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# How Haelixa is using 'invisible DNA markers' to verify sustainable materials

Stuart Stone

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**Image:** Credit: Haelixa

**Dr Gediminas Mikutis explains how real-world supply chain controversies shaped Haelixa's approach to enabling brands to verify material claims - and how opportunities can lie in sectors where trust is broken**

***BusinessGreen Intelligence*: How does what you do contribute to the green transition?**

**Dr Gediminas Mikutis:** The green transition only works if claims can be verified. Many sustainability failures are not about intent, but about a lack of physical evidence once materials move through complex global supply chains. Our technology enables brands to prove, at fibre or other raw material level, what a product is made of, where it comes from, and whether recycled or certified materials are genuinely present in the final product. Crucially, this physical proof can sit alongside digital systems. That reduces greenwashing, protects resources, and supports evidence-based regulation such as digital product passports. Without physical proof, sustainability remains a promise. With it, it becomes measurable, enforceable, and credible.


**What's the biggest misconception about what you do?**

The biggest misconception is that we are a digital or visual tagging solution. We are not QR codes, serial numbers, holograms, or blockchain systems. Those tools manage information about a product. They do not prove the product itself. Anything applied to the surface or stored in a database can be removed, copied, or reassigned.

What we provide is physical, material-level proof. Our technology uses plant-derived DNA markers that are invisible, non-toxic, and added at extremely low concentrations. The DNA is embedded directly into the fibre or material and becomes part of it. It does not affect performance, appearance, colour, feel, or durability. Once applied, it cannot be washed out, altered, or separated from the product.

Critically, the DNA survives industrial processing. It remains detectable through spinning, weaving, dyeing, finishing, and manufacturing, as well as through use, repair, resale, and recycling. This allows the same technology to be used across very different materials and risk profiles. It can verify silk at source, confirm ethical or organic cotton through complex supply chains, protect premium fibres such as cashmere, and authenticate high-value goods including jewellery and gold. In all cases, the principle is the same: authenticity is embedded in the material itself. If the DNA is present, the claim is true. If it is not, it isn't.

**Who or what are your sources of inspiration or influences?**

Forensic science and molecular biology have been key influences. DNA has long been used as the gold standard for identification because it is specific, durable, and extremely difficult to falsify. At Haelixa, we apply the same principles to products. Our markers

are based on natural DNA sequences derived from Swiss mountain herbs, selected for their stability, uniqueness, and ability to survive industrial processing.

The academic work at ETH Zurich provided the scientific foundation, particularly around DNA behaviour under heat, chemicals, and mechanical stress, and how it can be detected reliably at very low concentrations. What ultimately shaped the solution, however, were real-world supply chain controversies. Recent news of brands facing scrutiny over recycled content claims or severe labour abuses, show how reliance on documentation and trust alone repeatedly fails. These moments underline why proof at material level is no longer optional, but necessary.

**What have been the biggest landmarks in your innovation journey so far?**

Proving that our DNA markers survive industrial processing at scale was the first major milestone. That validation allowed us to move from theory into real supply chains. One example was tracking high end gemstones from mines to finished jewellery pieces in our collaboration with leading gemstone industry players Provenance Proof and Gübelin. It showed that DNA-based proof could operate reliably across harsh transformations from raw gems to finished jewellery.

Another landmark was being recognised in the sustainability reporting of C&A, where Haelixa's technology was used to support verified sourcing and material integrity at a scale of tens of millions of garments. This marked a shift from pilot projects to enterprise-level adoption.

More recently, confirming recycled content for New Focus Textiles demonstrated how fibre-level DNA can close long-standing credibility gaps in circular materials. In parallel, expanding into precious metals has shown that the same approach can support responsible and ethical gold sourcing, where provenance and substitution risks are high. Together, these milestones reflect our evolution from fibre traceability into full life-cycle authentication, increasingly integrated with digital systems such as digital product passports.

