Trendspek



From Assumptions to Evidence

A practical maturity guide to digital transformation for Structural Lifecycle Management

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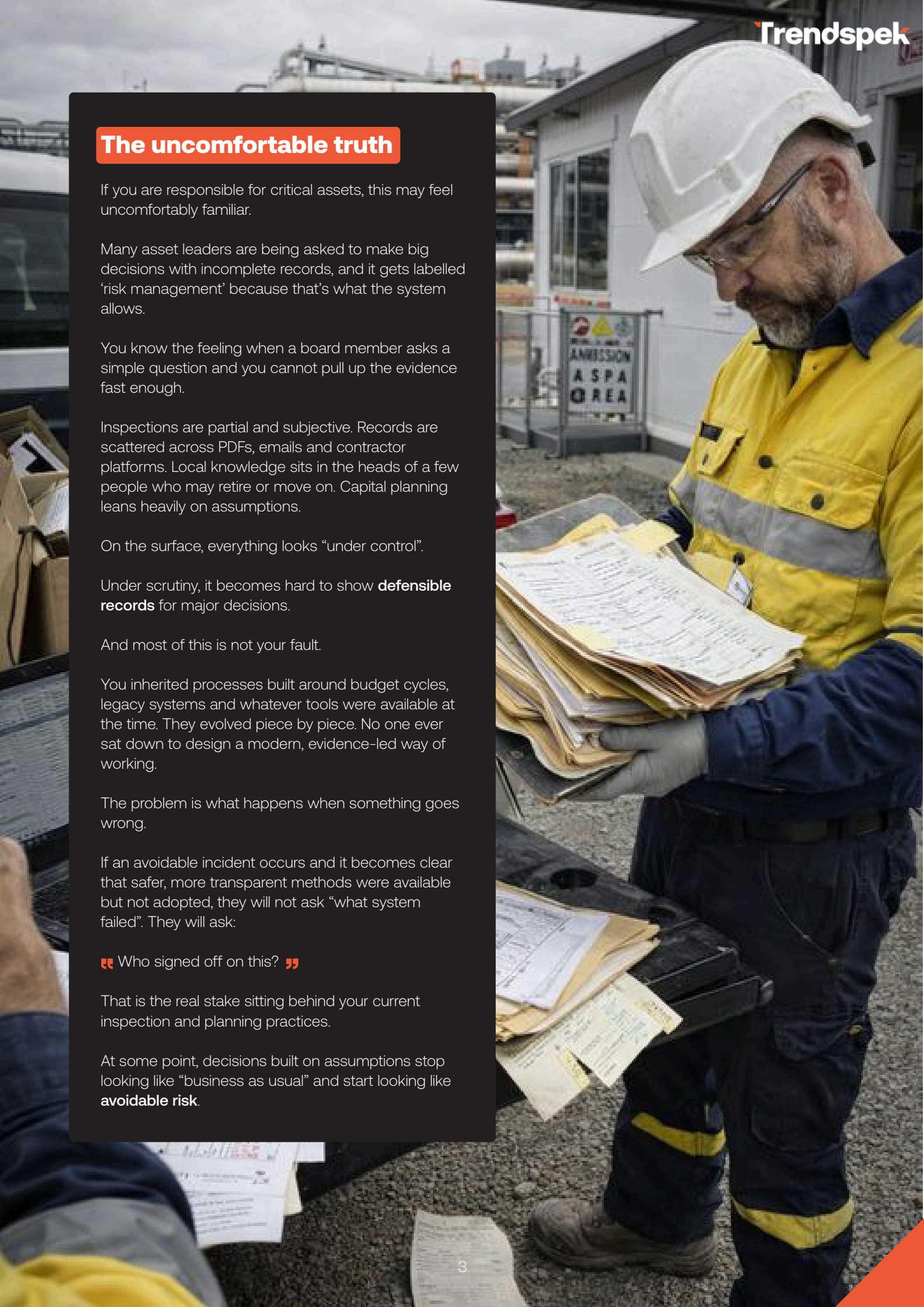
I wrote this to help asset leaders move from fragmented records and one-off inspections to a staged, defensible approach to lifecycle management. It's based on what we see working across complex asset portfolios and integrity programs globally.



The uncomfortable truth

If you are responsible for critical assets, this may feel uncomfortably familiar.

Many asset leaders are being asked to make big decisions with incomplete records, and it gets labelled 'risk management' because that's what the system allows.

You know the feeling when a board member asks a simple question and you cannot pull up the evidence fast enough.

Inspections are partial and subjective. Records are scattered across PDFs, emails and contractor platforms. Local knowledge sits in the heads of a few people who may retire or move on. Capital planning leans heavily on assumptions.

On the surface, everything looks "under control".

Under scrutiny, it becomes hard to show **defensible records** for major decisions.

And most of this is not your fault.

You inherited processes built around budget cycles, legacy systems and whatever tools were available at the time. They evolved piece by piece. No one ever sat down to design a modern, evidence-led way of working.

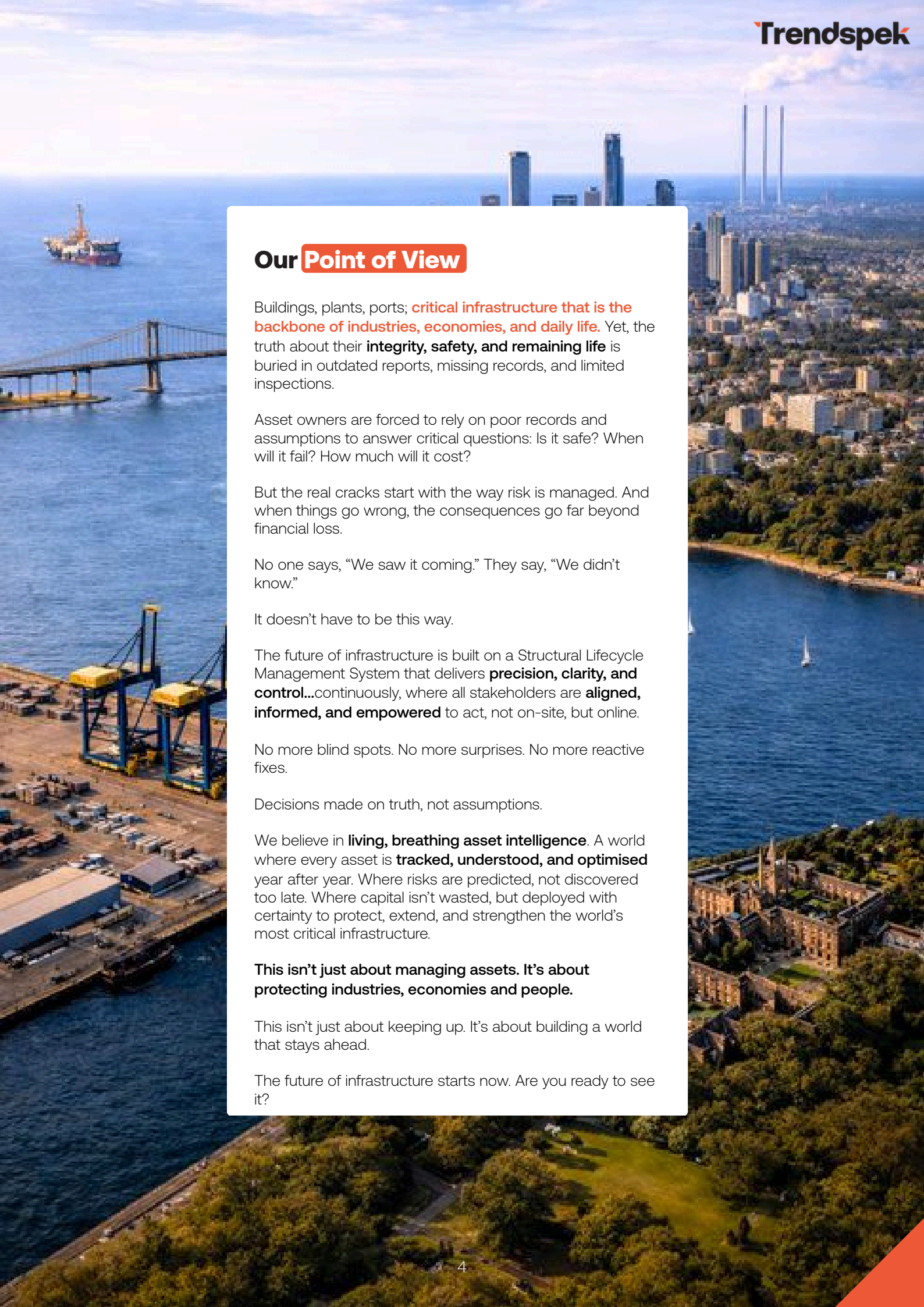
The problem is what happens when something goes wrong.

If an avoidable incident occurs and it becomes clear that safer, more transparent methods were available but not adopted, they will not ask "what system failed". They will ask:

> "Who signed off on this?"

That is the real stake sitting behind your current inspection and planning practices.

At some point, decisions built on assumptions stop looking like "business as usual" and start looking like **avoidable risk**.



Our Point of View

Buildings, plants, ports; **critical infrastructure that is the backbone of industries, economies, and daily life.** Yet, the truth about their **integrity, safety, and remaining life** is buried in outdated reports, missing records, and limited inspections.

Asset owners are forced to rely on poor records and assumptions to answer critical questions: Is it safe? When will it fail? How much will it cost?

But the real cracks start with the way risk is managed. And when things go wrong, the consequences go far beyond financial loss.

No one says, “We saw it coming.” They say, “We didn’t know.”

It doesn’t have to be this way.

The future of infrastructure is built on a Structural Lifecycle Management System that delivers **precision, clarity, and control...**continuously, where all stakeholders are **aligned, informed, and empowered** to act, not on-site, but online.

No more blind spots. No more surprises. No more reactive fixes.

Decisions made on truth, not assumptions.

We believe in **living, breathing asset intelligence**. A world where every asset is **tracked, understood, and optimised** year after year. Where risks are predicted, not discovered too late. Where capital isn’t wasted, but deployed with certainty to protect, extend, and strengthen the world’s most critical infrastructure.

