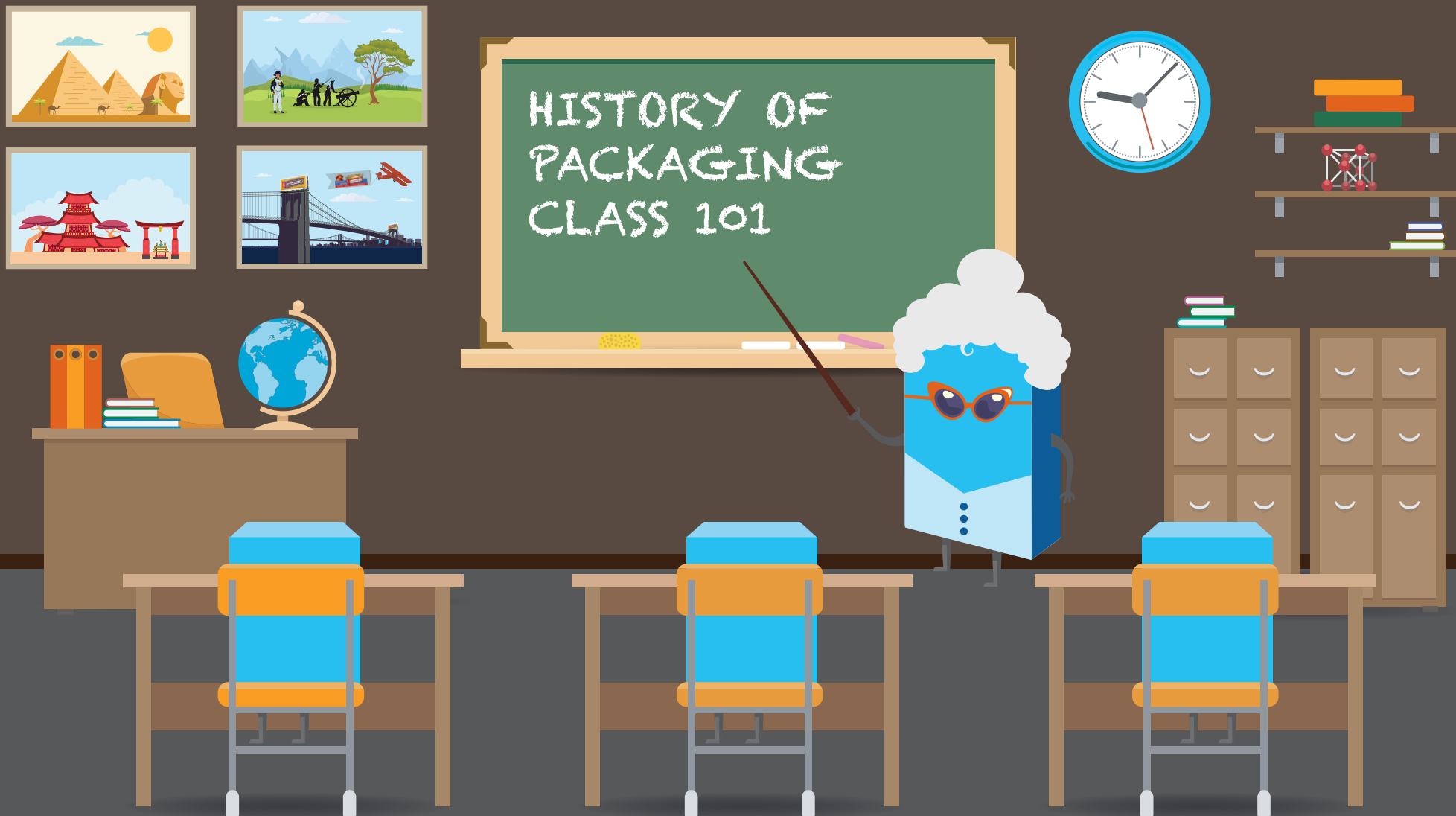


THE STATE *of* PACKAGING TODAY

A stylized illustration of a smartphone screen displaying a breakfast scene. The screen shows a yellow box with a star, a plate of food (toast, egg, bacon, pancakes), and a small blue bar at the bottom. The phone has a white home button at the bottom.

