b-y.to

A Digital Service History for Physical Products.

Exploring how QR codes and NFC could connect durable products to repair, service, and replacement information.



Connecting Apparel to the Web

As QR codes and NFC became more common, I became interested in how these technologies could give physical products a persistent connection to digital information.

Apparel seemed like an underused interface. While major brands such as Nike and Adidas were experimenting with connected products, most of the clothing and footwear I encountered had no digital connection after purchase. The product might be scanned at the point of sale or used for marketing, but there was rarely a way to access information about the item throughout its life with the owner.

Could the product itself become the interface to its digital history?

Would an NFC Tag Survive Everyday Use?

I initially preferred NFC because it could create a discreet interaction without requiring a visible QR code.

I purchased 100 adhesive NFC tags and began testing different placements on footwear.

Tags were attached in several locations and the shoes were put through washing to see whether the tags would remain attached and functional.



Adhesion Became the Failure Point

Most of the NFC tags detached during washing.

The tags positioned on the **inside tongue** of the shoes survived, demonstrating that placement and protection were critical to integrating electronics into apparel.

Rather than continuing to rely on adhesive NFC tags, I shifted toward sewn-in QR codes as a simpler and more durable connection.

The physical prototype changed the direction of the system.



Digital Product Passports

My research revealed that connected-product identification was becoming part of a much larger movement.

The European Union's **Ecodesign for Sustainable Products Regulation** established a framework for **Digital Product Passports**, which can make information about products' sustainability, durability, materials, and lifecycle accessible digitally.

Textiles are a priority product group in the EU's 2025–2030 working plan. Companies were already building infrastructure around this transition.

Product Identity Was Already Being Solved at Scale

Avery Dennison had already developed atma.io, a connected-product platform that assigns individual products unique digital identities and supports QR, NFC, and RFID technologies.

atma.io
by Avery Dennison

That changed my question.
Instead of trying to compete with large companies on brand-level supply-chain traceability, I began looking at what happens to an object after it reaches the customer.

Where could a smaller system add value?

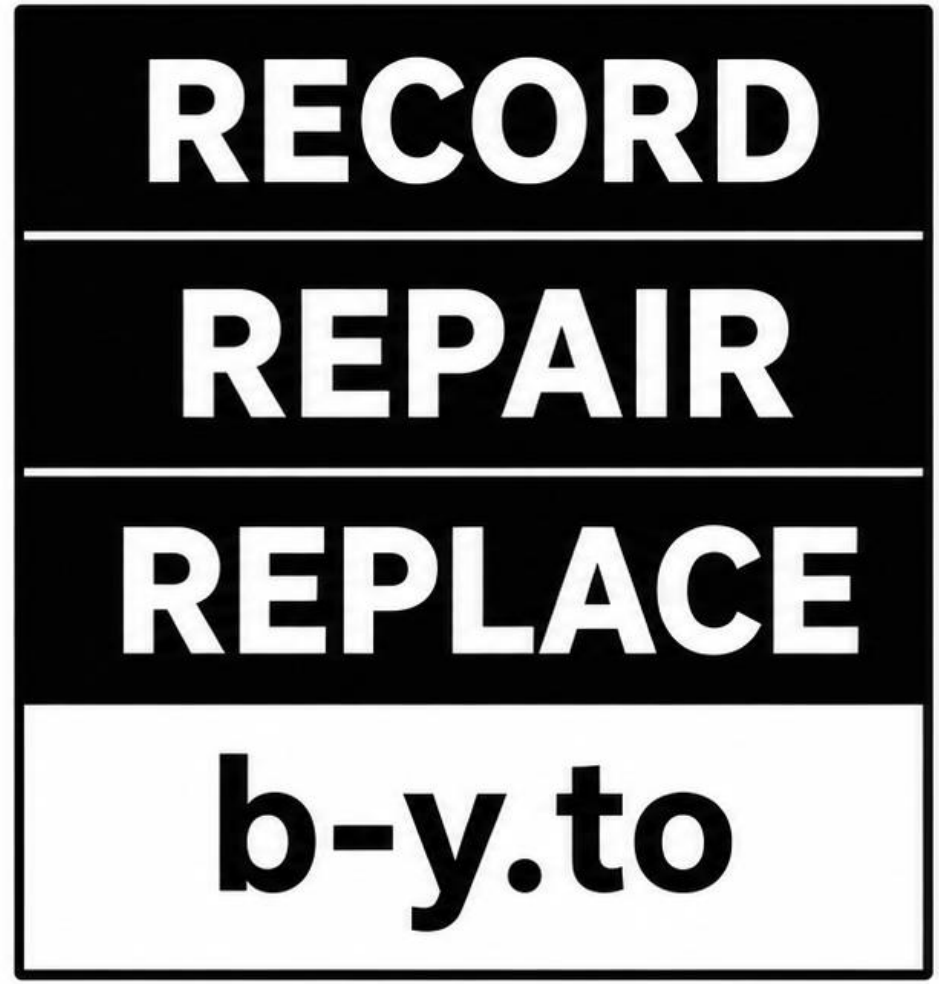
From Product Passport to Repair Passport

I shifted the project toward the moment when an owner has to decide what happens next to an aging or damaged product.

