CAMBRIDGE
DESIGN
PARTNERSHIP

CDP AUU-0146-GD-A

Future drug delivery systems

"Taking the example of at-home self-injection, here we explore the future of drug delivery systems – and how drugs will be packaged to enhance patient experience and ensure successful clinical outcomes. We consider how consumer trends, including convenience, personalization, and sustainability, in combination with next-generation technology, will impact how we package the drugs we are familiar with now – and those that will be part of our future healthcare regimens."

Clare Beddoes
Principal Consultant, Drug Delivery
clare.beddoes@cambridge-design.com

What do we mean by drug delivery systems?

At Cambridge Design Partnership, we don't think of packaging as simply the container for the drug.

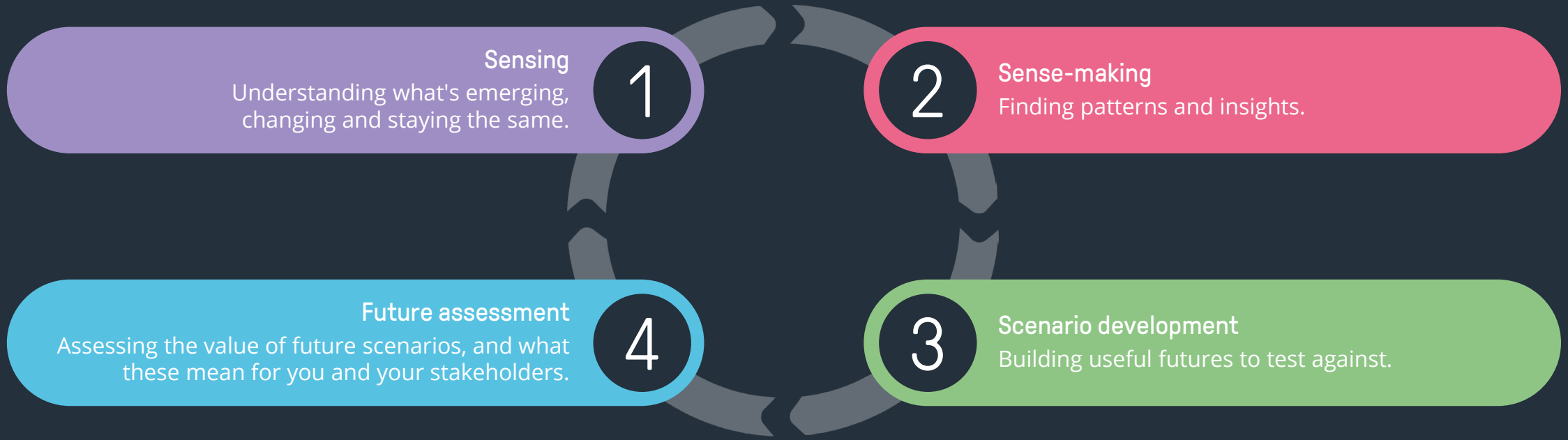
We consider the whole delivery experience, including the device, how it's packaged, and accompanying materials such as the instructions for use (IFU).

Several factors must be considered when selecting the right device and packaging materials for injectable drugs, including the drug rheology, how the drug is administered, and by whom and where.

This document takes a high-level view of how particular consumer trends may impact the experience of self-injection devices.

Futuring methodology

In our futuring process, we research, understand, curate, and create scenarios that stretch strategic thinking, materialize the new, and connect with our clients about what comes next.