**Have there been any setbacks so far? If so, what did you learn from them?**

Early adoption was slower because many companies relied on documentation and audits. We learned that trust-based systems persist until failure becomes visible. Once fraud, returns abuse, and regulatory risk increased, the need for physical proof became obvious. Timing matters as much as technology.

**What do you hope to achieve in the next five years? What's going to dictate whether you get there or not?**

Over the next five years, I want physical, DNA-based authentication to become standard infrastructure for anti-counterfeiting across both luxury goods and mainstream textiles. Counterfeiting no longer sits at the margins. It moves through legitimate channels, including returns, after-sales services, repair networks, resale platforms, and upstream material sourcing. The same risks now apply to premium fibres, recycled content, and certified materials, where substitution and dilution frequently occur long before products reach retail.

Our goal is to ensure authenticity can be proven at material level, whether that is a luxury watch, a cashmere garment, recycled cotton, or a precious metal component. The technology already works at scale and integrates into existing production and retail environments. Whether we get there will be dictated by regulation, brand leadership, and how seriously the industry shifts from assumption and documentation to physical proof. Accountability, not innovation, is now the limiting factor.

Dr Gediminas Mikutis, co-founder and chief technology officer, Haelixa - Credit: Haelixa

**Is there anything you know now that you wish you'd known when you started out?**

That counterfeiting is not a side issue. It is systemic and often invisible. Designing technology that works in complex, imperfect supply chains from day one is critical.

**What is the question you get asked most about your tech solution or innovation?**

'How easy is it to implement?' is the question we get most often, and it matters because many anti-counterfeiting solutions fail at the point of deployment. Our approach is deliberately designed as a plug-in, not a transformation project. The DNA marker is applied within existing production environments using a simple spraying or treatment step. It does not require changes to materials, machinery, or workflows, and it has no impact on the product's appearance, performance, or quality.

Once applied, the DNA becomes part of the material itself. From that point on, brands do not need to rely on a single checkpoint or central authority. Authentication can happen independently at any stage of the product's life cycle, during manufacturing, at a warehouse, in a boutique, at a returns desk, in a repair centre, or on the secondary market. Verification is carried out through a straightforward forensic test, producing a clear yes or no result rather than a subjective judgement.

This is what makes the system scalable. Brands can start at fibre or component level and extend authentication downstream without redesigning processes. Retailers can use it to control returns and after-sales fraud. Resale and repair platforms can verify items without relying on original paperwork. In practice, the technology sits quietly in the background, strengthening existing systems rather than replacing them, while giving brands and partners the ability to verify authenticity wherever risk appears.

**What advice would you give would-be clean tech entrepreneurs or innovators who are just starting out?**

Build for reality, not theory. Solve problems that regulation and market pressure will not make disappear. And be patient. Trust infrastructure takes time to adopt, but once in place, it becomes essential.

**What single policy would you like to see enacted that would help advance your technology?**

Mandatory evidence-based claims. Sustainability, origin, and authenticity should not be matters of trust, but of proof. If brands are required to substantiate claims about fibre origin, recycled content, and product authenticity with physical verification, the entire system improves. Consumers receive what they are told they are buying. Brands that invest in responsible sourcing and quality are protected from unfair competition. Regulators gain enforceable standards rather than voluntary disclosures.

Crucially, this is not about adding burden, but about restoring trust. Physical verification creates a level playing field where honest actors are rewarded and fraud becomes harder to hide. As regulations such as Digital Product Passports and green claims frameworks evolve, requiring evidence at material level would anchor sustainability, authenticity, and ethical sourcing in fact rather than assumption.

**Besides your own sector, where would you say the biggest opportunities lie for green start ups?**

Anywhere trust is broken. Secondary markets, recycling systems, repair networks, and critical raw materials all need verification. The next phase of green innovation will be less about ambition and more about proof.

*Do you want to highlight a cutting-edge piece of clean tech or sustainable innovation to feature in our series? Email Stuart.Stone@IncisiveMedia.com for more details.*



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