This isn’t just about managing assets. It’s about protecting industries, economies and people.

This isn’t just about keeping up. It’s about building a world that stays ahead.

The future of infrastructure starts now. Are you ready to see it?

The O&M wheel: how the stages are derived

Most organisations do not get caught out because they are not inspecting. Most teams are doing the best they can with the systems and records they inherited.

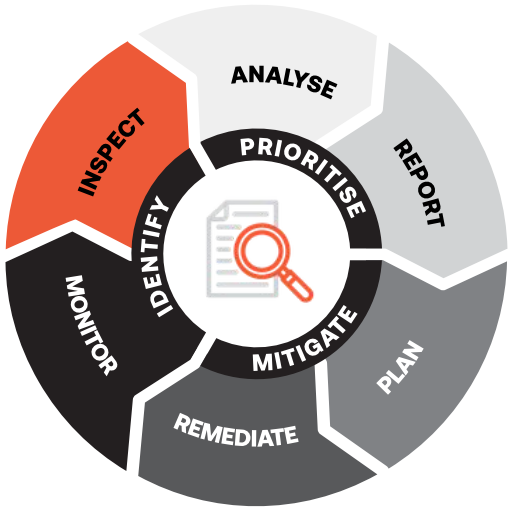
"This wheel represents the end-to-end asset management lifecycle."

From pre-inspection information and inspection capture, through reporting and capital planning, to delivery and post-work verification.

The exposure starts when records are too weak to carry decisions through to delivery.

Start at Inspect and move clockwise. The labels are simple on purpose.

- **Inspect, analyse, report:** Turn what's on site into evidence your team can use. In a form that is consistent and reviewable.
- **Plan, remediate, monitor:** Deliver the work, then prove what changed. So the next cycle starts with truth, not guesswork.
- **Identify, prioritise, mitigate:** Keep decisions tied to risk and consequence. Not just what is visible or easiest to scope.



Records sit at the centre. They feed every step.

That includes pre-inspection context, inspection findings, decisions, scopes, work orders, and post-work evidence.

If records are scattered, inconsistent, hard to find, or not comparable over time, the lifecycle breaks.

You end up re learning the asset each cycle. What good looks like is simple: **structured, searchable, and comparable** between cycles.

The wheel is the workflow. The maturity curve shows how reliably you run it across the portfolio. Take the next step, not the whole leap.

Lifecycle focus	Maturity stage	What it looks like in practice
Records break between stages	Status Quo	Decisions rely on PDFs and memory.
Capture begins, records scattered	Stage 0	Capture exists, but records stay in silos.
Inspect, analyse, report	Stage 1	Inspections run in 3D with consistent tags.
Plan	Stage 2	Scopes and tenders are built from the model.
Monitor	Stage 3	Repeat cycles show change and steer CAPEX.
Connect the lifecycle	Stage 4	SLMS links to CMMS, ERP, and BI.
Automate parts of lifecycle	Stage 5	AI flags defects and change for review.

The path forward

There is a clear, staged path out of this.

By moving from traditional, assumption-led inspections to a **Structural Lifecycle Management System (SLMS)**, asset owners and their partners can:

- **See the true condition of critical assets** in high fidelity 3D
- **Standardise inspections and reporting** across portfolios and partners
- **Plan shutdowns, remediation and capital works** using live, spatially accurate evidence
- **Monitor deterioration over time** and intervene precisely
- **Integrate condition data** into enterprise systems and AI models

Across oil and gas facilities, ports and university campuses, we at Trendspek have seen anisations achieve:

- **10–30× ROI** on lifecycle programs
- **65–70%** reduction in risk scores
- **Up to 40%** lower remediation and capital project costs
- **Up to 80%** labour efficiency gains in analysis, reporting and planning

Trendspek is a **Structural Lifecycle Management System, or SLMS.**

Think of it as a shared 3D online environment where owners, engineers and partners inspect, analyse, plan and monitor the lifecycle of their assets in one place.

This white paper gives you:

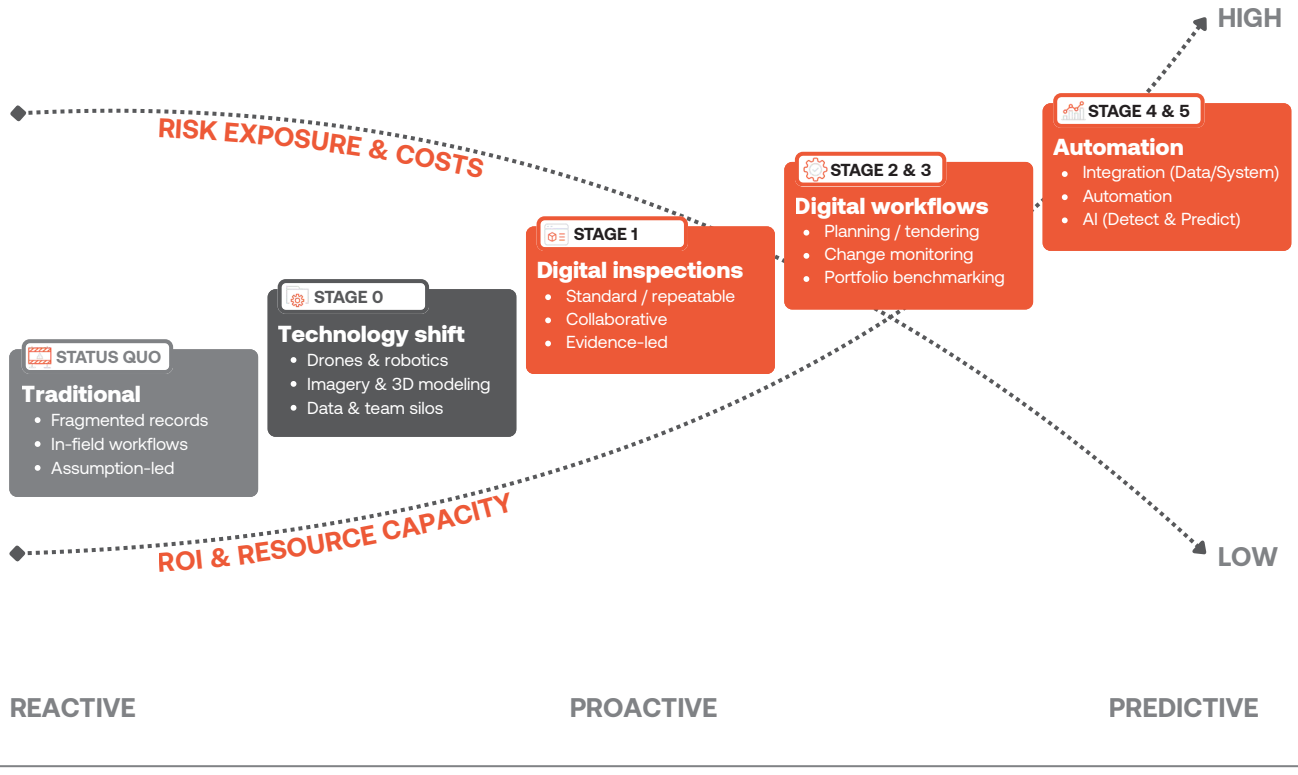
- A six-stage SLMS maturity model
- A self-diagnostic to see where you sit
- A practical roadmap to move one stage at a time

It is written for asset managers, integrity engineers and capital works leaders, and for the executives who rely on them.

This paper shows asset leaders how to transition from assumption-led inspections to an evidence-led Structural Lifecycle Management System, enabling them to defend every decision and reduce avoidable risk.

This is a practical model you can apply one stage at a time.

Maturity stages



The asset leader's reality

Hero, villain and stakes

You are the hero of this story if:

- You are responsible for assets that cannot fail
- You sign off inspections, remediation and capital works
- **You are expected to "optimise cost" and "reduce risk" at the same time**

You might be:

- An asset manager at a major university
- An integrity engineer responsible for offshore structures
- A capital works lead in a port authority

Most teams we meet are doing the best they can with the records they have. The status quo evolved over time. You inherited most of it. No one sat down and designed it.

The villain: an ecosystem of assumptions

The villain is not a person. It is the ecosystem you operate in:

Fragmented records

Existing asset information may be lost, incomplete, or not exist at all, limiting the ability to make informed decisions.

Local, undocumented knowledge

Critical asset knowledge is undocumented and held by only a few employees, making the organisation vulnerable to knowledge loss.

Partial, subjective inspections

- Representative coverage (10–30 percent) extrapolated to the whole asset
- Inspectors' experience, fatigue and focus shaping what is seen and recorded

When records are scattered and knowledge is local, you are managing risk by memory, not by evidence.

The stakes: safety, cost and liability

The consequences are real:

Safety and HSE

When inspections are based on visual walkarounds, assumption led data, or limited access, critical safety issues may go unnoticed.

Financial performance

- Inaccurate scopes and provisional quotes drive variations and overruns
- Capital is allocated to visible issues while unseen risks grow elsewhere

Reputation and personal liability

If an incident occurs and evidence shows a safer, viable method existed but was not adopted, legal and personal consequences may follow for leadership.

