



Midlands Highway Alliance Plus

Highways & Transport: The Future

Wednesday 23 September 2026

Workshop 5: Digital Showcase

**Chair: Rupinder Wilkhu, Digital Working Group Chair
& John Sisk & Son**



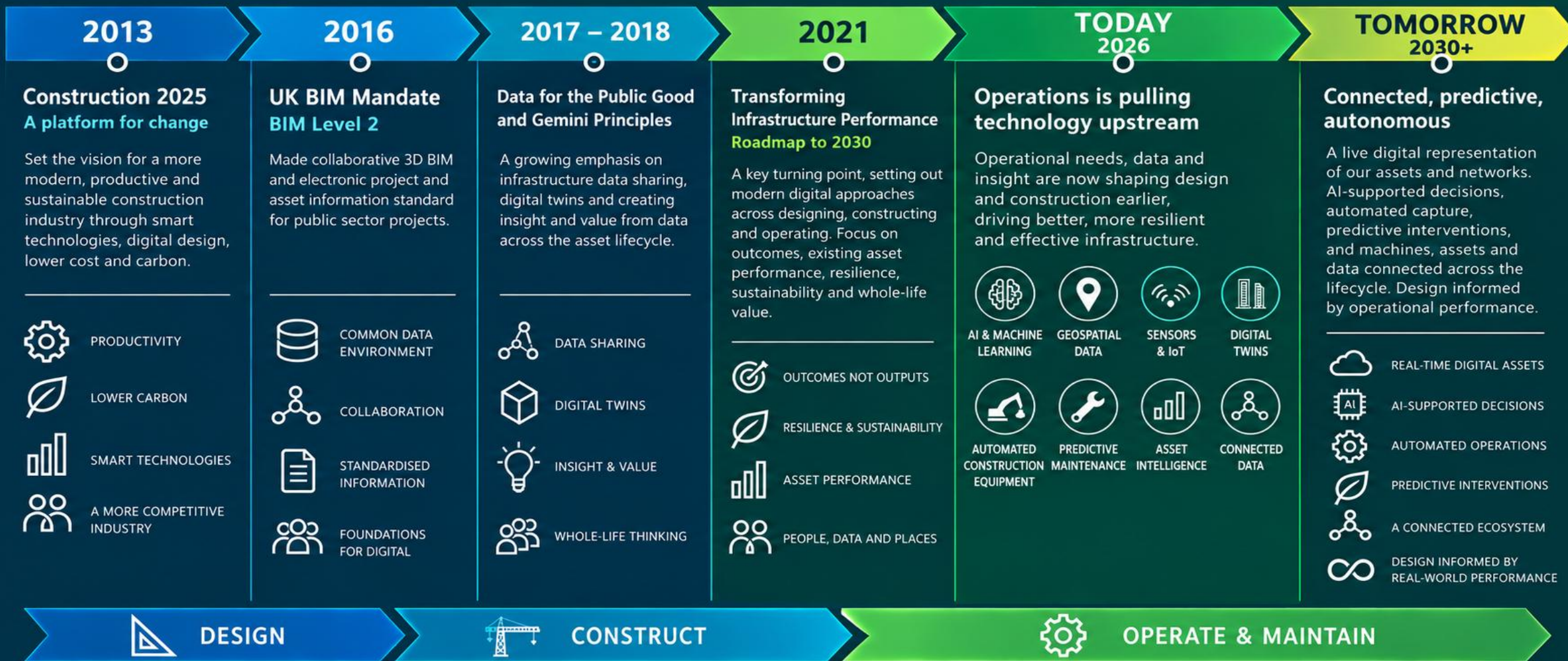
Introduction: Rupinder Wilkhu

Speakers:

Steve Birdsall – Gaist

Andrew McKinley - JCB





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Steve Birdsall – Gaist



A quiet revolution in The understanding of roads

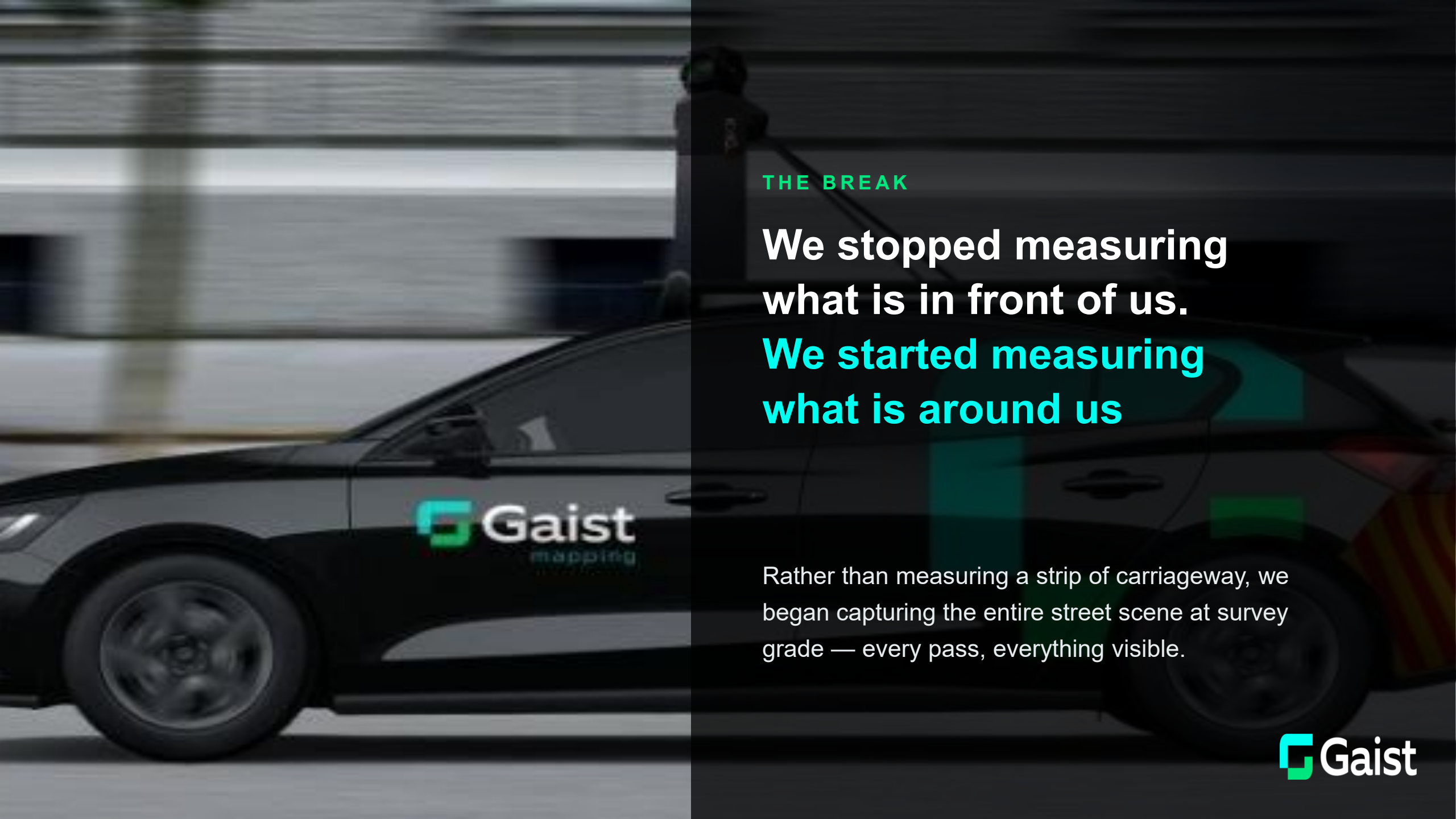
Gaist Solutions

2007

We started with the tools of the time.

Survey technology of the day could tell you how rough a carriageway was. It could not tell you what else was on the street, what condition it was in, or what it was worth. That was the limit of the tools, not the limit of the question.





THE BREAK

**We stopped measuring
what is in front of us.
We started measuring
what is around us**

Rather than measuring a strip of carriageway, we began capturing the entire street scene at survey grade — every pass, everything visible.

BUILDING LINE TO BUILDING LINE

Building a picture of the roadscape. Not just the road surface.

Carriageway, footway, kerbs, ironwork, lighting columns, signs, signals, markings, street furniture, the green estate. Everything between the buildings.