Instead of primarily documenting where a product came from, **b-y.to** would help document what happens to it during ownership.

RECORD → REPAIR → REPLACE

Every product could accumulate a service history while connecting owners with the businesses capable of extending its useful life.



A Decision Layer for Durable Products

A QR code or NFC tag connects the physical object to its **b-y.to** record.

When the product requires service, the system brings together information needed to make a decision:

The object becomes the persistent point connecting the owner, product, and repair shop.

01 Product identification and photograph

02 Object/service history

03 Repair estimate

04 Estimated completion time

05 Repair-shop contact information

06 Technician service notes

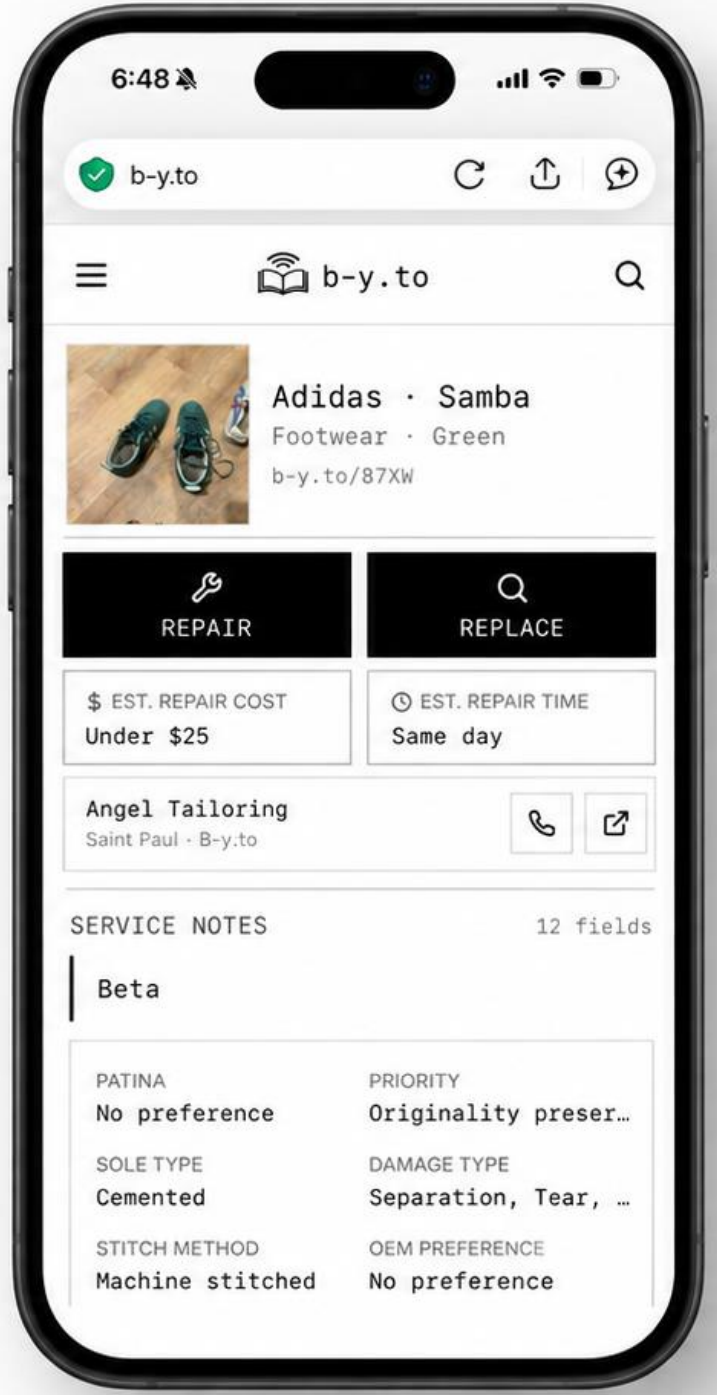
07 Previous records

Making Repair Easier to Understand

I designed the website around the questions a customer faces when something breaks.

What is wrong?
How much will it cost?
How long will it take?
Who is repairing it?
Has it been repaired before?

Repair shops could add service information to the object's record, allowing its history to remain associated with the product rather than disappearing after each transaction.



Turning Product History Into a Decision

b-y.to was designed to do more than store records.

When repair was practical, the customer could proceed with service.