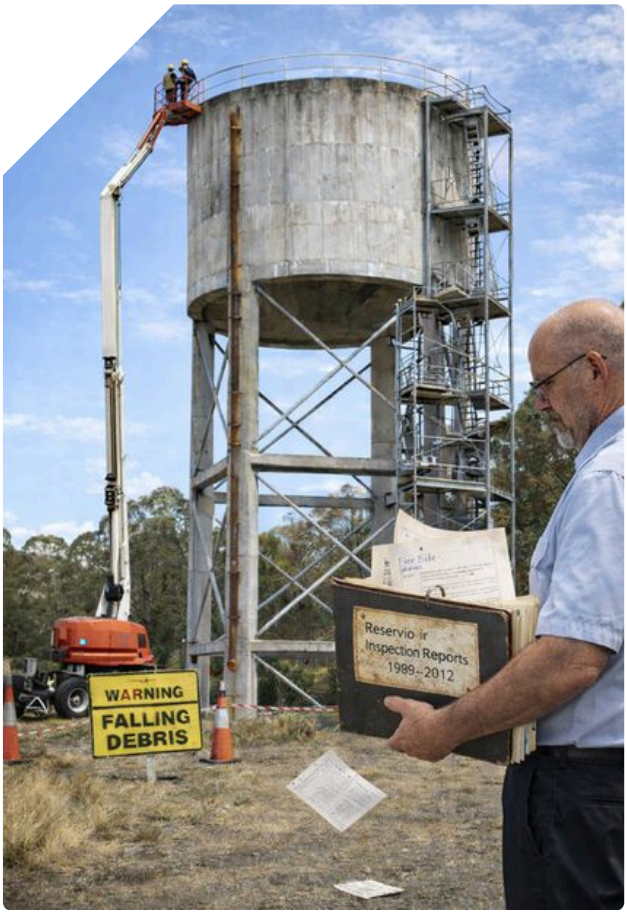
The world is moving toward evidence-led governance. Asset leaders can no longer rely on "this is how we have always done it" when records and tools can be improved.

Your real risk is not the crack in the structure. It is the gap in the record.

Success vs failure at a glance

Same budget, two futures. One is documented, one is guesswork.

If you stay in the status quo		If you move up the SLMS maturity curve
Capital is allocated reactively to visible issues		**Capital is allocated based on portfolio-wide risk** and condition
Decisions rely on **partial inspections** and **assumptions**		Decisions rely on **full coverage**, high fidelity **evidence**
Reports are **static PDFs** that are hard to find and cannot be replayed		Reports are **interactive, spatially accurate** and easy to explore
Local knowledge walks out the door with key staff		Knowledge is captured as structured, auditable records
People spend time travelling, climbing and doing admin		People spend time analysing, planning and collaborating virtually
Unexpected failures drive emergency works and downtime		**Issues are picked up earlier**, outages are shorter and planned
Executives **struggle to defend decisions** under scrutiny		Executives can reference **clear, defensible records** for each decision





Your six step plan to move from assumptions to evidence

Status quo: traditional

"Gaps, assumptions and scattered records."

- Manual, field-based, low coverage inspections
- Static reports stored across teams and systems
- Capital planning based on snapshots and assumptions

Stage 0: technology shift

"Trialling drones and 3D, but still in silos."

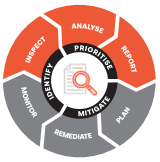
- Early use of drones, robotics or scanning on selected assets
- Better data, but scattered across vendors and platforms
- Limited impact on core processes



Stage 1: digital inspections

"See everything without sending everyone."

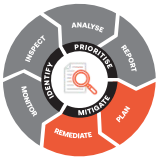
- Full coverage imagery or 3D models as standard
- Engineers inspect assets virtually from anywhere
- Findings are consistently marked up directly on the model



Stage 2: digital planning

"Scope and tender from reality, not guesswork."

- Planning, scoping and tendering take place in the 3D environment
- Contractors quote from shared evidence, not vague descriptions
- Fewer provisional sums and fewer surprises on site



Stage 3: digital monitoring

"Let trends, not snapshots, drive your CAPEX."

- Repeat captures and comparisons show deterioration over time
- Monitoring insights feed capital planning and risk decisions
- Remediation timing is optimised



Stage 4: integration

"One source of truth across systems."

- SLMS is integrated with asset registers, CMMS and ERP
- Work orders, budgets and dashboards pull from the same data
- Less manual data entry and fewer transcription errors

Stage 5: AI-enabled automation

"AI-supported, human-led decisions."

- AI assists with defect detection
- Predictive insights inform inspection frequency and interventions
- AI is transparent and reviewed by engineers, not a black box



You do not need a moonshot, you just need to know where you are and take the next rung on the ladder.

Quick self-diagnostic

Use this quick diagnostic to see where you sit today.

How to read this:

- If you tick mostly Status Quo and Stage 0, you are at the start.
- If you tick Stage 1 and Stage 2, you are in the digital inspection and planning phase.
- If you tick through Stage 3 to Stage 5, you are operating a maturing SLMS.

Most organisations we speak with sit between Status Quo and Stage 1. A few have elements of Stage 2 and Stage 3. Almost none have a coherent Stage 4 or Stage 5 story....yet

Honest answers here will save you years later.

Stage	You are here if...
Status quo: Traditional	☐ Inspections are mainly done on site with people on ropes, scaffolding or EWPs. ☐ Reports are static PDFs or Word documents. ☐ Finding previous reports is slow and stored across multiple systems. ☐ You cannot see the full history of issues on an asset at a glance.
Stage 0: Technology shift	☐ You have trialled drones, robotics or 3D scans on some assets. ☐ Data lives in separate systems or with contractors and is siloed. ☐ There is no easy way to consume, share or act on that data. ☐ Most reporting and planning still relies on traditional written reports.
Stage 1: Digital inspections	☐ You routinely capture full coverage imagery or 3D models. ☐ Engineers or SME's log in remotely to analyse assets and mark up findings. ☐ Templates keep defect and reporting fields consistent, regardless of who inspects. ☐ Defects can be analysed and compared acorss the whole portfolio.
Stage 2: Digital planning	☐ You use digital models to scope remediation and plan shutdowns. ☐ Contractors receive isolated access to models for quoting. ☐ You see fewer provisional sums and less "risk loading" in quotes. ☐ Tender participation has improved for key projects.
Stage 3: Digital monitoring	☐ You have a schedule for repeat captures on key assets across your portfolio. ☐ You can compare models between cycles to see how cracks or corrosion change. ☐ Monitoring results influence your CAPEX program. ☐ Some projects are brought forward or deferred based on trends, not assumptions.
Stage 4: Integration	☐ Your SLMS is connected to your asset register or CMMS. ☐ Defects marked in the model can create or update records or work orders. ☐ Executives can open a dashboard and see condition and risk alongside financials. ☐ Regulatory or board reports draw directly from this data.
Stage 5: AI & Automation	☐ AI supports automatic defect detection on images or models. ☐ The system flags unusual changes between captures. ☐ You use predictive insights to adjust inspection frequency and budgets. ☐ Teams trust AI outputs because they can see them in context and validate them.

Business case: risk reduction you can defend

Risk is not just the defect. It is the gap between what was seen, what was decided, and what was delivered.

As organisations move up the SLMS maturity curve, that gap closes. Evidence becomes consistent, accessible, and comparable between cycles.

In our client risk assessments, we typically see an average **69.2% reduction** in risk exposure across **48 preventable risks** (with **99 mapped consequences**) when the same scope is run with SLMS controls in place.

What to look for in your organisation: if your records are scattered, inconsistent, hard to find, or not comparable over time, exposure concentrates in the handovers. Then it shows up later as cost, safety, and governance pain.

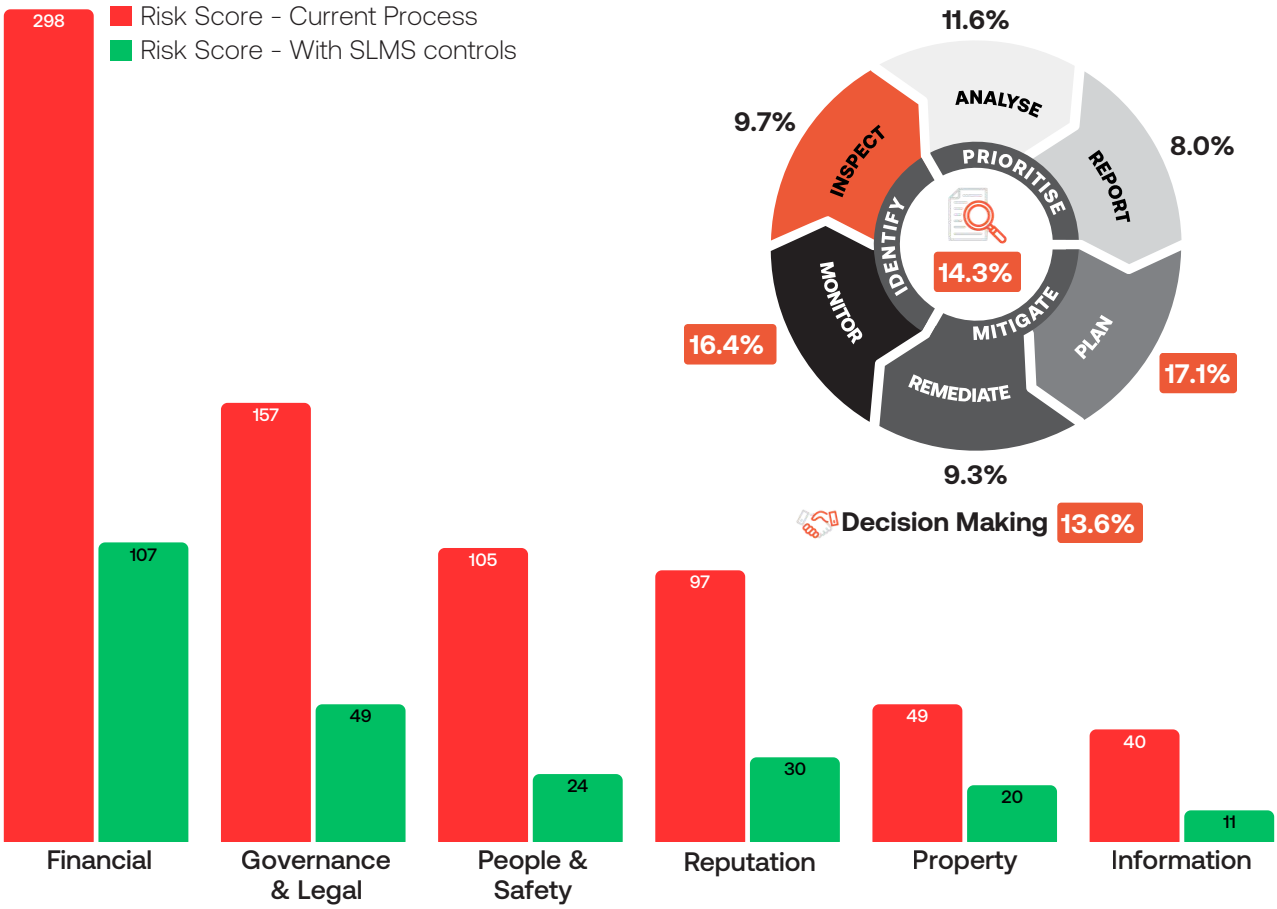
These charts are one example. They are included to help you pressure test where exposure tends to build when inspection evidence is fragmented and decisions are made on partial context.