A DIFFERENT QUESTION

Measuring the road surface was never going to be the whole answer

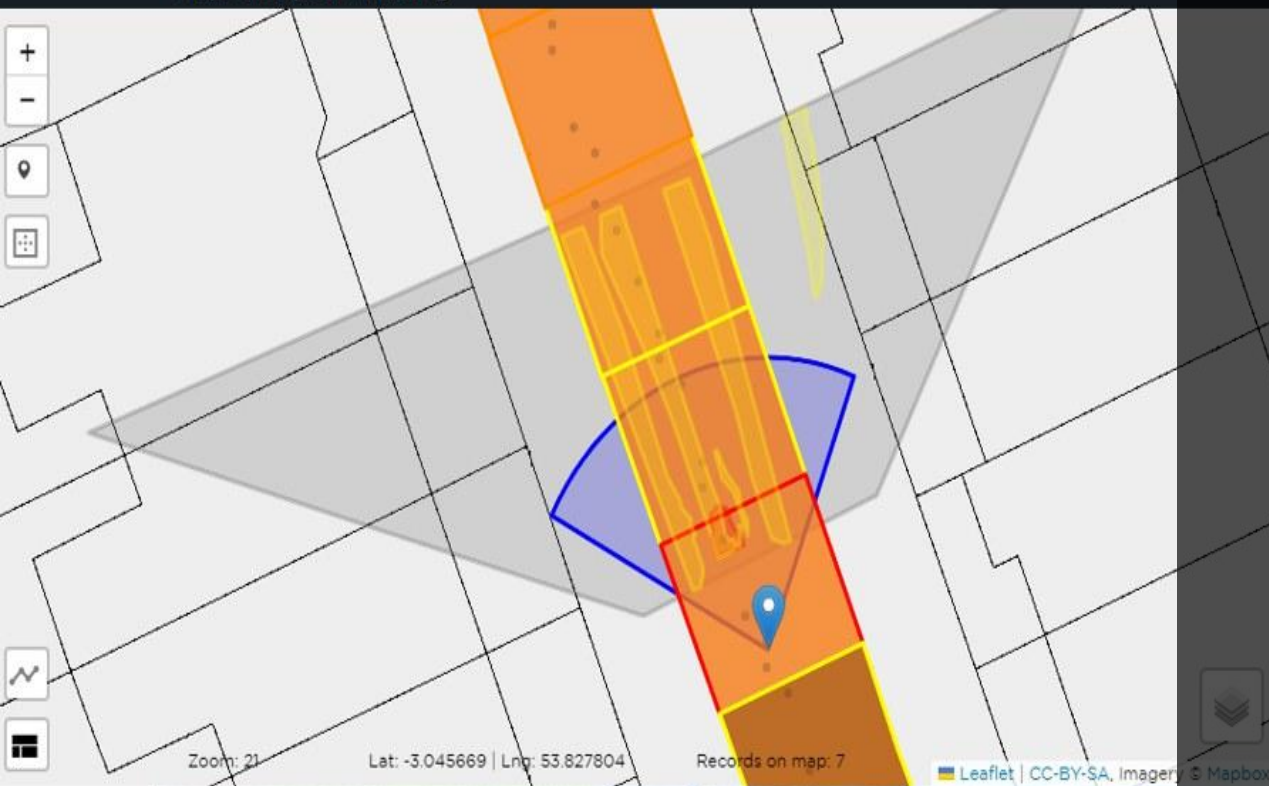
Around 2010 we began asking a wider one: what if you could understand the street as a whole system? Everything since has been built on that, and quietly, at national scale, it now works.

ARTIFICIAL INTELLIGENCE

Twelve years of development, and still accelerating innovation.

We have been running machine detection of highway assets and defects at national scale since long before it became the thing everyone talks about. That development compounds — every network we survey trains the next, so the models get sharper and the gap between what was possible last year and this year keeps widening.





WHAT AI ACTUALLY DOES

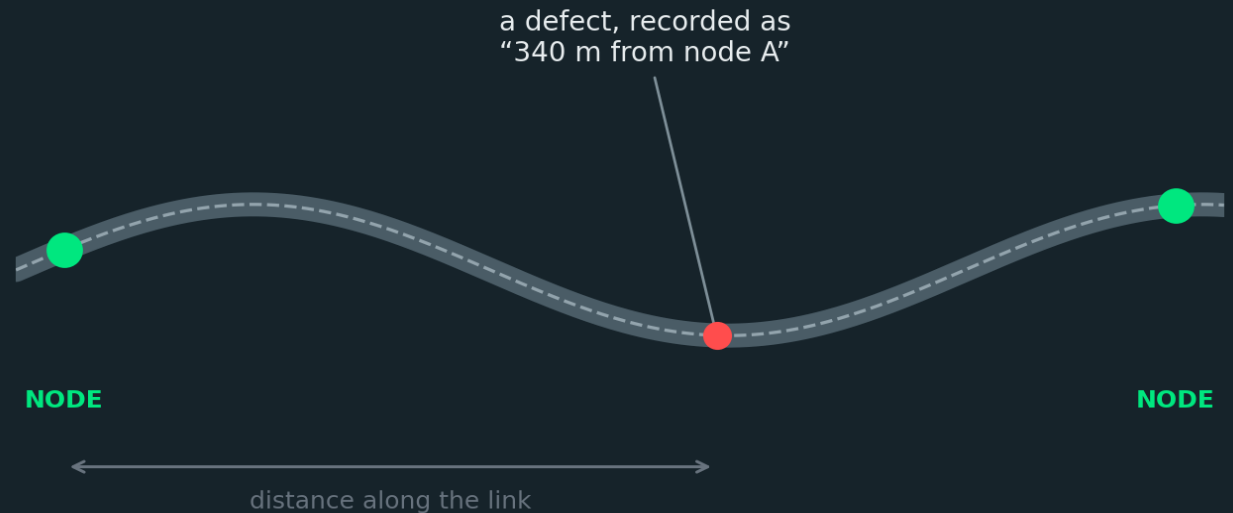
**AI is not our product.
It is our toolset.**

AI is the toolset that allows us to create massive insight from our valuable data. We use it to read the network as we survey it, and to mine everything we have already collected — twelve years of record that gets more useful every time we return to it.

THE FOUNDATION WE ALL INHERITED

A node, and a distance along a line.