Consumer needs

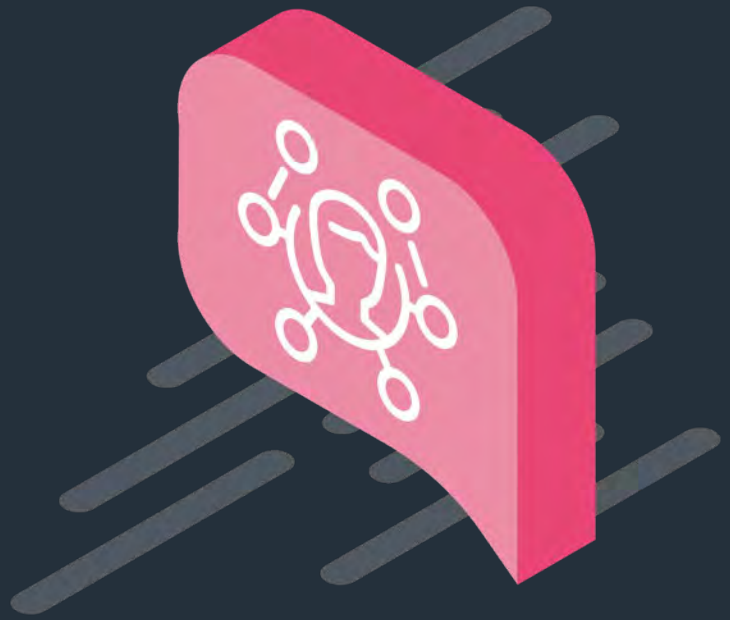
Consumer needs for packaging have changed – from protecting the product to being a conduit for digital content and brand. Fast forward 20 years and packaging will be a truly personalized experience tailored to specific individual needs.

Consumer needs and overlap with pharma

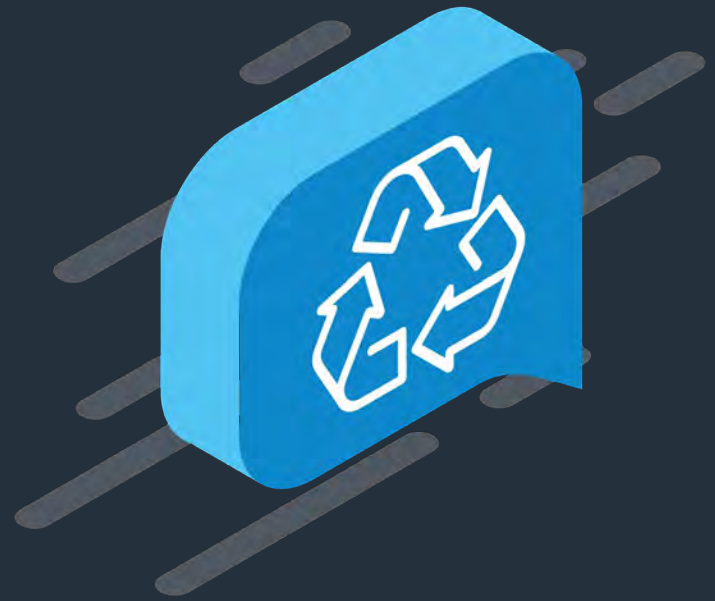
Drug delivery will continue to be influenced by consumer categories that have the advantage of lower regulatory barriers. Drug delivery systems of the future will leverage benefits for patients that successful packaging innovation and product delivery offer consumers today.

Better for the patient, better for the planet

We'll now look at a snapshot of critical trends that will lead to improved drug delivery systems in the next 10–20 years, focusing on the delivery device and external packaging.