Risk by category: shows where consequences cluster. In most portfolios, the biggest exposure is not one defect. It is the downstream impact across cost, safety, governance, reputation, and information continuity.

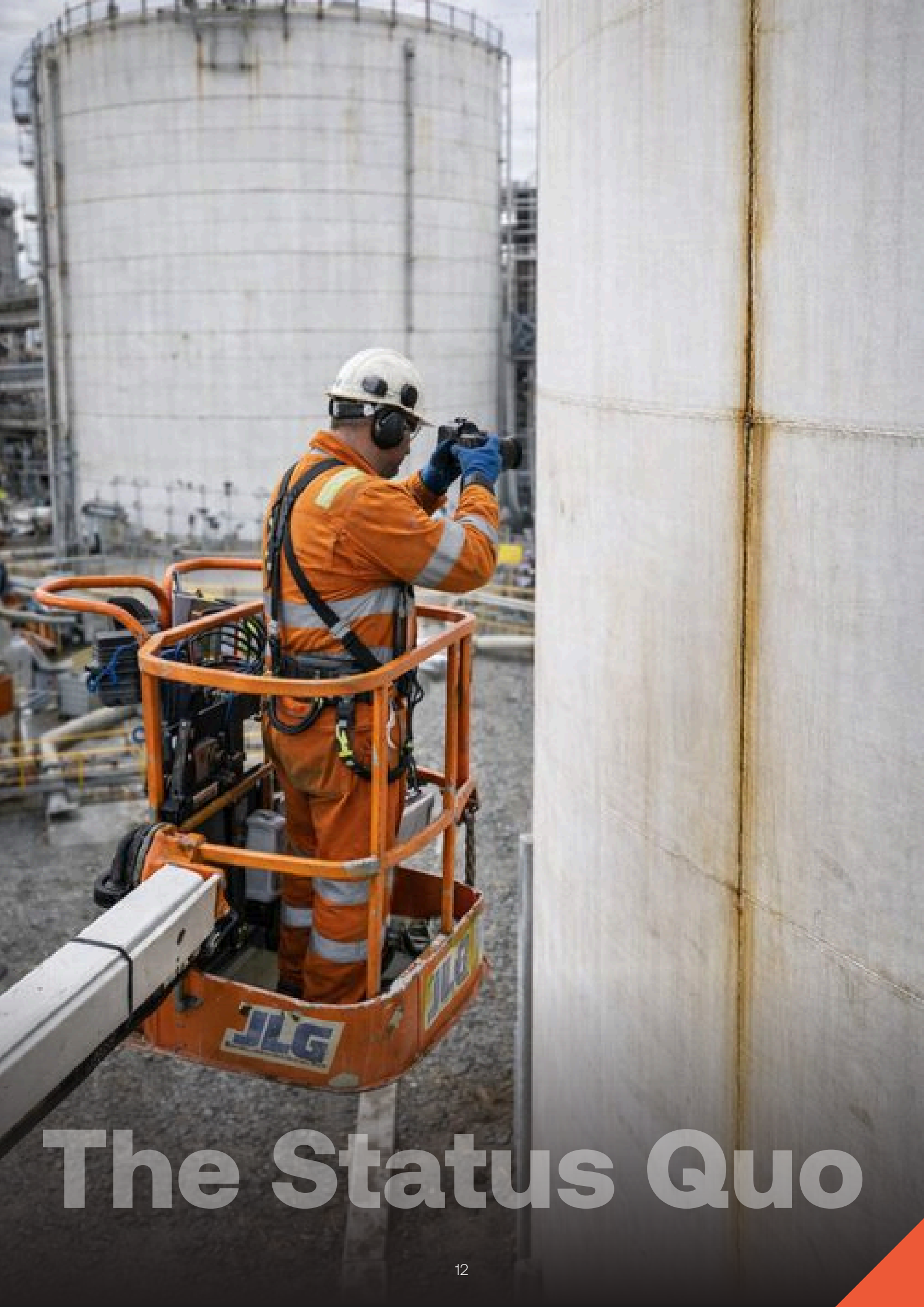
Risk across the lifecycle: shows where exposure is created. Most of it does not sit in the inspection itself. It builds in the steps between inspection, reporting, planning, delivery, and monitoring. That is where record quality either holds or breaks.

Risk concentrates where evidence breaks between steps.

Risk by category



Risk across the lifecycle



The Status Quo

Status quo: traditional, assumption led

What it really looks like on the ground

Before we talk in abstractions, it helps to see the status quo in real life.

At the University of Sydney's historic campus, traditional façade assessments relied on ground based inspections and photography, with only 5 to 10 percent of façades inspected up close because of access limits via boom lifts or rope access. The records from those inspections sat in static reports and folders, hard to search and hard to compare over time.

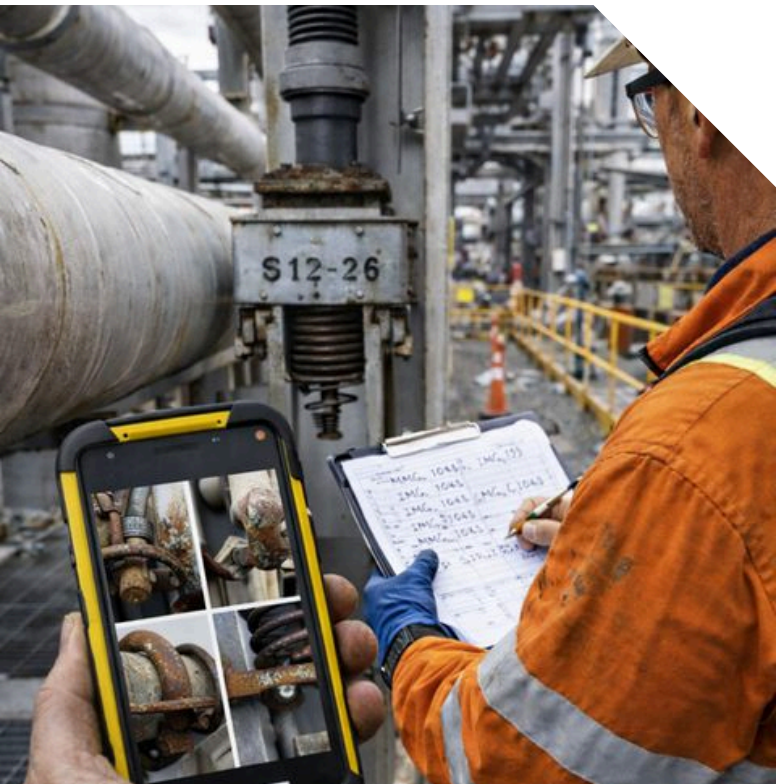
At NSW Ports, condition assessments for wharves and jetties meant sending people out in boats with paper notes, reliant on weather, tides and the individual inspector's line of sight. Photos, sketches and notes were stored in separate systems, making it difficult to build a single, consistent view of each structure.

If that sounds familiar, you are not alone. Most asset leaders we meet are operating in some version of this world.

You inherited most of these processes. You did not design them from scratch.

They evolved around budget cycles, contracts and whatever tools were available at the time. The result is not just an inspection problem. **It is a record-keeping problem.**





Where you are now

Typical patterns:

- Inspections are manual, often at height or in hazardous environments
- Heavy access equipment (scaffolding, EWPs, booms) is used frequently
- Coverage is low. Ten to thirty percent of an asset might be inspected and extrapolated
- Records live in static reports, file shares, email chains and contractor portals
- The quality and format of records vary by consultant, project and year
- There is no single, consistent source of truth for asset condition or history
- Local knowledge is held by key staff rather than documented centrally

> ***Inspections are often focused only on visible issues, and the resulting data is recorded in isolation without clear spatial context. This leads to blind spots, poor traceability and missed opportunities to understand the true condition and risk profile of the asset.***

What is going wrong

Everything downstream starts with how **records are kept, shared and updated.**

1) Information and record-keeping risk

- Asset data is incomplete, inconsistent and hard to retrieve
- Changes over time are rarely documented with a clear audit trail
- The same defect may be described differently in different reports
- New teams or contractors have little visibility into past inspections or maintenance

> ***Reports are stored in isolated systems, team folders or contractor platforms. Older reports are often misplaced, inaccessible or deleted when staff or contractors exit.***

When records lack quality, accessibility and consistency, every later decision is built on soft ground.

