SMART SYSTEMS, SUSTAINABLE OUTCOMES

WHY INDUSTRIAL SUSTAINABILITY STARTS WITH BETTER DATA

Rethinking Sustainability in the Industrial World

Most people associate sustainability with carbon offsets, renewable energy, and ESG policies. However, there's another layer, one that quietly drains resources and generates waste across every industry: how we inspect and maintain infrastructure.

Every year, perfectly good insulation is ripped out and sent to landfill. Components get replaced prematurely because the data isn't strong enough to justify keeping them in service. Facilities shut down based on calendar dates, not actual asset condition. In addition, the people trained to prevent failure spend more time formatting reports than inspecting anything.

This is not just inefficiency. Its systemic waste, built into the way industrial inspection has functioned for decades.

We're approaching the problem differently. Not by tweaking old workflows, but by building intelligent systems that make smarter decisions possible. Because the most sustainable inspection is the one you don't need to perform, and the only way to know that is through better data.

The Hidden Waste Behind Traditional Inspection

Walk any turnaround and the impact is obvious.

Insulation piles headed for disposal. Days spent assembling and dismantling scaffold. Confined spaces needing continuous ventilation. Technicians working in harsh conditions just to confirm what was already suspected: no major findings.

The carbon cost is real, even if no one's measuring it. Every pound of discarded insulation, every unnecessary shutdown, every early part replacement, it all adds up.

Joshua de Monbrun, CEng, is the Co-Founder and Chief Technology Officer of SUBSEA NDT & Engineering. A U.S. military veteran and Chartered Engineer, he has over two decades of experience in advanced NDT, inspection robotics, and digital integrity solutions. Joshua currently serves on the ASNT Board of Directors and continues to advance innovation in NDE 4.0 technologies.

Dustin Whitehead, MBA, is the Co-Founder and Chief Executive Officer of SUBSEA NDT & Engineering. A U.S. Navy veteran and member of the ASNT Board of Directors, he brings over 25 years of advanced NDT and engineering experience. Holding multiple ASNT Level III certifications and an MBA from Wharton, Dustin specializes in scaling technology-driven inspection businesses.

Traditional inspection practices were developed in a world where labor was cheap, materials were considered disposable, and emissions didn't make it onto the balance sheet. Manual workflows rely on invasive access: staging, removal, teardown. Data quality varies by technician, and trend analysis is unreliable across years and crews.

So teams default to conservative calls. Not because they want to, but because the data doesn't support any other decision.

How Intelligence Changes the Equation

Intelligent systems change that dynamic.

Our **TITAN** platform uses robotic C-Scan mapping and phased array UT to inspect large surfaces with precision and speed. However, speed is only part of the sustainability impact.
What matters more is **data quality**. When every scan is consistent, standardized, and validated, asset managers can make confident, data-driven decisions. They can extend service life, defer replacements, and prioritize work based on actual degradation, not just time on paper.

Smarter Maritime Inspection
Take maritime drydocking. Getting a vessel into drydock consumes enormous time, money, and energy, and often reveals nothing that couldn't have been discovered in water.

Our Gen 2 platforms are being designed to support Underwater In-Lieu of Drydock (UWILD) inspections that meet class society requirements without pulling a ship out of service. Robotic crawlers using phased array, HD imaging, and real-time data transmission can inspect hulls and perform UT while the vessel is still operational.

That means no downtime, no unnecessary drydock movement, no emissions from staging and prep.

But it only works if the data is trusted. That's where real-time validation, built-in measurement confidence, and direct comparison to acceptance criteria matter. We're not just replicating drydock conditions, we're improving on them.

This approach applies across offshore and industrial sites too.

Platforms can be scanned without flying in technicians. Ship hulls can be mapped without drydocking. Structures can be monitored continuously instead of annually.

NEPTUNE: Data Infrastructure for Sustainable Inspection

The real sustainability gains happen when those intelligent inspections are tied into a long-term, integrated platform. That's what our NEPTUNE system delivers.

NEPTUNE is more than just software, it's a complete Inspection Data Management System (IDMS). It tracks inspection history, flags recurring issues, supports remote monitoring feeds, and enables data-driven scheduling of future inspections. It provides a real-time dashboard showing the live condition of a facility's assets, integrating both historical inspection data and live sensor input from IoT devices.

With NEPTUNE, an engineer doesn't need to guess. They can see 20 years of validated data. They can compare measurement drift across multiple scans. They can distinguish degradation from noise. And they can make repair decisions based on evidence, not habit.

Every inspection skipped because the data proves it isn't needed saves emissions, waste, and labor. Every early failure prevented through trend tracking avoids a costly shutdown. And every component left in service until it's actually at risk reduces unnecessary material impact.

Remote Monitoring and the Role of Sensors

Smart sensors embedded into pipelines, vessels, or structures now provide continuous condition data. Moisture, wall thickness, corrosion rate, ambient pressure, captured and transmitted without anyone stepping foot on-site.

This changes inspection from routine coverage to targeted intervention. Teams get notified when conditions change, not just when the calendar says it's time. The result is fewer mobilizations, reduced access risk, better resource allocation, and a smaller environmental footprint.

In addition, contrary to what some fear, this does not replace people. It enables them. Experienced technicians now have live data, built-in QA tools, and system intelligence backing up their decisions. They spend time solving problems, not formatting spreadsheets.

Moreover, when they leave, the system retains what they taught it. NEPTUNE captures technician insights, flags commonly adjusted thresholds, and learns inspection trends over time, preserving institutional knowledge even when personnel rotate out.

The Metrics That Matter

The biggest sustainability wins often go uncounted:

- Waste that wasn't generated
- Materials that weren't replaced
- Outages that didn't happen
- Shutdowns that were avoided

Traditional reporting doesn't track what didn't occur. But our systems can. NEPTUNE will enable metrics like:

- Component life extension rates
- Insulation waste avoided
- Drydock avoidance through UWILD
- Downtime prevented
- Sensor-triggered interventions that replaced routine full-scope inspections

These are operational wins. But they're also environmental KPIs, and they're starting to show up in ESG reports, emissions dashboards, and even carbon credit conversations.

If you can demonstrate that smarter inspection prevented waste or avoided emissions, there's real value there. Some of our clients are already tracking it.

The Future We're Building

Most of the world's industrial infrastructure was never designed for the ESG era. But it can still be managed that way, if we give engineers the right tools.

We're not waiting for regulations to force change. We're building systems that make sustainability practical now.
That includes:

- Second-gen robotic platforms for drydock alternatives
- AI-enabled analysis that recommends repair vs. monitor
- Cloud platforms that unify inspection, maintenance, and certification
- Open ecosystems that integrate sensors, manual inputs, and legacy data
- Interfaces that attract new talent by making inspection look and feel like modern tech work

This isn't about replacing inspectors. It's about amplifying them. And giving organizations the tools to make smart decisions that reduce waste, extend service life, and build truly sustainable reliability programs.

Because the most sustainable system is the one that prevents unnecessary work, targets what actually matters, and keeps critical assets online, safely, efficiently, and responsibly.