DIGIMARC | 



READING, WRITING & CENTURIES OF INNOVATION

Product packaging began in the ancient world with the challenge of how to transport food and drink. The Egyptians invented glass containers and the Chinese leveraged paper-making techniques to create the first flexible packaging. In the 20th century, packaging materials and packaging design merged to become one. The contour glass Coca-Cola bottle is a substrate, brand and package design all in one.

Packaging today is now increasingly intertwined with advanced technology, giving brands and retailers opportunities to utilize serialized packaging, plant-based materials for bottles and barrier technology to reduce food waste. Packaging is no longer a container or even just a brand communicator, it is a digital entity connected to smart technologies that “talk” and share data, often in real time. **The future is now.**



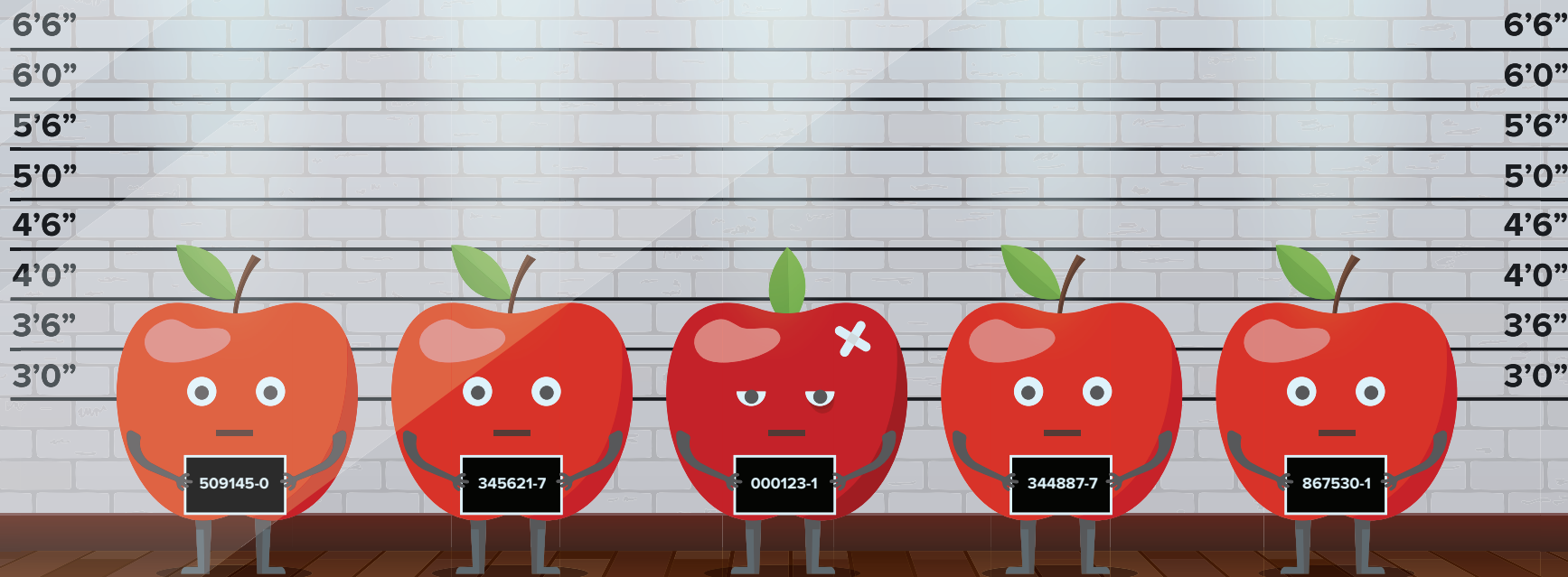
Design That Thinks Green

Post-consumer packaging today is likely to end up in one of three places: a recycling program, a landfill or (worst case scenario) in the environment, perhaps floating in the ocean. One way to ensure that packaging gets recycled, is for brand owners and designers to start the design process with the end in mind.