When replacement made more sense, the system could search for the same product, including attributes such as:

Brand · Model · Size · Color

The concept therefore became a decision system:

RECORD → REPAIR → REPLACE

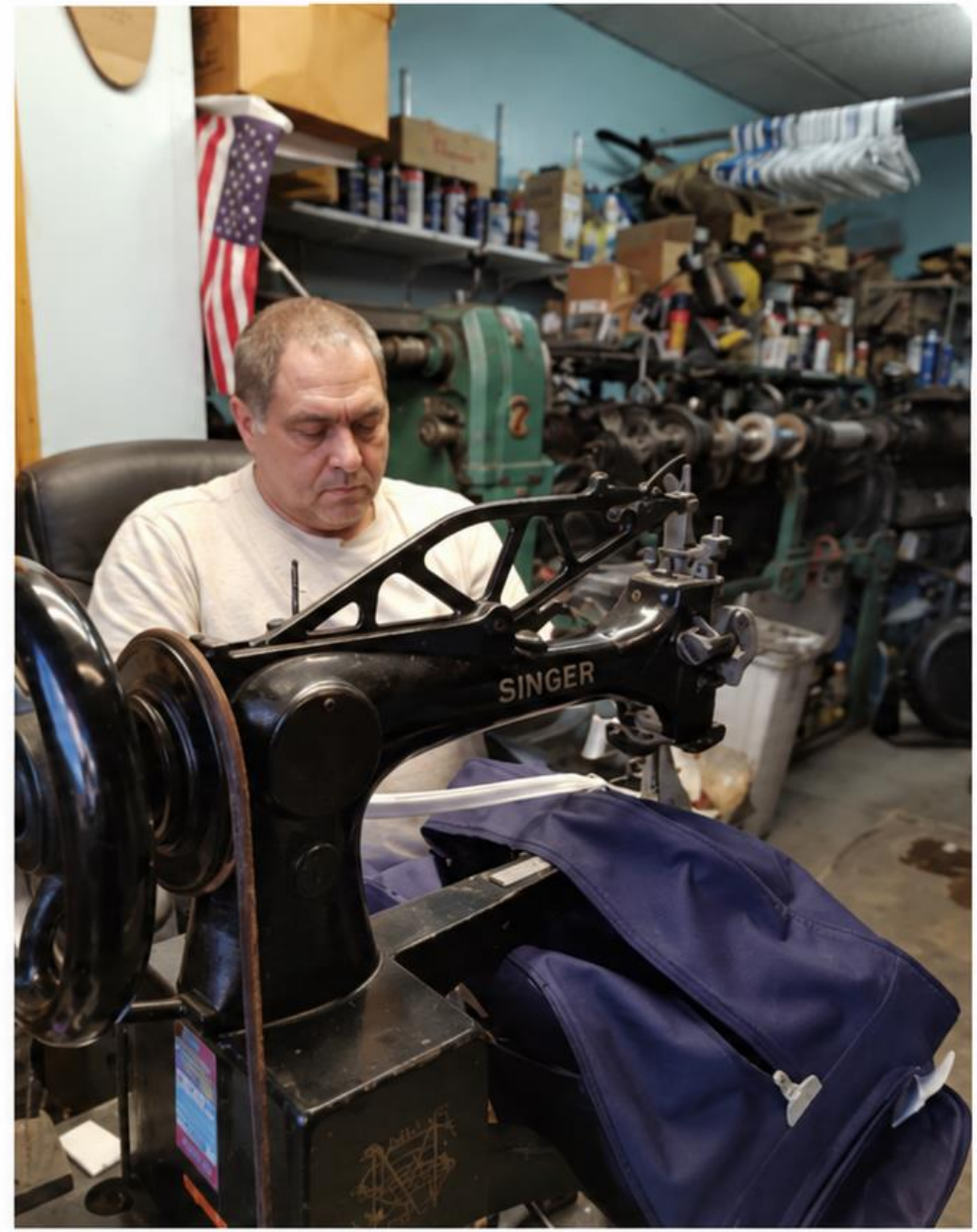
Testing the System With the People Who Would Use It

After developing the website and repair-shop onboarding process, I brought the concept to local repair businesses for feedback.

The conversations exposed a problem that the digital prototype had not.

Many of the shops I visited operated with very little digital technology, and staff described portions of their customer base as uncomfortable with phone-based systems.

The system could work technically—but adoption would require changing behavior for both the repair business and its customers.



The Technology Worked. The Context Wasn't Ready.

b-y.to began as an experiment with NFC tags and developed into a complete product-service system for recording, repairing, and replacing durable goods.

Physical testing moved the concept from adhesive NFC toward more durable identification. Competitive research redirected it from brand-level product tracking toward repair. Field research ultimately revealed the largest constraint: **technology only creates value when the people within the system are willing and able to use it.**

I chose not to continue developing b-y.to for the current repair-shop market.

The opportunity may become more relevant as digitally connected products and Digital Product Passports become commonplace.