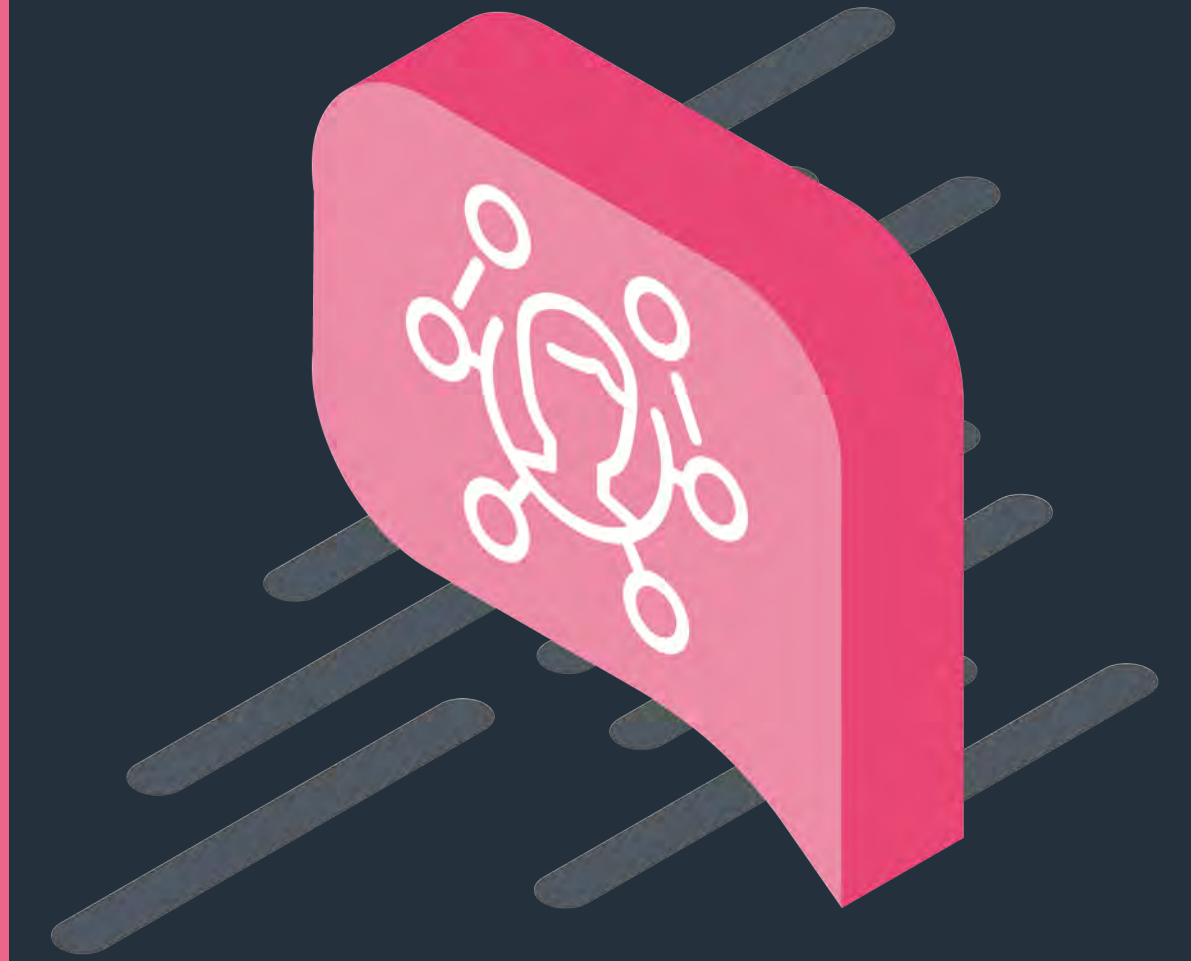


'Better for the patient' examines enhancing the patient experience through elements such as personalization and integrating digital.



'Better for the planet' explores two versions of a sustainable future for drug delivery devices, focusing on AI for patient self-injection.