Walmart is the largest retailer on the planet with considerable influence on their suppliers' choices. They offer suppliers a guide, "Sustainable Packaging Playbook," and urge suppliers

to ask themselves: "Is the package made with materials and in a format that can be recycled?" Walmart offers tips on materials to avoid, such as polyvinyl chloride (PVC) or biodegradable additives in petroleum-based plastics. When sourcing materials, they also advise reducing or eliminating packaging components or layers, going with "right sizing" packaging and shifting to reusable containers.

"Start the design process with the end in mind."



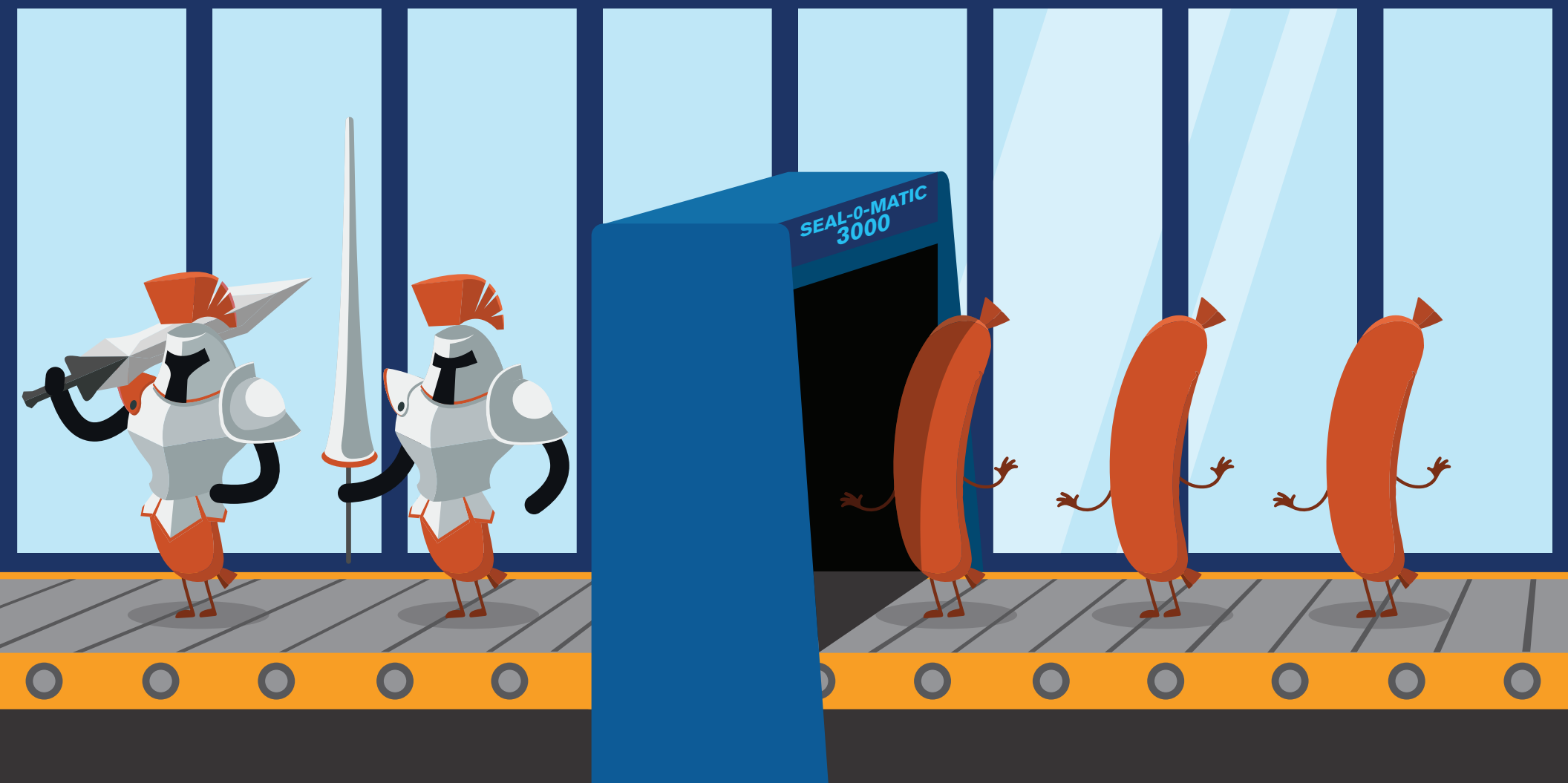
Easily Find the Bad Apple

The U.S. Food and Drug Administration (FDA) reports* more than 20 million pounds of food products were recalled in 2017. When a food product has been mislabeled, for example, it can unwittingly expose allergic consumers to certain food ingredients. Food manufacturers can potentially identify the problem products and their locations (“track and trace”) and get those particular products removed from shelves without resorting to a blind recall, causing millions in lost sales.

Serialization assigns each product a unique serial number via a barcode, such as Digimarc Barcode, and is a prerequisite to track-and-trace efforts. Serialization can also help with supply chain and warehouse efficiency, through the process of aggregation, where individual products can be serialized and put in larger packages that are also serialized; aggregated packages can be tracked and traced in real time.

*FDA Summary of Recall Cases in Calendar Year 2017

“Serialization can also help with supply chain and warehouse efficiency.”



Packaging: To ‘Serve and Protect’

For years, a socially responsible approach to packaging centered on recycling the substrate alone. Yet a growing awareness among consumers about food waste, has food manufacturers looking at innovative packaging technology to extend product shelf life. In 2017, *The New York Times* reported that 60 million metric tons (\$162 billion of food) is wasted annually in the United States.