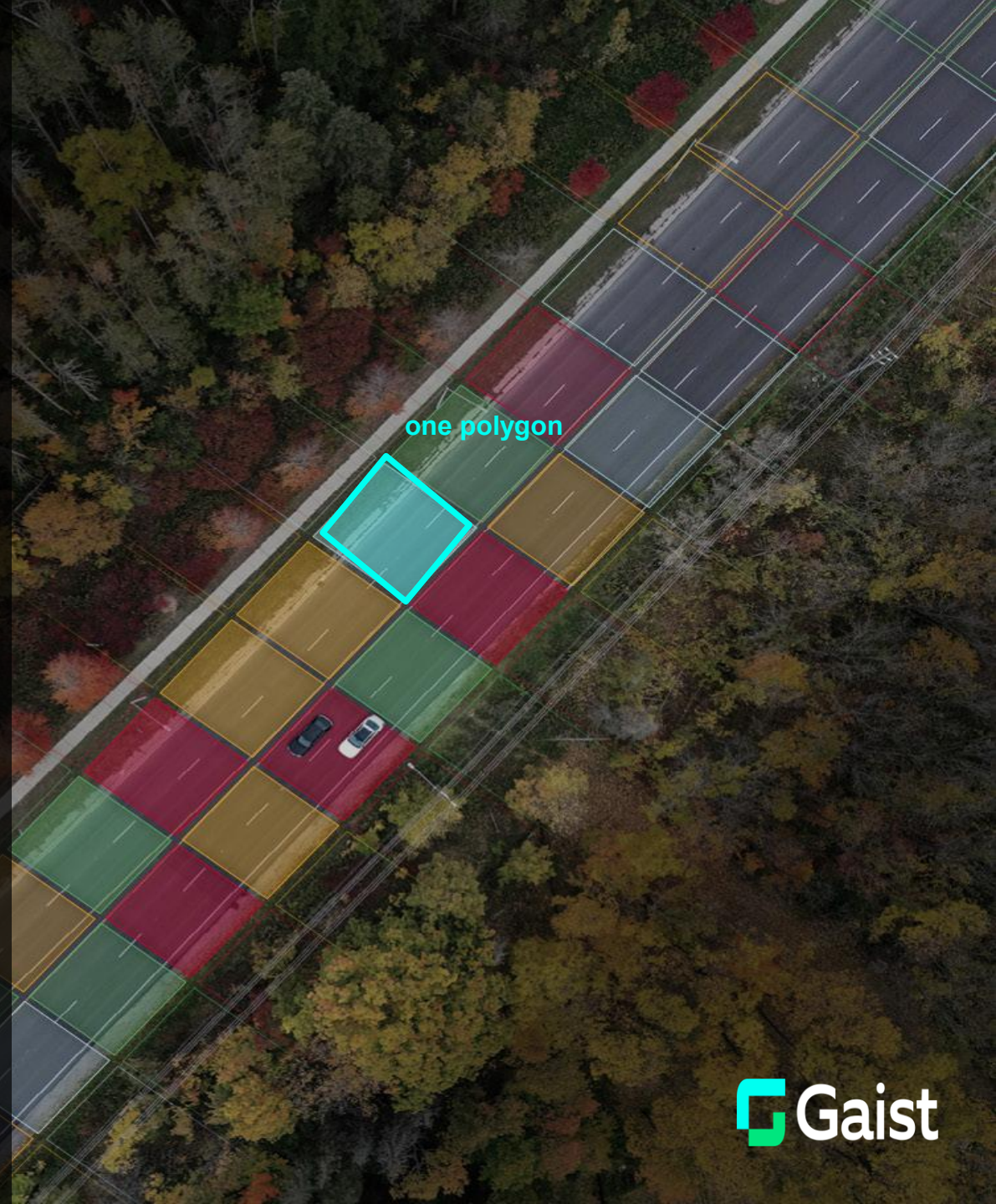
For decades highway data has been referenced to a linear network — so many metres from a node, along a link. It was the right answer for its time and it has served the sector well. Its limit is that the reference can move: resegment the network and the history no longer lines up.



BUILDING ON IT

So we fixed the **reference in space.**

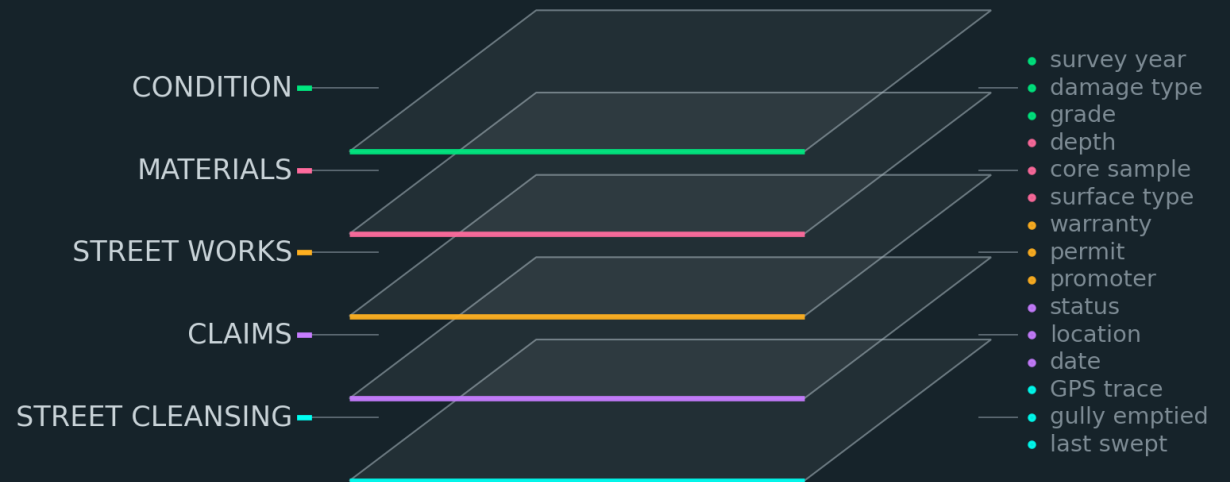
We divide the network into five-metre polygons — a patented process we call the grid. Each polygon has a permanent address that does not move when the network is resegmented, so every survey year stacks cleanly on the one before it.