2) Safety risk

- Staff travel long distances by road or air to conduct inspections
- Working at height, near heavy equipment or in live environments is common
- Each inspection cycle repeats similar HSE exposures

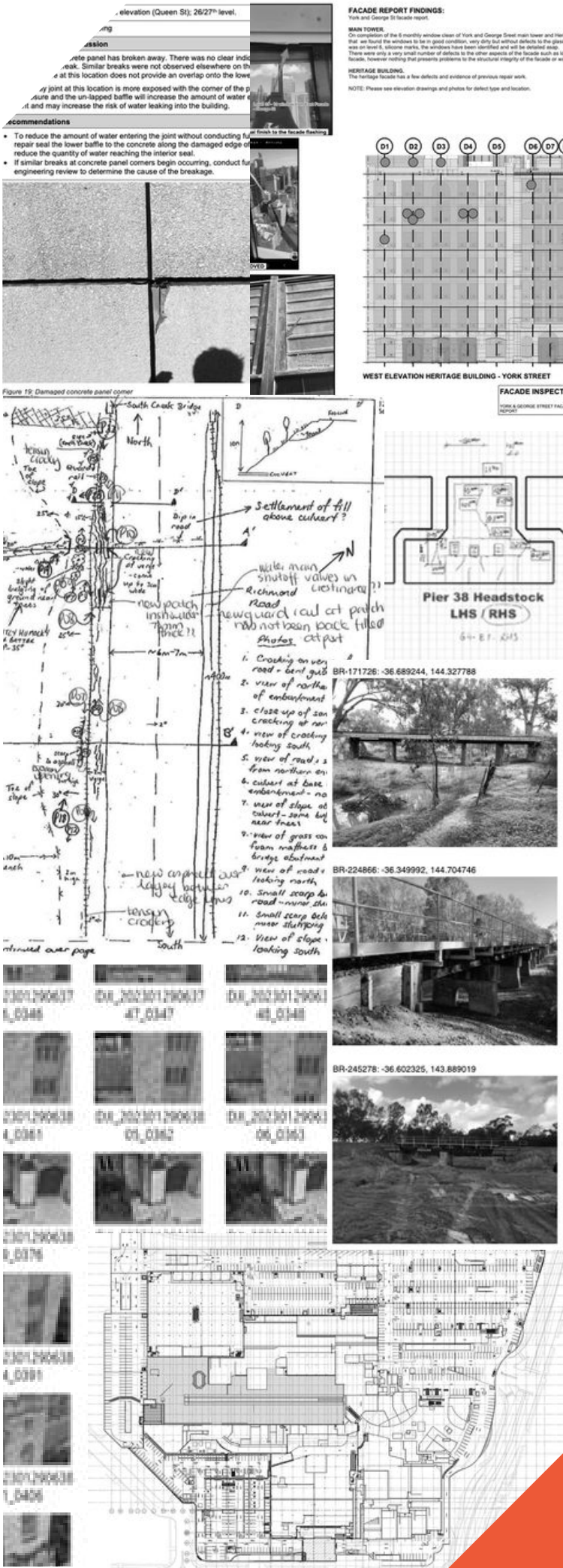
> ***Inspection teams face health and safety risks while travelling to sites and working in potentially hazardous environments.***

Poor records also make it harder to prove that reasonable steps were taken to reduce these exposures.

3) Financial and delivery risk

- Scopes of work are based on partial, assumption-led reports
- Quotes are provisional, heavy on contingency and carry variation risk.
- Capital is allocated to visible issues, while unseen risks build elsewhere
- Inconsistent records make it difficult to compare performance across assets or projects

> ***Without visibility across the full asset portfolio, capital is allocated reactively to visible or previously identified defects while other high risk or deteriorating areas remain unaddressed until failure occurs.***



The story you are stuck in

You keep using manual, assumption-heavy methods because:

- They are familiar and “how we have always done it”
- Procurement and contracts are built around historic ways of working
- Digital alternatives seem complex, unproven or hard to bring into existing teams

The risk is that you are **normalising preventable risk and waste**, built on records that are hard to trust.

Status quo is not neutral. It is quietly compounding risk.

Why move on

Moving out of status quo is not about chasing novelty. It is about:

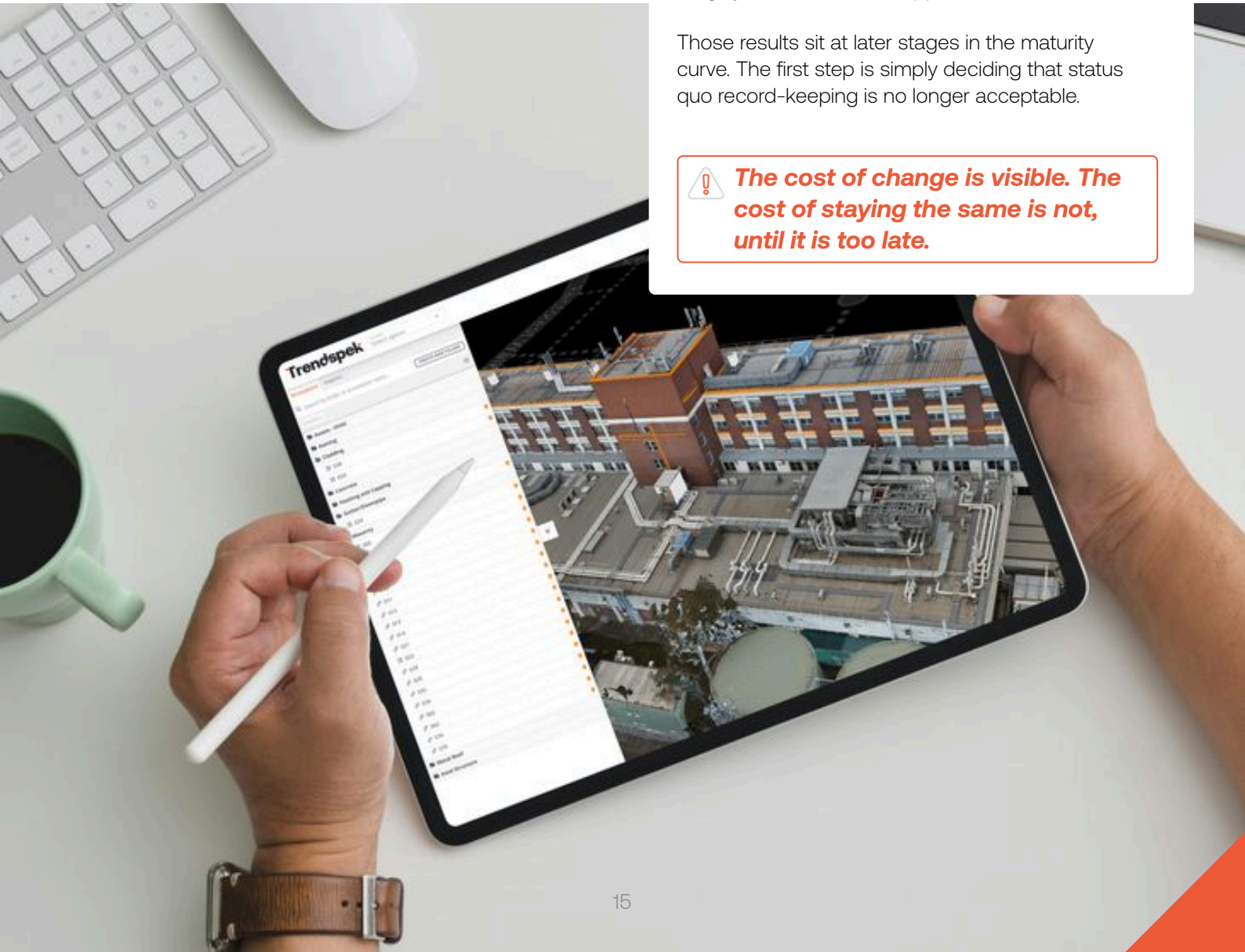
- Reducing unnecessary HSE exposure
- Avoiding cost blowouts driven by poor scope and guesswork
- Lifting the quality, accessibility and consistency of your records
- Giving yourself a realistic chance at **defensible, evidence-led decisions**

The same University of Sydney program that once relied on partial visual coverage now runs remote engineering assessments with up to **100% façade coverage**, inspections around **80% faster** and roughly **30% lower project costs**, with standardised 3D records that are easy to access and compare over time.

NSW Ports, once reliant on boats and paper notes, now uses 3D models to inspect hard to reach areas, plan remediation and brief contractors remotely. Records are centralised and consistent, and some inspection costs have been cut to roughly a third of the old approach.

Those results sit at later stages in the maturity curve. The first step is simply deciding that status quo record-keeping is no longer acceptable.

The cost of change is visible. The cost of staying the same is not, until it is too late.





Stage 0: technology shift

If this feels familiar

You are probably in Stage 0 if:

- You have recognised that the current approach is risky or inefficient
- You have trialled drones or robotics on selected assets
- You have experimented with 3D models for a bridge, tank, berth or building
- Data is richer but lives across vendor portals, drives and contractor systems

You are doing "something digital", but the way you **keep and use records** has not really changed.

> ***Drones create great outputs, but without a standard way to store, name and review findings, they don't translate into repeatable decisions.***

Why you get stuck here

Stage 0 is where many organisations stop. Common patterns:

- Pilots are scattered, with no shared strategy or prioritised use cases
- Lessons from pilots are not documented or shared across teams
- Early wins are described anecdotally, not backed by clear numbers
- Each department uses different tools that do not connect
- New digital data becomes **another silo** on top of existing reports

You risk getting stuck in pilot purgatory. Lots of activity, little structural change, and no improvement in the **quality, accessibility or consistency** of your records.

How to use Stage 0 properly

Stage 0 should be about **proof and focus**, not toys and trials.

Key moves:

1. Pick a few high-pain use cases across your portfolio:
   - A corroded jetty in a port
   - A complex façade on a university building
   - The underdeck of an oil rig
2. Partner with credible drone operators and consultants who understand engineering, not just flying
3. Decide upfront how you will measure success against the old way:
   - Time on site
   - HSE exposure
   - Access cost
   - **Quality, completeness and reusability of the records produced**
4. Capture results in a short, clear summary that executives can scan in minutes
5. Use consistent language and visuals so pilots can be compared across assets and sectors

Done well, Stage 0 creates **defensible evidence** that a different way of working is both safer and more effective. It gives you something solid to take into budget and planning discussions.