This new technology includes multi-barrier technology (MBT), where a barrier is inserted into the package substrate that prevents elements like oxygen, water and light to permeate the substrate and impact the product. This has great potential for extending the shelf life of food products and reducing food waste. Heinz uses barrier technology for its Beanitos Fridge Pack and incorporates it into its marketing; the package copy states “Once Open Stays Fresh for 5 Days.”

“Brands are looking at innovative packaging technology to extend product shelf life.”



Pouches Take Center Stage

Pouches are big time. Sixty-one percent of consumers prefer snacks in stand-up pouches*. Pouches have a number of obvious advantages: lightweight, durable and affordable. They also allows brands to reposition a product. Dried fruits in a pouch, for example, can be more easily positioned in or near the fresh departments. One issue, however, is that many pouches are not recyclable, which runs counter to current consumer and brand enthusiasm for sustainability.

A 2018 report by Energias Market Research indicates global flexible packaging (predominately pouches and bags) is projected to reach \$313.1 billion in coming years, growing 5.1% from 2018 to 2024. Many products, such as pasta sauce, which traditionally came in glass jars and cans, are now available in pouches, making it less expensive to produce and move goods through the supply chain. Of brands that use stand-up pouches, a majority (57%) reported* they were able to lower production costs because of this form factor.

*"Flexible Packaging Transition Advantages Study," Flexible Packaging Association (FPA)

“61% of consumers prefer snacks in stand-up pouches.”



All Boxed Up and Ready to Go

Retailers today expect shelf-ready packaging. Fulfilling this expectation requires a thorough understanding of both a retailer's needs and the needs of its shoppers. When designing packaging and cases, brands should focus on how easy it is for the product to be removed from the cases and transferred easily to the shelf. If a store associate can't intuitively understand how to display the product correctly on the shelf, it's not retail ready.