ONE POLYGON, EVERYTHING IN IT

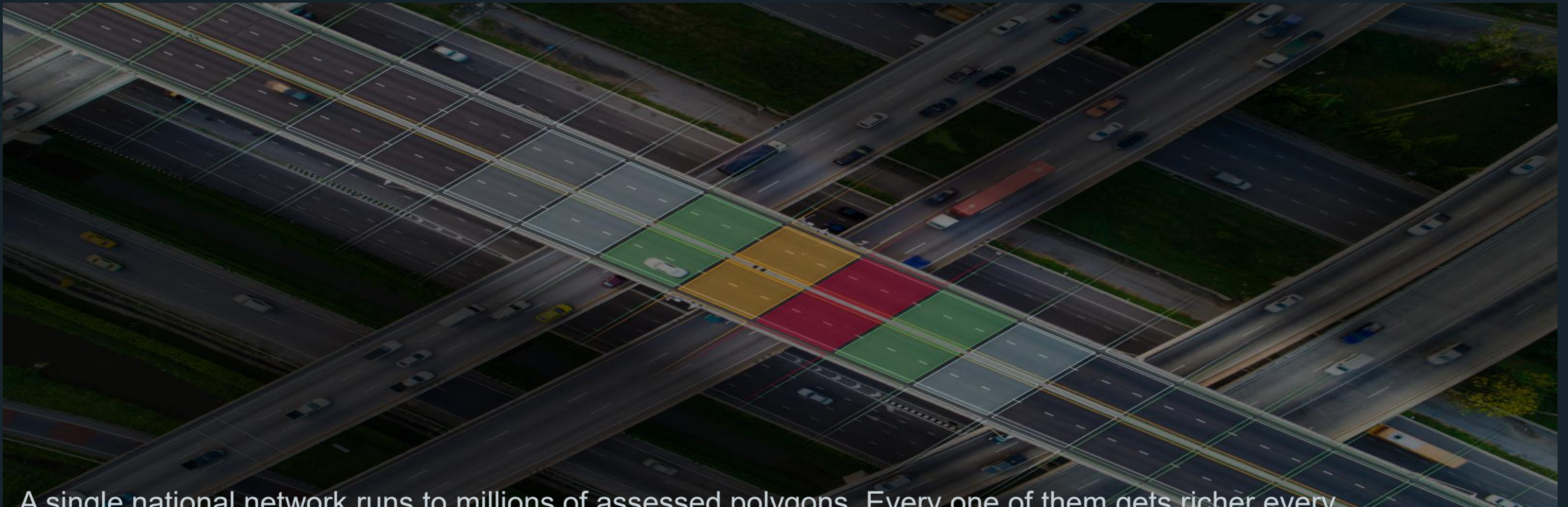
A database in its own right.

Condition and materials. Core samples. Street works and who carried them out. Claims against that point. Anything with a GPS trace — when the sweeper last passed, when the gullies were last emptied. It all has an address now.



THE CONSEQUENCE

**Millions of small databases,
per network, per client, per country.**



A single national network runs to millions of assessed polygons. Every one of them gets richer every year, and none of it has to be collected twice.

Polygonising an entire network is hard.

Polygonising an entire country is a major technological achievement.

The idea of a fixed grid is easy to describe. Building one that holds across a whole network took years of development — and it is the reason this is ours rather than a feature anyone can bolt on.

Every network, edge to edge

Junctions, roundabouts, varying widths, splitter islands — the grid has to resolve all of it without gaps or overlaps.

Stable through change

Polygons must survive resegmentation, renaming and re-survey, or the year-on-year comparison is worthless.

Built to hold anything

One schema that accepts condition, materials, works, claims and GPS traces against the same address.

