Didn't solve the biggest problem (local authority constraints)
 - Data links missing
 - Quantum vs Genetic algorithm

Mind Foundry are developing AI solutions to address asset condition management at scale

4. Reduce reliance on inspections

- Remote inspection
 - Automatic defect detection, segmentation & quantification
- Attention guidance based on risk
- Data fusion from different vision sources

But why would we trust any of it?!

- Industry rejects technologies that cannot be proven to be as safe as the current regime
- At a societal scale, failures in infrastructure can dramatically impact economies and quality of life and with aging assets risks rise
- The use of AI within the Digital Custodian raises safeguarding risks
 - Probabilistic
 - Could be built on untrustworthy or unrepresentative data
- If it cannot be clearly proven and trusted, it will not be accepted



Safeguarded AI for Digital Custodians

Today: Fallible, human-driven processes for approving rollout of AI systems.

Tomorrow: Robust, mathematically provable guarantees of safety required and delivered before deploying AI systems.

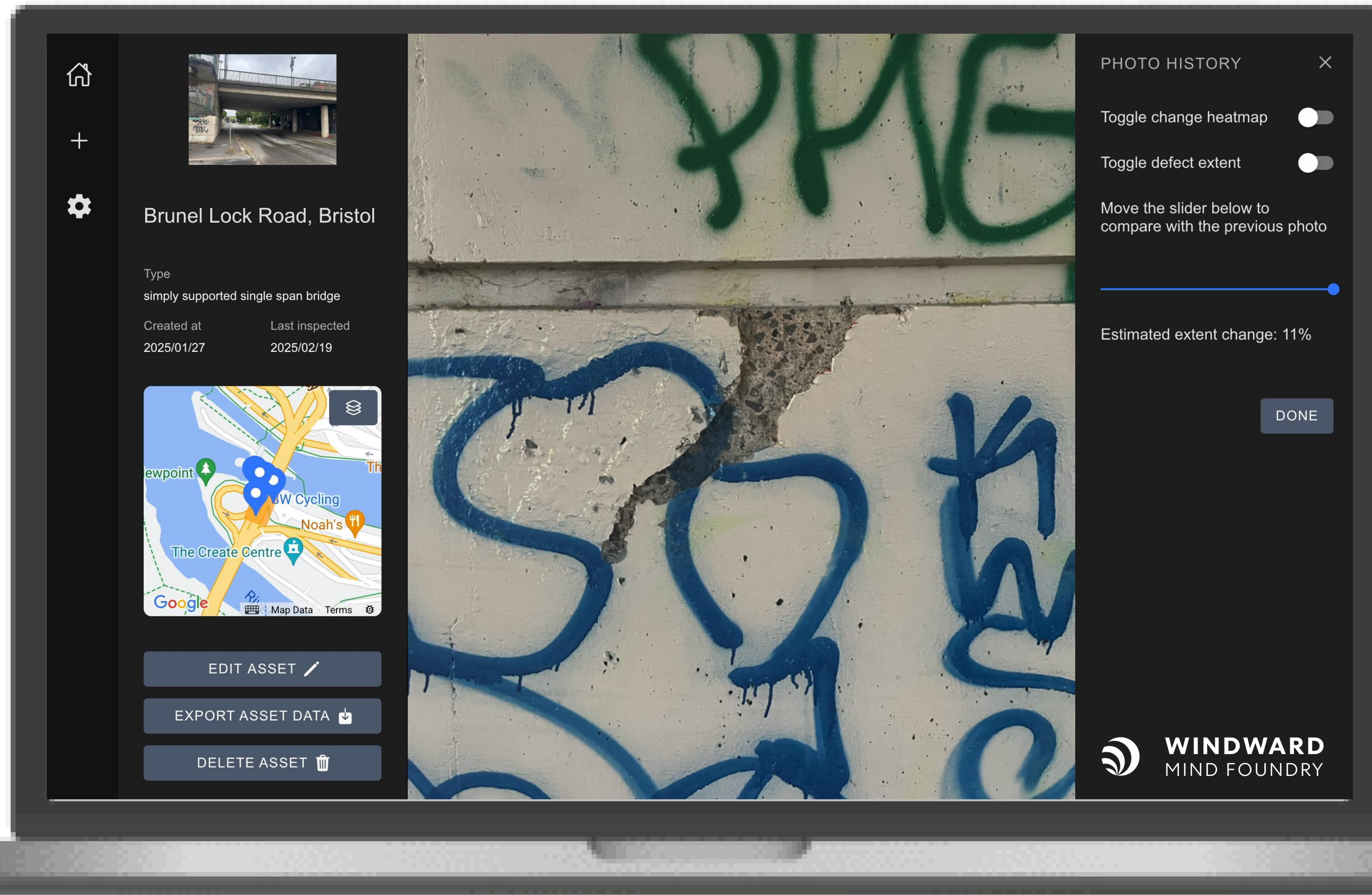


Windward

Efficient field inspections. Better data. Defensible Decisions.



But what's tangible now?



AI FOR CIVIL ENGINEERS WHITEPAPER

What You Need to Know to Build the Future