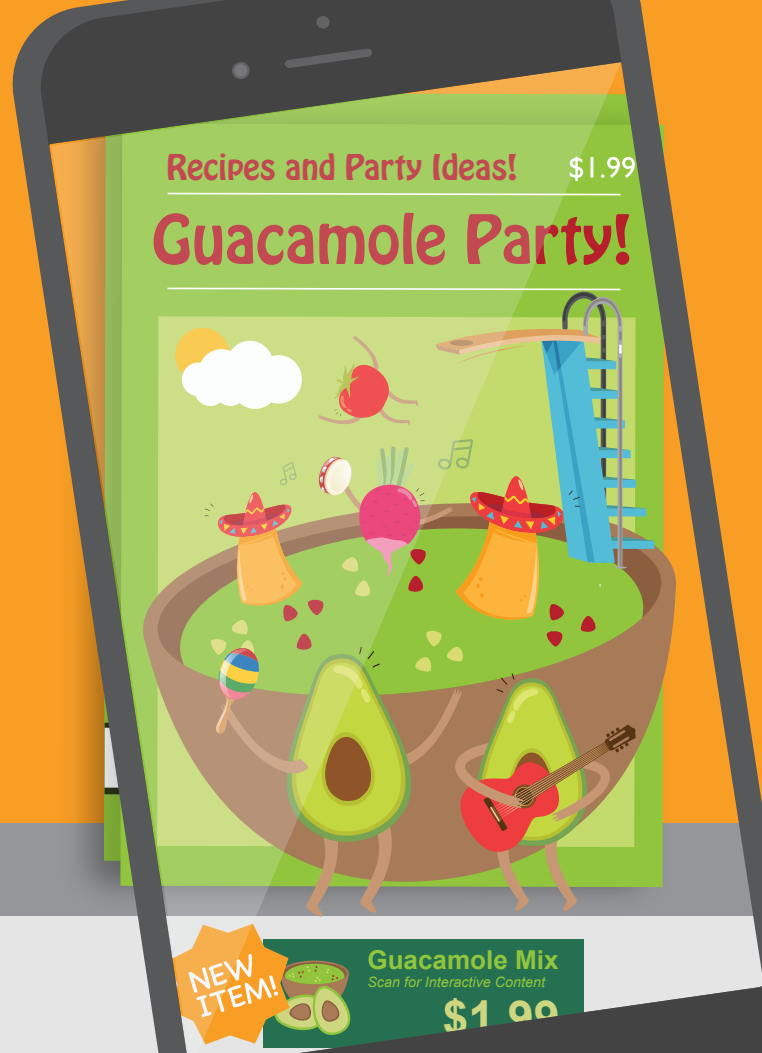
WestRock, a global packaging manufacturer, advises brands to think of the "five easies" when designing cases that are retail ready: Products are 1) easy to identify in the stockroom (clear text and graphics); 2) easy to open (no tools needed); 3) easy to stock (product to shelf in one movement); 4) easy to shop (case does not obscure primary package); 5) and easy to dispose of (unit is designed to break down and is recyclable/reusable).

"Retailers today expect shelf-ready packaging."



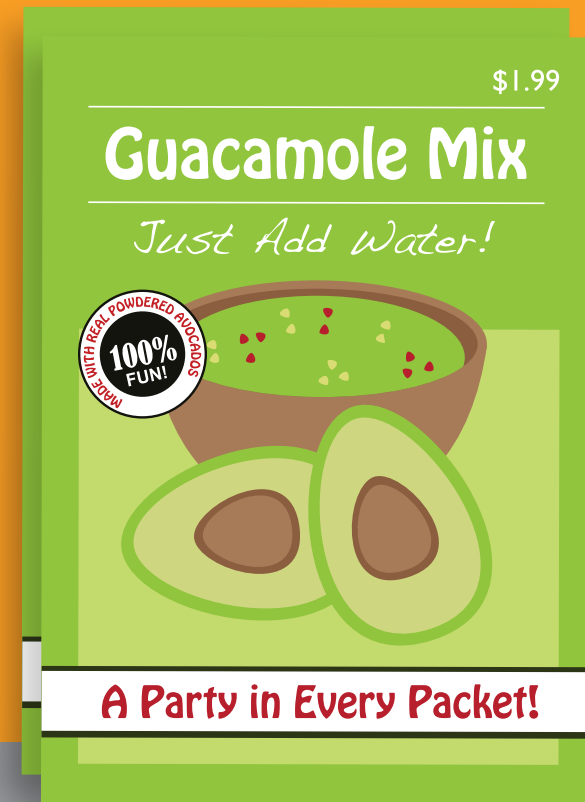
Guacamole Mix
Scan for Interactive Content