Value unlocked

Even at Stage 0 you can:

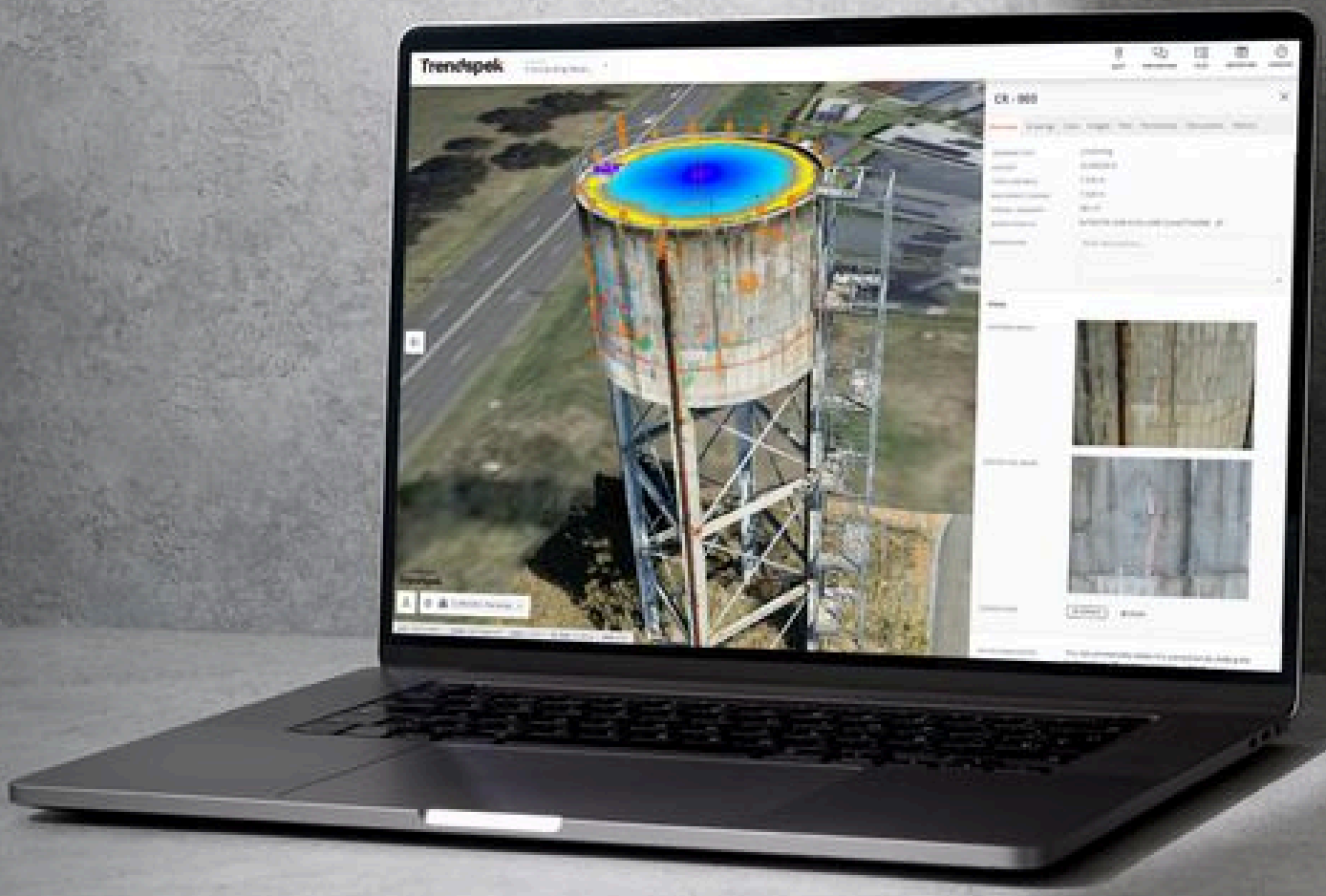
- Reduce working at height exposure on targeted assets
- Access inspection results in hours or days, not weeks
- Produce richer records that can be reused in later stages
- Build internal belief that digital capture is safer, faster and more complete

Stage 0 is a bridge. It shows that **technology can help**. Stage 1 makes it part of how you work, not just a series of experiments.

Pilot projects should be experiments, not ornaments.



Stage 1



Stage 1: digital inspections

From site to screen

You know you are in Stage 1 if:

- Full coverage imagery or 3D models are captured as standard for key assets
- Engineers and inspectors log in remotely to review assets in 3D
- A primary platform, such as Trendspek SLMS, hosts models, annotations and measurements
- Physical access is used only when targeted investigations are required

You have moved beyond pure trial mode. The question now is whether your records are keeping up.

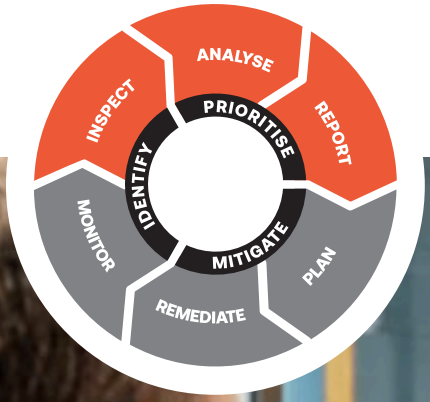
> ***Instead of having an engineer on ropes doing an on site physical assessment, they can now log in from anywhere in the world and do that inspection in 3D.***

Where inspections still break

If you stop here:

- Models risk being treated as “fancy photos” rather than living records
- Annotation and reporting styles differ by consultant and project
- The platform may still be used mainly to create another static PDF report
- The chain of evidence needed for planning and monitoring is still weak
- Executives cannot quickly filter, compare or reuse inspection results across assets

You have better inputs, but the **quality, accessibility and consistency** of your records may still look suspiciously like the old world.



What a mature Stage 1 looks like

Stage 1 is about **standardising digital inspections** so they become the backbone of your Structural Lifecycle Management System.

Key changes:

- Define standard classification and naming conventions for defects
- Configure reporting templates by discipline and stakeholder:
  - Structural or civil
  - HSE
  - Insurance and risk
  - CAPEX and maintenance planning
- Require that **all findings are spatially located on the model**
- Use collaborative online reviews where asset owners, engineers and partners walk through models together
- Treat the 3D model plus annotations as the source of truth, with any PDFs generated from there

This is where an SLMS starts to emerge:

- Inspections are complete, not representative
- Records are structured and filterable, not free text
- Evidence is visual, not buried in appendices

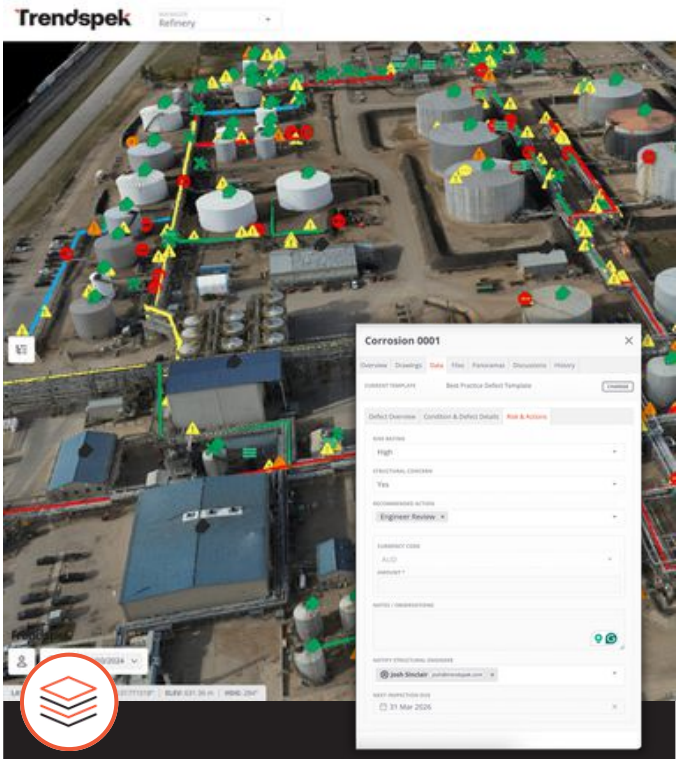
Value unlocked

At Stage 1, organisations typically see:

- Inspection time reduced by 50 to 80 percent
- Fewer people travelling and working at height
- Higher coverage and better defect detection
- A reusable 3D inspection record for each asset that can be revisited and re-reported at any time

You now have evidence, not just reports. Stage 2 shows you how to use that evidence to plan and procure better work.

Stage 1 is simple. Stop sending people up ladders to collect data you can already see in 3D.



Build your reporting template

Use this quick checklist to tighten Stage 1.

Tick all that apply:

- ☐ We have **templated reporting attributes**, defect classification lists that are used by all consultants and internal teams
- ☐ Each **finding is tied to a location on the model**, not just a photo in a folder
- ☐ **Reports can be filtered** by asset, defect type, severity, risk, discipline and date
- ☐ Different stakeholders (engineering, HSE, finance, insurance) have **access and tailored report views** drawn from the same underlying data
- ☐ We can regenerate a **consistent, up to date report from the SLMS** at any time without rebuilding it in Word or Excel

If you cannot tick most of these, you are capturing good data **but not yet building defensible records.**

Stage 2: digital planning

From evidence to executable plans

You are in Stage 2 if:

- You use digital models and annotated findings to scope remediation and maintenance
- Contractors are invited to view models for quoting and method planning
- Planning teams export models into design tools for clash detection or BIM

You have started to plan from evidence, not just from written reports.

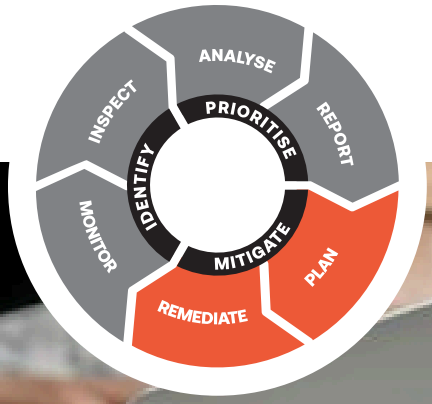
> ***Time constraints, limited access or partial inspections often result in poorly defined scopes of work, increasing the likelihood of project changes, delays or cost overruns.***

Where planning still breaks

If planning teams keep old habits:

- They still send static reports and screenshots to contractors
- Tenders remain based on vague scopes and generic quantities
- Contractors continue to add heavy contingency or decline to bid
- Access methods are still guessed, not modelled
- The SLMS is used as a reference, **not the source of truth** for scope

You end up with better data but **unchanged commercial risk**. The records look modern, the contracts still behave like the old world.



What changes at this stage

Stage 2 is about making the **3D environment the main planning workspace**, not just a visual aid.