STEP ONE

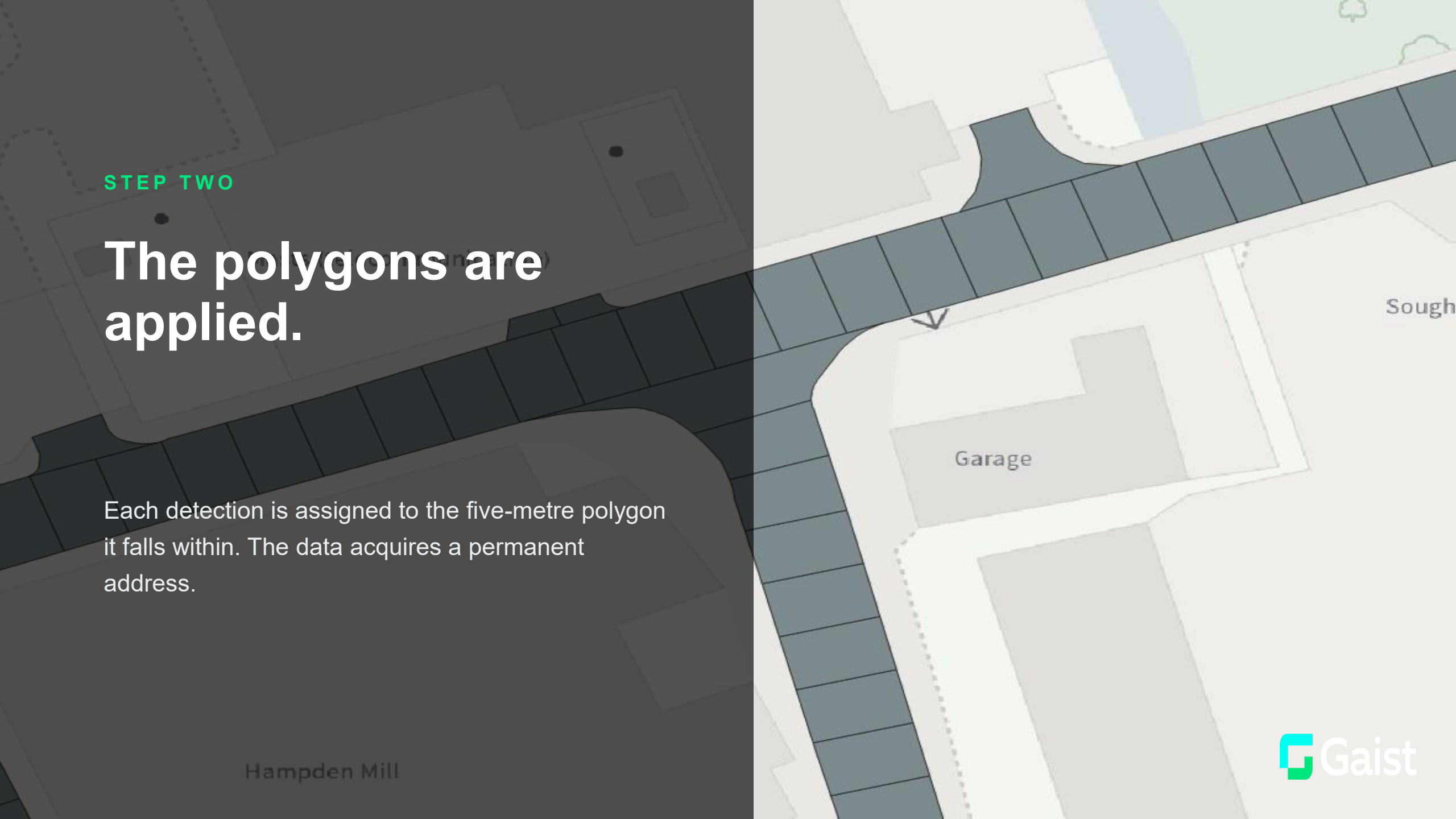
AI detects what is there.

Every defect, marking and asset in the frame, identified and classified automatically.

Hampden Mill

Garage

Sough



STEP TWO

The polygons are applied.

Each detection is assigned to the five-metre polygon it falls within. The data acquires a permanent address.

STEP THREE

Every polygon carries a grade.

The result is a graded network you can query, compare year on year, and build a programme from.

NORTHERN IRELAND

An entire national network. Inside twelve months.

Department for Infrastructure Roads. Every district, the motorway network reported separately, and the whole carriageway estate assessed polygon by polygon.



WHAT CHANGED

Twelve months, and a different picture.