\$1.99



Guacamole Mix
Scan for Interactive Content

\$1.99



Guacamole Mix
Scan for Interactive Content

\$1.99

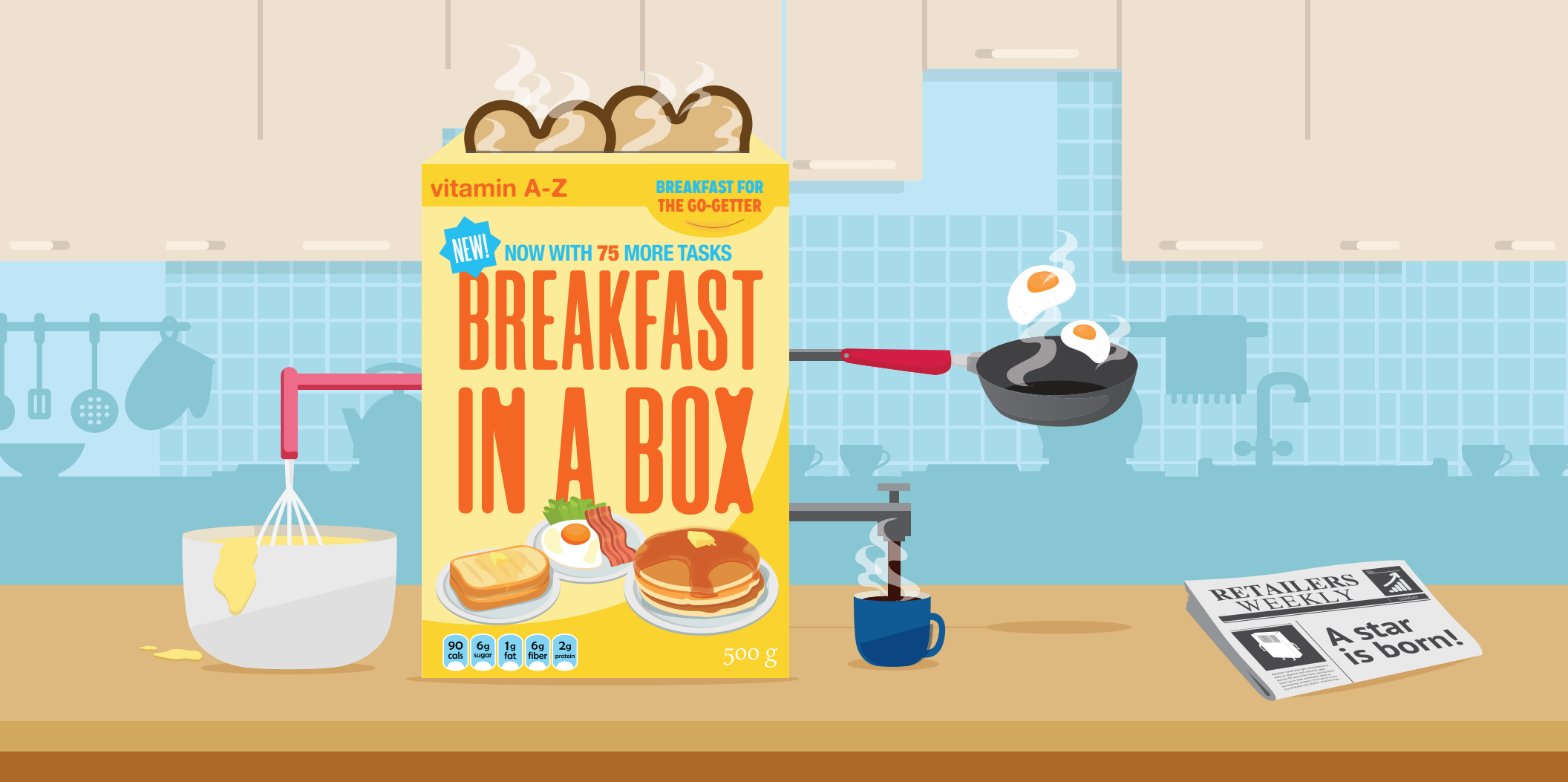
Using AR to 'Mix it Up'