Key changes:

- Build scopes of work directly from the model and defect annotations
- Group marked up issues into logical work packages within the SLMS
- Share scoped packages with contractors through controlled access rather than email chains
- Encourage contractors to take their own measurements and plan access from the model
- Capture access assumptions, quantities and method notes as part of the same record

This turns your SLMS into the single planning record for each project:

- Everyone sees the same issues, quantities and context
- Any change to scope is visible and traceable
- The story from “defect identified” to “work delivered” can be replayed

Value unlocked

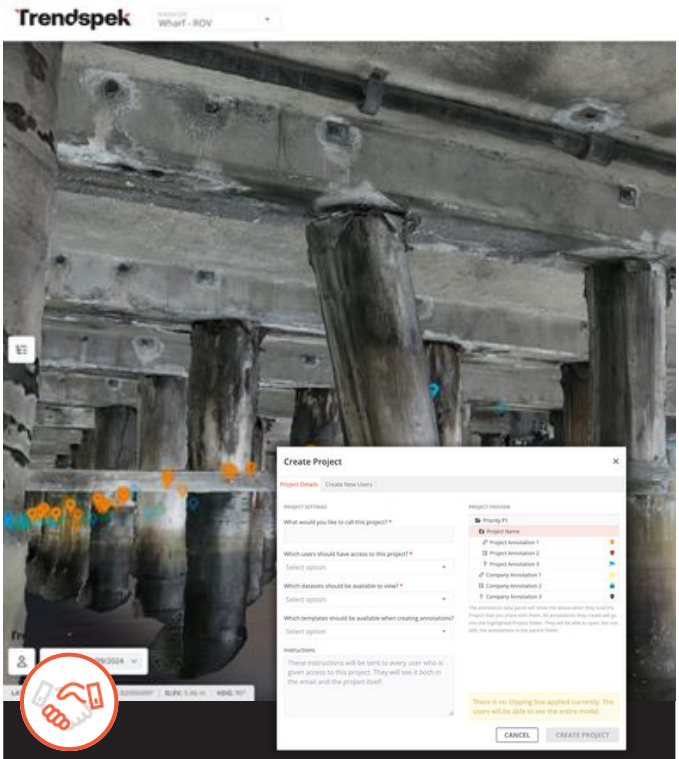
When Stage 2 is done well, organisations typically see:

- **Reduced contingency and provisional sums** in quotes
- Fewer surprises on site and **fewer variations**
- Ability to invite more bidders without multiple pre-bid site visits
- **Better alignment** between owner, consultant and contractor on what success looks like

It also improves capital planning:

- Projects are scoped more accurately
- Budgets are more realistic
- Portfolio-level trade-offs are easier to see and defend

You have moved from “we have evidence” to “we **plan with evidence”**. Stage 3 builds on this by managing change over time, so you can decide when to act, not just how.



Are your scopes evidence-led?

Tick what is true today:

- ☐ **Our scopes of work are built from the 3D model** and annotations, not retyped into separate documents
- ☐ **Contractors can see exactly what they are pricing**, including location and context, before they quote
- ☐ We can trace each line in a quote back to specific findings in the model
- ☐ Access methods are planned from the model, not guessed on a site walkdown
- ☐ **Variations are checked against the same evidence**, not just narrative claims

If you cannot tick most of these, you are planning around your records, not with them.

If you still scope in spreadsheets, you are leaving money and credibility on the table.

Stage 3: digital monitoring

From snapshots to trends

You are likely in Stage 3 if:

- You have repeat captures scheduled for key assets in your portfolio
- You align and compare models between cycles to see changes
- Senior stakeholders now ask “what changed since last time”

> ***When a new issue is identified on an asset, it is often impossible to determine when it first appeared or how it developed due to the lack of spatially aligned, historical inspection data.***

You are starting to look at **change over time**, not just isolated inspections.

Where monitoring still breaks

If monitoring is ad hoc:

- Captures happen when budgets allow, not when risk demands
- Comparisons are manual and depend on individual effort and comparing PDF reports.
- Slow or subtle changes may go unnoticed
- Monitoring results are interesting, but do not formally influence CAPEX decisions
- Records of “what changed and when” are hard to retrieve and hard to defend

You spend money on repeat inspections without gaining a defensible, portfolio-wide view of trends.



What changes at this stage

Stage 3 is about making monitoring systematic and decision-linked.

Key changes:

- Define monitoring frequencies based on risk, consequence and known deterioration mechanisms
- Use the SLMS to align models so you can flip between cycles at the exact same point
- Track simple, meaningful metrics, such as:
  - Crack lengths and widths
  - Corrosion areas
  - Counts of active, new and closed defects
- Set thresholds that trigger review, investigation or reclassification of risk
- Capture monitoring decisions as part of the same record, so you can replay the story later

Monitoring is no longer a loose collection of repeat inspections. It becomes a **structured record of change** that links directly to planning and funding.

Value unlocked

Stage 3 is where risk and cost shift permanently.

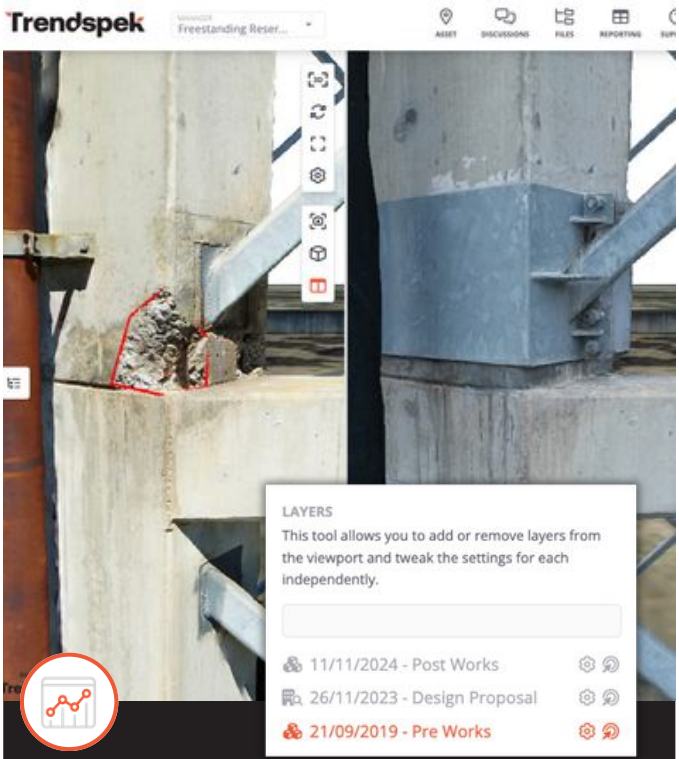
- You **catch issues earlier**, before they become failures
- You **justify deferring works** when deterioration is slower than expected
- You focus capital where conditions are changing fastest
- You validate whether remediation has fixed the root problem

Across portfolios, we see:

- **65 to 70 percent reduction in risk scores** compared with status quo
- **10 to 40 percent savings on remediation** and capital works because of fewer surprises and better timing
- **Large reductions in planning and analysis time**, often up to 80 percent

> ***The real win is not a nicer model. It is a better capital plan.***

You are now operating in a **proactive** mode. Stage 4 and Stage 5 connect this to your wider digital ecosystem and AI strategy.



Are your trends decision ready?

Tick what is true today:

- ☐ We have a documented **recapture schedule** based on risk, not just budget
- ☐ We can **compare any point** on an asset between cycles in a few clicks
- ☐ We track simple condition metrics over time, not just “defect lists”
- ☐ Monitoring results are an input to our CAPEX program, not an afterthought
- ☐ We can show, for any major asset, how key defects have changed between inspections

If you cannot tick most of these, you are paying for monitoring without fully changing how you decide.

If your data cannot show change over time, it is just a prettier version of the old reports.



Stage 4&5
Integration & Automation



Stage 4: integration

Connecting SLMS to the enterprise systems

You are probably in Stage 4 if:

- Your SLMS holds rich condition and risk data for assets
- You already run asset registers, CMMS, ERP and finance systems
- Some data from inspections is manually keyed into multiple systems

You have strong records in one place. The challenge is getting every other system to **trust and use them.**

> ***Asset and capital teams rely on varied formats with inconsistent terminology and incomplete context.***

Where integration still breaks

Without proper integration:

- Work orders are raised manually from inspection findings
- CAPEX planners rely on spreadsheets that are not linked to live condition
- Executives see financial dashboards with little direct link to asset risk
- Board and regulator reporting involves painful collation and copy-paste exercises
- Each team ends up with its own version of the truth

The result is friction, avoidable error and **stories that do not quite line up** under scrutiny.

What changes at this stage

Stage 4 is about treating the SLMS as a **first-class data source** in your ecosystem.

Key changes:

- Integrate defect and condition data with the asset register and CMMS
- Allow work orders to be created and updated directly from the model
- Feed condition and risk scores into capital planning tools and portfolio dashboards
- Connect the SLMS to BI platforms so leaders can explore live condition views alongside cost and performance
- Align naming conventions and IDs so assets, locations and work items match across systems

Now your records do not just sit in the background. They **drive** the operational and financial systems people already use.

Value unlocked

When Stage 4 is done well, integration delivers:

- Less double handling and fewer transcription errors
- Faster movement from “issue found” to “work planned and funded”
- A more **consistent story** across engineering, operations, finance and risk
- Stronger defensibility. You can trace decisions from evidence to work order to spend

Executives gain confidence that the organisation is not simply collecting good data but using it coherently to run the business.

If your best data is stuck on its own island, your decisions are still swimming in the dark.