BEFORE

Condition known in parts

No consistent national baseline

Programmes built on local judgement

Funding cases hard to evidence

NOW

Every crack, asset and grade located

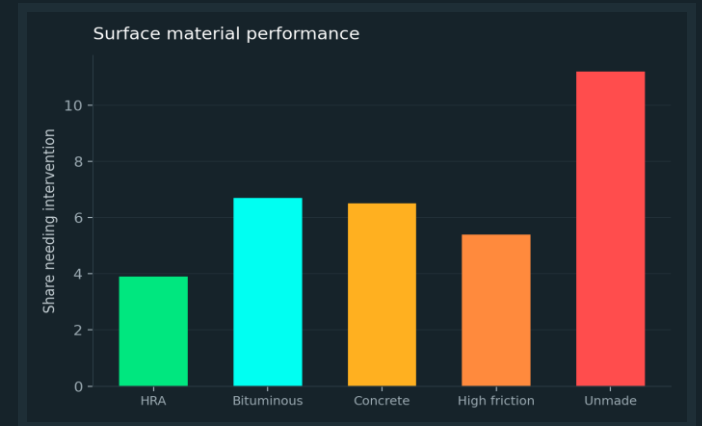
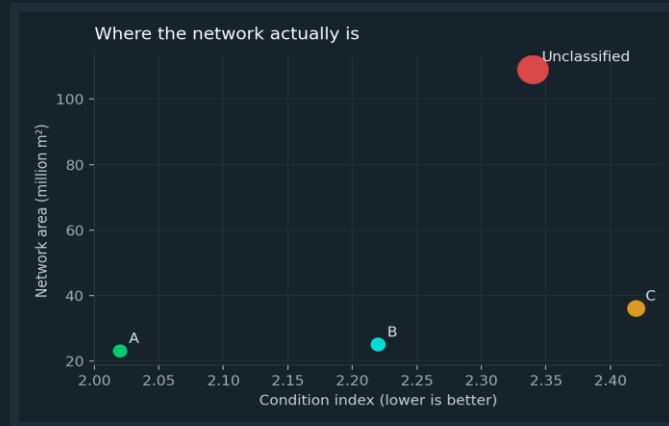
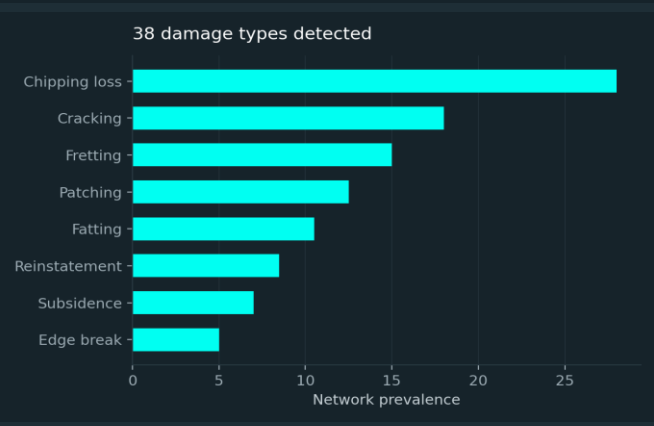
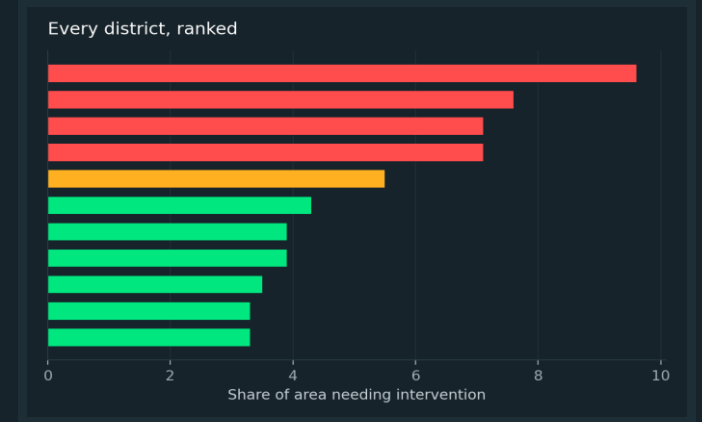
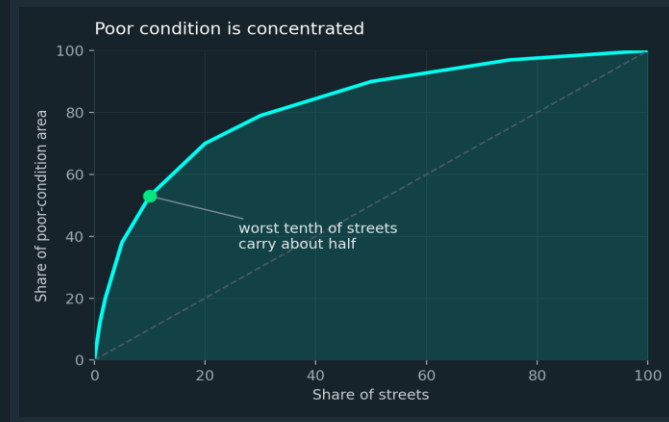
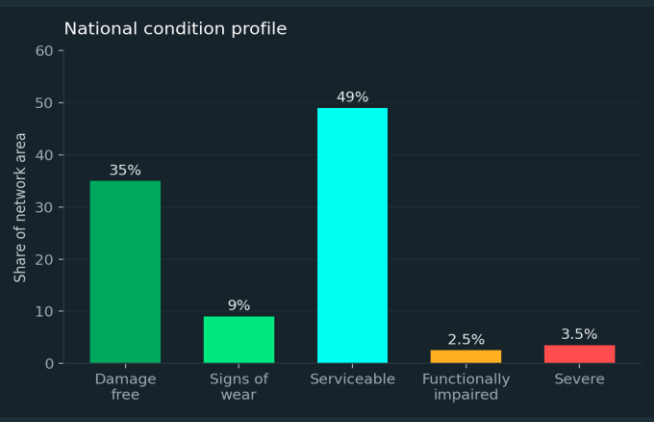
One baseline, all eleven districts

Programmes built on network-wide evidence

A case government can audit

THE DEPTH OF ANALYSIS

The depth you can work at when the whole network is measured.