Retailers and brands have been quick to understand the potential for augmented reality (AR) to enhance the in-store consumer experience. Lacoste makes it easy for consumers to point the mobile app at their feet and discover what shoe styles and colors might look best. Apparel brand and retailer Timberland now offers a virtual fitting room, which they put in main window displays of store windows to engage foot traffic.

AR and packaging is now the newest playing field for increasing brand interaction and loyalty in the store and also during post-purchase. Australian wine maker Treasury Wine

Estates uses AR mobile engagement to target a specific consumer demographic: 18- to 34 year-old-men. Its brand "19 Crimes" has wine labels with black and white pictures of British 19th century convicts sentenced to the penal colony of Australia. The winemaker created an AR mobile app, and when consumers point their phone at the label, the convicts begin "talking" in the app, telling their story.

"AR and packaging is now the newest playing field for increasing brand interaction and loyalty."



Packaging with a Mind of Its Own

Internet-of-Things (IOT) technology is more than just smart home appliances, it is also smart packaging. By adding an advanced barcode, such as Digimarc Barcode, brands and retailers can digitize packaging, turning products into interactive assets. These connected packages become more than just new channels for consumer engagement, but ways to make supply chains smarter by accessing data on real-time location, manufacturing history and logistics performance.

In 2017, Frito-Lay demonstrated how IOT packaging expands the consumer engagement playbook. It created a limited-edition "Party Safe" Tostitos bag. The bag came with a sensor connected to a microcontroller that detected traces of alcohol on a person's breath. If alcohol was detected, the green symbol on the packaging turned red and reformed into the shape of a steering wheel with the warning: "Don't Drink and Drive." The bag also automatically connected users with an Uber ride home.

"IOT technology is more than just smart home appliances."