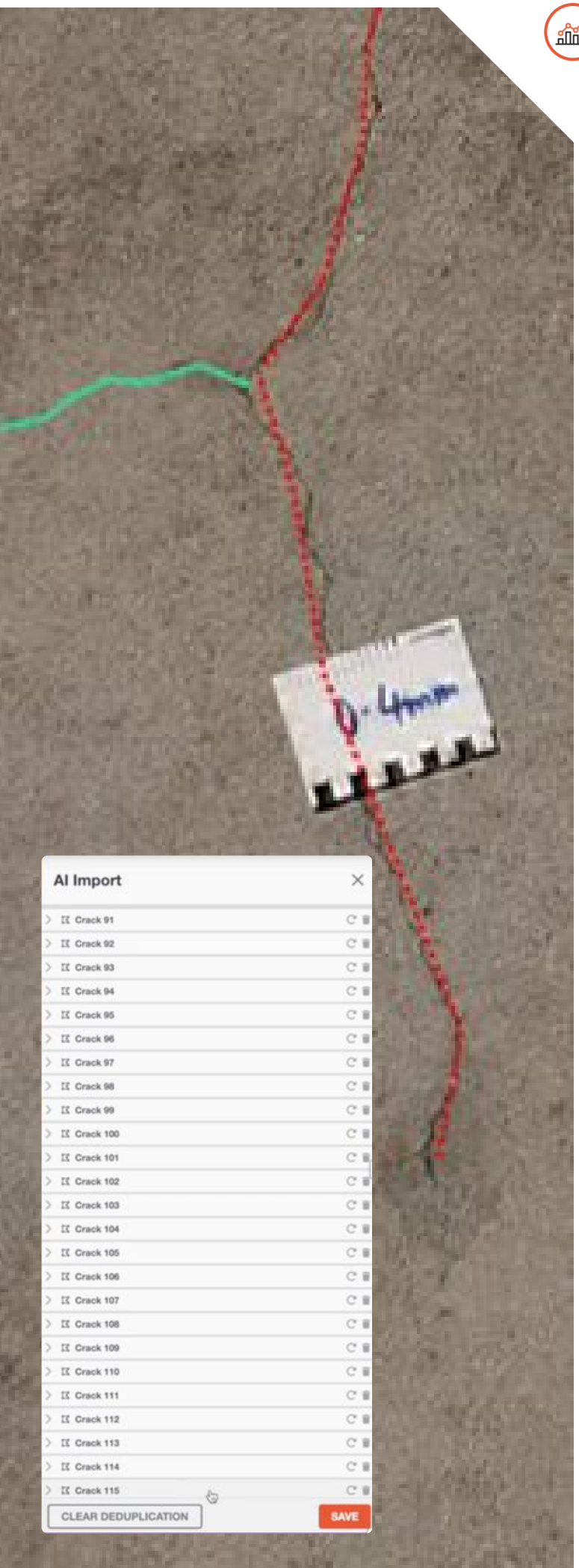


Is your SLMS part of the system, or next to it?

Tick what is true today:

- ☐ We can create or update work orders directly from findings in the SLMS
- ☐ Asset IDs and locations match between the SLMS, CMMS and asset register
- ☐ CAPEX planning tools draw on live condition and risk scores, not static exports
- ☐ Executives can open a dashboard and move from a high level metric to the underlying evidence in a few clicks
- ☐ Board and regulator reports reuse the same data model, rather than rebuilding numbers from scratch

If you cannot tick most of these, your best data is still sitting **off to the side** of how the organisation runs.



Stage 5: AI & automation

From data-rich to insight-rich

You are ready for Stage 5 if:

- You have several cycles of spatially accurate inspection and monitoring data
- Your SLMS, asset and work management systems are integrated
- Data quality is high and consistently structured

In other words, you have good records in good shape. Now you want them to work harder.

> ***Reactive to lag indicators: when maintenance planning relies on delayed signals of failure, the opportunity to intervene early is lost.***

Where AI projects often fail

Even with strong data:

- Teams cannot review every inch for every asset every cycle
- Subtle patterns across hundreds or thousands of assets are hard to spot
- Inspection frequencies are still often based on rules of thumb and habit
- AI pilots are run in isolation, disconnected from the systems people use each day

You risk spending money on AI that feels clever but does not change decisions or records in a meaningful way.

What changes at this stage

Stage 5 is about using AI as **decision support**, not a black box.

Key changes:

- Apply AI models to identify likely defects in images and on 3D surfaces
- Use change detection to highlight where conditions have altered between captures
- Develop predictive models that estimate when defects will reach unacceptable levels
- Integrate AI outputs into existing workflows with clear confidence indicators
- Ensure AI findings are written back into the SLMS as structured, auditable records

Engineers remain in control:

- They review and validate early AI outputs
- The AI continues to learn from their corrections
- Teams see AI driven flags in the same 3D context as all other records, not in a separate tool

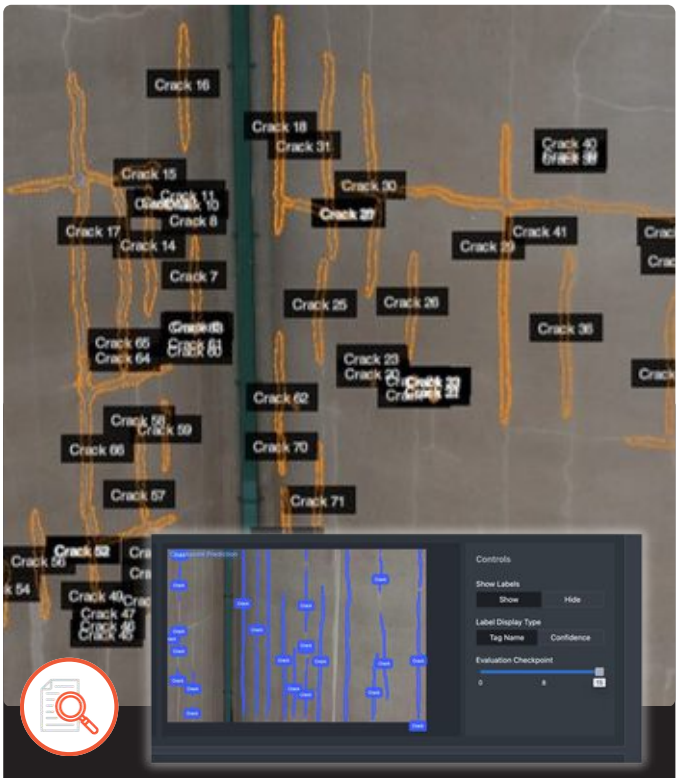
This keeps AI transparent and traceable, aligned with **risk defensibility** rather than hype.

Value unlocked

With AI-enabled automation, organisations can:

- Reduce manual review effort significantly
- Lower the risk of missing small but critical issues
- Optimise inspection intervals based on real patterns rather than static rules
- Move closer to **predictive maintenance**, where interventions are planned just before risk thresholds are crossed

Done properly, AI becomes a force multiplier for your engineers and your records, not a replacement.



Are you AI-ready, or just AI-curious?

Tick what is true today:

- ☐ We have several cycles of consistent, spatially accurate inspection data
- ☐ Defects are classified using a standard schema across assets and projects
- ☐ Our SLMS is integrated with core asset and work management systems
- ☐ We can already answer “what changed and when” for key assets
- ☐ Any AI outputs would have a clear home in our existing workflows and records

If you cannot tick most of these, the next step is to strengthen **Stages 1 to 4**, not to start another AI pilot.

AI should not replace engineers. It should stop them from drowning in data.

Partners in the SLMS journey

An SLMS does not replace consultants, engineers or contractors. It changes how they work together.

When all parties operate from the same evidence base, less time is spent recreating context and more time is spent analysing risk, planning remediation and delivering outcomes. Scopes are clearer. Variations reduce. Accountability improves.

For asset managers, this means less time reconciling reports and more confidence in the decisions being made.

Drone and robotics providers

Drone and robotics partners move from ad hoc vendors to long term data partners:

- Capture reality models on scheduled programs across ports, plants and campuses
- Follow standardised capture and QA procedures agreed with owners and engineers
- Upload directly into the SLMS so every model is ready for inspection, planning and monitoring

Their value is measured not just in images, but in the **quality and consistency of the records** they help create.

Why this matters

When partners and internal teams all work in the same SLMS, **you get network effects**:

- Better data at each stage
- Better shared understanding of risk and priority
- Better outcomes for owners, operators and service providers

We at Trendspek see the strongest results when owners treat SLMS as the shared workspace for everyone around the asset.

⚠ ***The more people use the same model, the more valuable it becomes.***

Consultants and engineers

In a mature SLMS, consultants and engineers can:

- Focus more on analysis, risk and strategy
- Spend less time chasing photos, folders and missing reports
- Use the SLMS to collaborate live with asset owners and other disciplines
- Build clearer, more defensible recommendations from the same evidence base

They become the **interpreters of the record,** not the people rebuilding it from scratch each project.

Contractors

Contractors benefit directly from working in the same environment:

- Tender and deliver against shared reality models and markups
- Plan access, materials and resourcing from detailed 3D context
- Reduce variations and disputes by working from the same evidence as the owner
- Provide close out records in a format that feeds straight back into the SLMS

The scope, method and evidence all live in one place.

Your next step

This guide is intended to help you recognise the structural risks created by fragmented inspection records and to understand the staged path toward an evidence-led, digital approach.

If you see your organisation reflected in the early stages of the maturity model, the next step we recommend is a **SLMS Maturity and Risk ROI Assessment**. It gives you a clear, defensible picture of where you sit and what is at stake.

Most teams run it before their **next budgeting, CAPEX or Inspection cycle,** so funding decisions are informed by evidence, not assumptions.

This is a working session grounded in:

- Your assets
- Your current practices
- Your priorities

For asset managers and integrity leads, it gives you a board-ready story.

For executives, it clarifies what SLMS unlocks and what it takes to get there.

Digitially transforming

Chevron, Woodside Energy, cenovus energy, Suncor Energy, Port Authority of New South Wales, Port of Melbourne, NSW Ports, Ports Victoria, Adelaide University, The University of Melbourne, The University of Sydney, SA Water, GrainLNG, Queensland Government Transport & Main Roads, acciona, Vocus, Systra, Beca

Book the hour

success@trendspek.com

In the workshop, we will cover:

1. **Your current stage**
   Across inspection, planning, monitoring and decision handovers.
2. **Your material exposure**
   Where record breaks, partial coverage, or weak handovers create safety, cost, or governance risk.
3. **A quantified business case**
   ROI and risk reduction ranges using benchmark patterns from similar portfolios.
4. **A potential roadmap**
   The next capability to make progress, without rebuilding everything.



Trendspek

Trendspek is a Structural Lifecycle Management System (SLMS) that helps asset owners and partners inspect, analyse, report, plan and monitor critical assets in 3D. It replaces fragmented records with consistent, auditable evidence, improving risk defensibility and capital efficiency across the asset lifecycle.

trendspek.com

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