

Current and future use of smart labeling technology to enable the circular economy.

Oregon Truth in Labeling Taskforce
April 12, 2022



What is smart labeling? The consumer perspective

Can be QR code, image recognition, digital watermark, near-field communication (NFC) or RFID tag

A way to connect digital information the product to that can:

- Create new brand engagement opportunities
- Offer additional sourcing, health/nutritional information
- Provide recyclability information based on geolocation
- Enhance the consumer experience
- Educate on food storage to prevent food waste



Smart labels are becoming a key driver for the Internet of Things (IoT).

Retailers like Walmart and brands like Unilever are using these technologies to interact with consumers. Over 80,000 products that now include a smart labeling method.

Consumers are very much on the curve for learning this functionality to drive it toward normalization.

A way to share all the information that won't fit on a package.

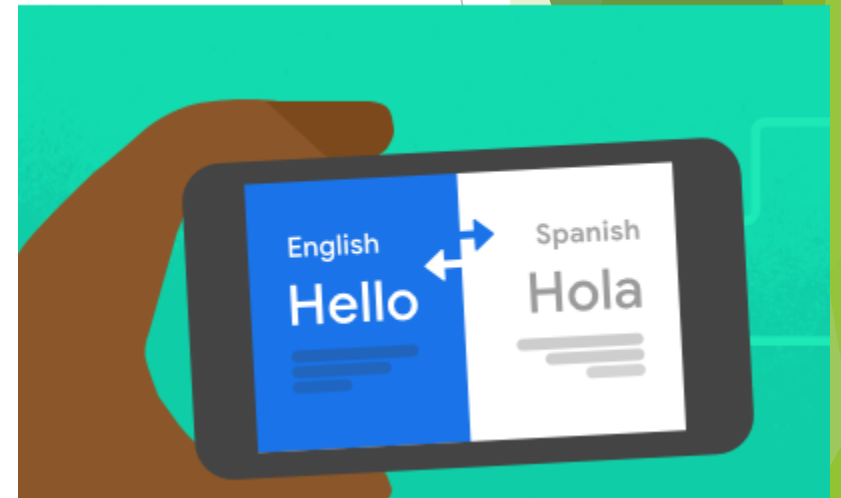
What is smart labeling? The consumer perspective and access

By providing a new and interactive way to present information, the conveying information through use of a digital link allows for nearly limitless customizability, greatly expanding how product information can be accessed.

Based on language preferences set on a smartphone, information can be translated into different languages, or even read to the user by the device.

As accessibility and equity become a greater focus in sustainability work, smart labels can be an important tool to help overcome the systemic barriers in accessing information for different segments of the population.

- Language barriers, [Multilingual Digital Labelling and Smart Packaging in an Increasingly Global Marketplace](#)
- Vision impairment (CVS and RFID [Spoken Rx](#) app)
- Health and safety, [nutritional value ingredients and allergens](#)



The potential for recycling education

If the app that engages with smart labels can be tied to geo-location or opt-in based on location/service provider, consumers could be told if those items are recyclable based on where they are. They could also be told how to recycle particular items, either curbside or drop off, along with where the nearest drop off location is.

Benefits:

- People don't need to take the extra step of checking their local government website for the accepted materials list.
- We aren't relying on the consumer to determine the category of the product they are looking to recycle and negotiating that with the accepted materials list.
- Consumers could be instructed on recyclability specific to design features (e.g., full-shrink labels, separating liner from box).
- We can overcome "check locally" confusion.
- The RIC gets to be the RIC - simply resin identification. The consumer has a new method of determining recyclability.

Smart labeling can help remove "friction" as a barrier to consumer engagement with recycling.



What is smart labeling? The recycler perspective

Giving Packaging a 'Digital Recycling Passport'

Certain types of smart labels, like digital watermarks which repeat across the package, can provide virtually unlimited codes to identify:

- Manufacturer and specific product (for reduced Extended Producer Responsibility Fees paid by brands)
- Food vs. non-food packaging
- Recyclable vs. compostable packaging
- Component layers of multi-layer packaging
- Carbon-black, opaque, difficult-to-recycle
- Package dimensions and weight
- CO2 footprint
- New material introductions
- *And more...*

Rich product-level data for brands/retailers, Producer Responsibility Organizations, mitigation of Extended Producer Responsible fees, compliance reporting, etc.



What is a Digital Watermark?

A digital identifier that is integrated into a product or package

- Visually imperceptible to consumers
- In print, does not require special inks or processes, just uses existing pixels in the design
- In plastics, integrated as subtle decorative embossing
- Compatible with the circular economy, no additive elements, simply uses existing design or material substrate