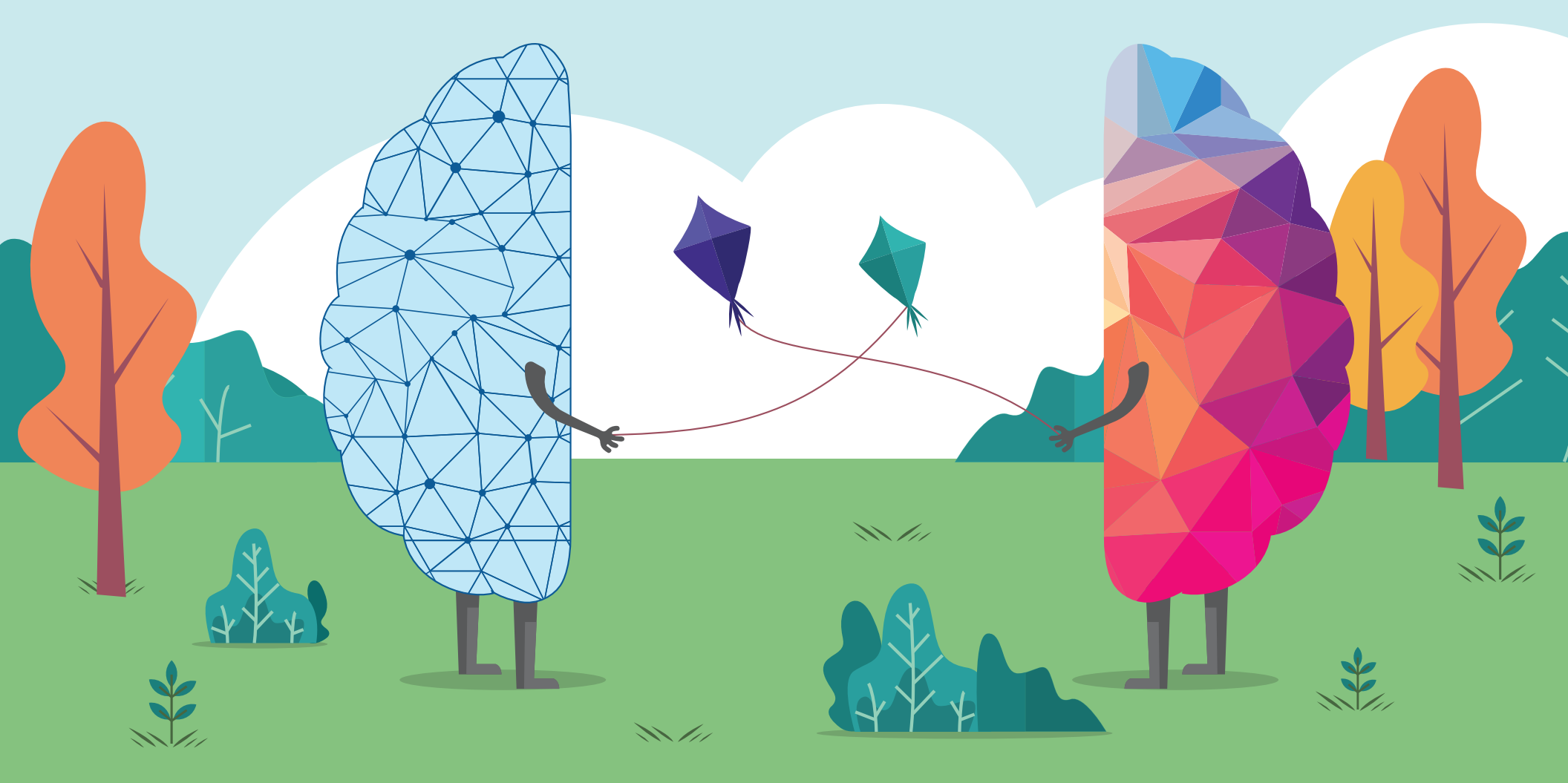


Plastic's Future Is Plant-based

The standard plastic for beverage containers (PET bottles) has served for decades as the trusty workhorse of packaging. It is portable, inexpensively made and easily recyclable. But not all plastics are recycled, and many tons end up in the environment. In 2017, Coca-Cola sold 128 billion PET plastic bottles, but the company's Ben Jordan admitted in a Coca-Cola blog: "too many of them ended up as waste." Plastic made from plant biomass, such as corn, now offers an alternative to petroleum-based beverage containers.

In 2015, Coca-Cola launched PlantBottle™, the first-ever recyclable plastic bottle made from plants, such as corn. The bottle looks, functions and recycles like a PET bottle and is made up of 30% ethanol from plant material. According to a Hexa Research report, the global bioplastic packaging market size was at \$3.61 billion in 2016 and is expected to significantly grow through 2024. Major brands and retailers, including Nestle, Procter & Gamble, Unilever and Target, have formed the Bioplastic Feedstock Alliance (BFA) to examine how best to use feedstocks (e.g., corn) for bio-based plastics.

"In 2015, Coca-Cola launched PlantBottle™, the first-ever recyclable plastic bottle made from plants."



Future of Packaging: Math Meets Art

In our current stage of technology advancement, where packaging is smart and talks to other machines, how can we possibly imagine a future where packaging is more cutting edge? What can the future possibly hold for the humble consumer goods container?

The answer is a next-generation design concept from Digimarc known as Signal Rich™ art, which combines art and mathematical principles to produce beautiful, one-of-a-kind designs that are digitally enabled and go beyond what's available using conventional codes.

With Signal Rich art, the code is native, inherent in and inseparable from the design. The code is the art. This new approach to design—because it is based on mathematical algorithms—will literally offer an infinite number of new design approaches for the creative community.

“With Signal Rich™ art, the code is the art.”

The History of Packaging

The State of Packaging Today

➔ Watch **Chapter One: “The Evolution of Packaging Materials”**
digimarc.com/hop

➔ Watch **Chapter Two: “The Birth of Packaging Design ”**
digimarc.com/hop



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