Illustrative examples of analysis type. Figures are indicative only and not published network results.

WHAT THE ANALYSIS REVEALS

Not just how much is failing. How, where, and what next.

How it is failing

Thirty-eight distinct damage types, separated and quantified — cracking, fretting, chipping loss, subsidence, patching.

What to do first

Treatment targeted where it earns most, rather than spread evenly across the network.

Where it is failing

Down to the polygon, aggregated to street, ward, district or nation, whichever the decision needs.

Whether it worked

Re-survey the same polygons and the effect of the money spent is measurable, not asserted.

Which materials are failing

Performance by surface type, so specification decisions rest on evidence from the network itself.

What happens next

Deterioration modelled forward, so the funding case covers the years ahead as well as this one.

THE BAND THAT DECIDES

**The interesting part is
what is not broken yet.**

A large part of any network is sound today and could go either way. That is where preventative treatment earns its return — and it is invisible unless you can see the whole surface at polygon resolution.

Half the network sits in the middle band



BEYOND THE CARRIAGEWAY

Carriageway condition is one part of the job.

Traffic regulation orders

Every sign and marking located and legible, so orders can be evidenced and enforced.

Street works

Every reinstatement assessed, in and out of warranty, with evidence that stands up.

Active travel

Footway, crossing and cycle provision condition — the network people actually walk.

Asset inventory

Signs, columns, ironwork, drainage, furniture. Located, classified, condition graded.

Green estate

Verge, vegetation encroachment and sightline obstruction across the network.

Safety and liability

Dated, located evidence for every claim, on every polygon.

STREET WORKS

**It is not a seeing
problem.
It is a scale problem.**

Utilities and authorities do put inspectors on the ground, and they are good at the job. There are simply more reinstatements than any team can reach. What gets inspected is a sample; what gets missed is most of it.



THE ARITHMETIC

Networks are too big to inspect on foot.

Whatever the size of your network, walking it to find data is close to impossible. There is too much of it, and it changes constantly.

And the engineers to do it are not there to hire. Recruiting them is hard, training them takes years, and the shortage is not something funding alone can fix.

So we changed how the data is collected — not how hard people look for it.



○ OSM
● Satellite



500 m



**Every reinstatement,
assessed and
evidenced.**

Visual assessment of every reinstatement, in and out of warranty. Enforcement-ready reports generated automatically — annotated evidence, checklist, recommended actions, tied to the polygon it sits on.

Gaist

Street works inspection

Reinstatement — Jerry Croft

08/09/2026, 09:30:33 - Jerry Croft - USRN 9601305 - 53.96227, -2.01617

DEFECTS FOUND

confidence medium

A grade-5 structural section with a recorded reinstatement is centered near the faded '5' road marking; the image shows general surface wear, some tonal patching, and a nearby drainage gully, but the reinstatement's precise edges, joints, and profile cannot be confirmed with certainty at this resolution. Given the recorded grade 5 and defects (rutting, subsidence, patching, reinstatement), the area should be treated as non-compliant pending site verification.

INSPECTOR

—, Gaist Solutions

PERMIT REFERENCE

—

USRN

9601305

IMAGE SOURCE

Gaist survey frame - Rear camera - 9 m from section, 4°

Annotated evidence — defects marked

5. target area indicated by red box; road surface here looks uneven/patched in tone but no obvious pothole or subsidence clearly resolved at this resolution — severity 4/10
6. double yellow lines, worn/faded, standard — severity 1/10
7. paved footway with stone flags, appears intact, no visible trip hazard — severity 1/10
8. pedestrians and parked car, not surface-relevant — severity 0/10

Gaist - Skipton 2024 - batch_10438

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Street works inspection

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inspector - Page 2

Street works inspection

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inspector - Page 3

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THE REFRAME

Where the value actually lands.

Efficiency

The right treatment, in the right place, at the right time. Less waste, fewer wasted visits.

Recovery

Recover cost from utilities and promoters with evidence that survives challenge.

Risk and liability

Know the condition of every asset. Defend claims with dated, located proof.

Funding

Build a case that stands up to government scrutiny, and show progress against it.

More data is coming. But it should not be a burden.

The volume of data a network can generate is about to grow enormously. Authorities do not need to process it — that is our job. What arrives is the insight, already interpreted, at the point the decision is made.

Available today

Gaist clients already work this way. It is not a roadmap item.

Reaching further

More authorities are coming to this level of understanding each year.

Setting the standard

We have set the pace for nearly twenty years. We would rather others followed than not.

Network by Network we are revealing the true state of the UKs roads

The revolution is quiet because it is not about us.
It is about every authority getting to know its roads this well.

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Questions