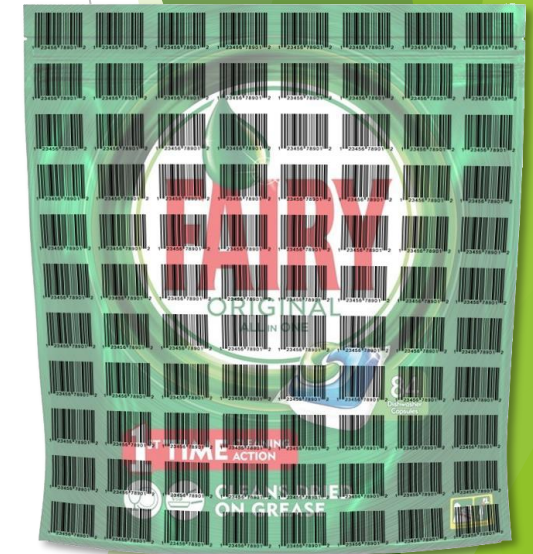
Identifier links to virtually unlimited information and package attributes stored in the cloud

Turns packaging into Internet-of-Things objects



Looks Like This

To consumers, the package looks as it did prior to enhancement



Performs Like This

This is how the package functions to computing devices with cameras

HolyGrail 2.0 - Testing digital watermarking at scale in recycling

Digimarc is the technology provider to the HolyGrail initiatives to find a harmonized technology to improve sortation

- HolyGrail – Ellen MacArthur Foundation, 3-year program
- HolyGrail 2.0 – 160+ participants and funding by European Brands Association (2,500 members) and Alliance to End Plastics Waste
- Technology proven in extensive demonstrations

European Commission & Parliament

- “Proposed: Digital watermarking of all packaging by 2030 to facilitate sorting”
- “...digital watermarking that can support the development of the circular economy through the tracking, tracing and mapping of resources.”
- Digital watermarking to harmonize eco-modulation of EPR fees, with recycling rate as ultimate criteria



Enabling EPR and supporting eco-modulation

If unit-specific data could be recovered from packages at the MRF, it will help track rates of return, and consumption patterns. Having more detailed sorting should enable easier use of recycled content in more applications.

Results per packaging material

Category	Detection Rate[1] (Estimate)	Ejection Rate[2] (By weight)	Purity[3] (By weight)
Rigid PP	99%	95%	96%
Rigid PE	98%	96%	99%
Rigid PET	99%	98%	95%
Flexibles	99%	91%	90%
Average across packaging materials	99%	95%	95%

News & Positions - March 2022

Digital Watermarks Initiative HolyGrail 2.0 achieves significant milestone with the successful semi-industrial validation of detection sorting unit

Press release for immediate release – Brussels, 30 March 2022 – The Digital Watermarks Initiative [HolyGrail 2.0](#), driven by [AIM](#) – European Brands Association and powered by the [Alliance to End Plastic Waste](#), has achieved a significant milestone with the successful validation, after semi-industrial testing mimicking real-life conditions of the prototype



Other smart label applications

This technology approach is already vetted and recognized in the Federal Registry for the 2016 GMO Labeling Bill

- Digimarc worked extensively with the USDA, validated in USDA-commissioned report by Deloitte on smart phone access
- Language specifies “electronic or digital link” as acceptable means to deliver content to consumers

Other uses

- Textiles and garments to enable reuse, [EON](#)
- Potential use of tags on furniture to enable reuse in the future, [Ikea](#)
- Sports jerseys digital watermarking enhanced fan experience.
- Inclusion in apparel care labels.

Making everyday products around us a piece of the IoT.



Houdini Sportswear took a groundbreaking step towards complete product circularity by digitizing its iconic One Parka, and committing to digitizing all garments by 2023.

By simply touching their mobile phone to YKK's NFC-enabled zipper pull, Houdini customers can instantly access a world of experiences, services, knowledge sharing and content.

"The relationship with Houdini doesn't end when we sell the product – it continues through use, care, reuse and next life. Connected, our products become vehicles for these continuous conversations and our support. Connecting our products, we will be able to deliver a richer customer experience and foster long term relationships with products, community and the planet."

—Jesper Danielsson, Head of Product, Houdini Sportswear

Potential smart labeling approaches in regulation

Construct all laws relating to labeling in a way that allows for smart label innovation:

[listed information/consumer communication requirements], which may be conveyed through traditional labeling means or through the use of an electronic or digital link;

the use of single-material packaging that includes prominent and easily understandable recycling or disposal instructions for consumers **or other design characteristics intended to reduce consumer confusion** regarding recyclability and to reduce recycling contamination; any other incentives designed to support the management of packaging material consistent with the solid waste management hierarchy in section 2101.”

Need to Recognize:

Smartphones are already the remote control for the lives of most consumers. This will only continue to grow.

Already proven, similar labeling initiatives using linkage from package: SmartLabel, Federal Registry for GMO labeling, HolyGrail 2.0 initiative.

Appendix



About Digimarc

Pioneer and world leader in the automatic-identification of packaging, or any other printed or physical object, by machines with a camera (scanners, recycling sorters, smartphones)

Founded in Oregon in 1995, corporate headquarters in Beaverton

One of Oregon's most successful IPOs (1998), publicly listed on the NASDAQ exchange (DMRC)

325 number of employees, global footprint

Currency counterfeit deterrence solution for consortium of world's central banks (running contract since 1999)

In packaging, adoption by leading brands such as P&G and retailers such as Walmart

Recent acquisition of EVERYTHING, the leading product cloud solution that provides data and transparency to interactions between products and machines or consumers

- "See Everything, Achieve Anything™"