Better for the patient

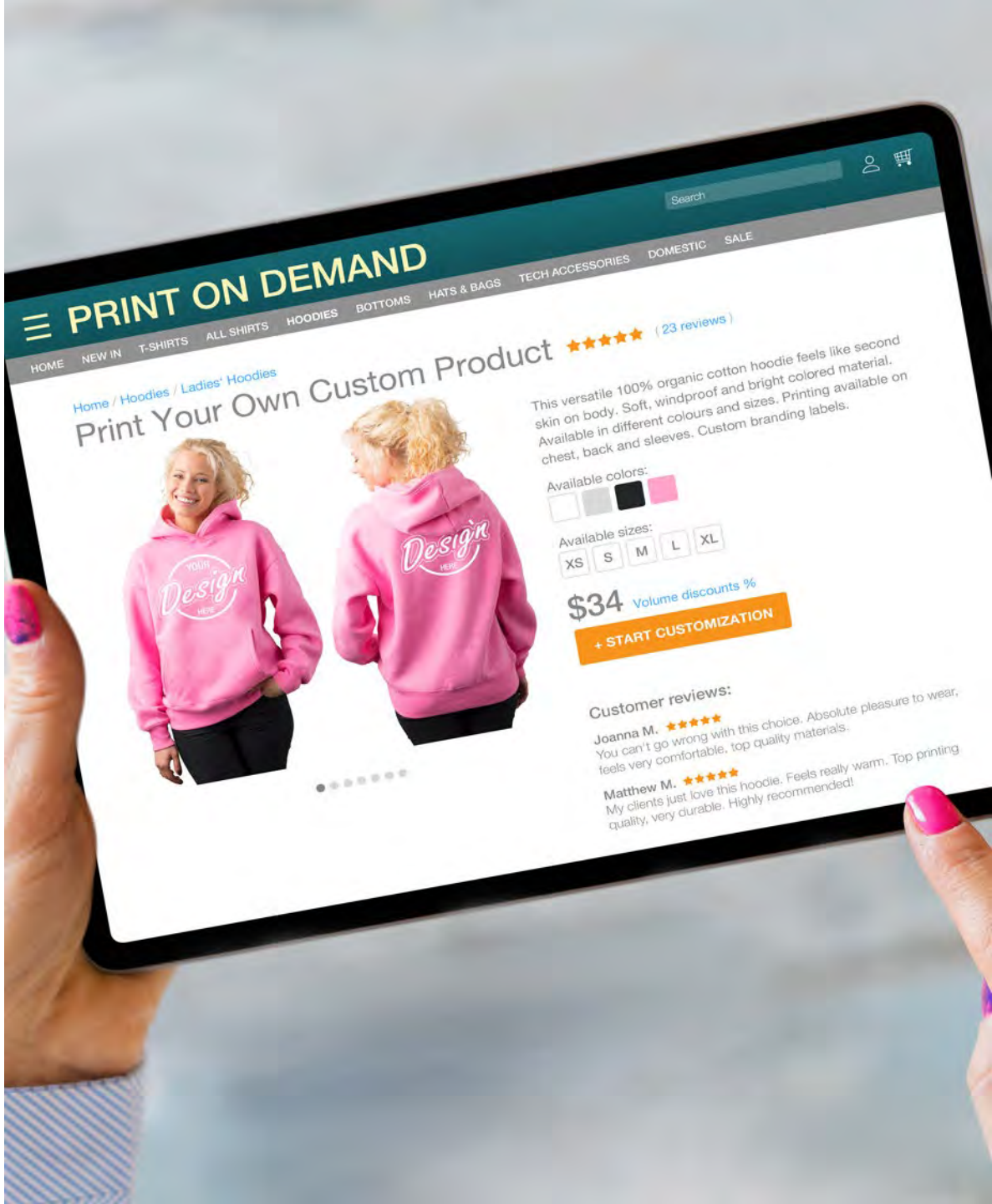


Personalization

Personalization is a mega trend in consumer products.

It could have been seen as a fad in the early days – think of novelty products such as beverage packs with people's names on them – but it is now an important factor in brand and product differentiation.

Tailoring products and services to individual needs increases consumer convenience and satisfaction – critical to loyalty and new adoption.



The value of personalization

As you ascend the tiers (right) towards the ultimate personalized experience, you potentially increase value to the consumer. However, bespoke manufacturing is costly, compared to mass manufacturing.

Technologies that enable bespoke products and packs to be generated quickly and efficiently will be key to personalization's future success.

We are already in the early days of faster personalization (thanks to advances in additive manufacturing and direct-to-consumer delivery), but these technologies and systems will increase in accessibility, affordability, and prevalence.

Bespoke
A unique offering made only for the individual.

Personalized
Using consumer data to change the offering for an individual.

Customized
Enabling consumers to select changes to the offering.

Segmented
Tailoring the offering to appeal to specific groups of consumers.

Mass
Same offering to everyone, everywhere.

Both delivery system and external packaging could contribute to a better personalized experience of future healthcare products.

Premium cosmetics ‘system’ Perso personalizes the skincare product you need for the day you’re wearing it, taking into account skin typology, humidity, and climate.

This level of customization and contextual integration creates enormous opportunities for the drug delivery sector to better calibrate to an individual's daily needs.

The system can leverage digital technology by incorporating real-time contextual information about the user's environment or needs at that moment, providing a higher level of personalization.

Consumer experience and digital technology

The connectivity and digital experience consumers already have in many parts of life are raising expectations of their experience with healthcare products.

The #WeAreNotWaiting movement is a global digital health phenomenon in which people with diabetes (mainly type 1) are engaged in developing and using open-source, closed-loop technology to improve their chronic condition.

Consumers expect a level of service and connectivity in all aspects of life – and are starting to push for it.

Fast forward 10 years: the digital world will be integrated with the physical in all aspects of life. A ‘metaverse’ (where physical and digital experiences are blended) hasn’t been fully defined yet, but it’s coming – in one form or another.

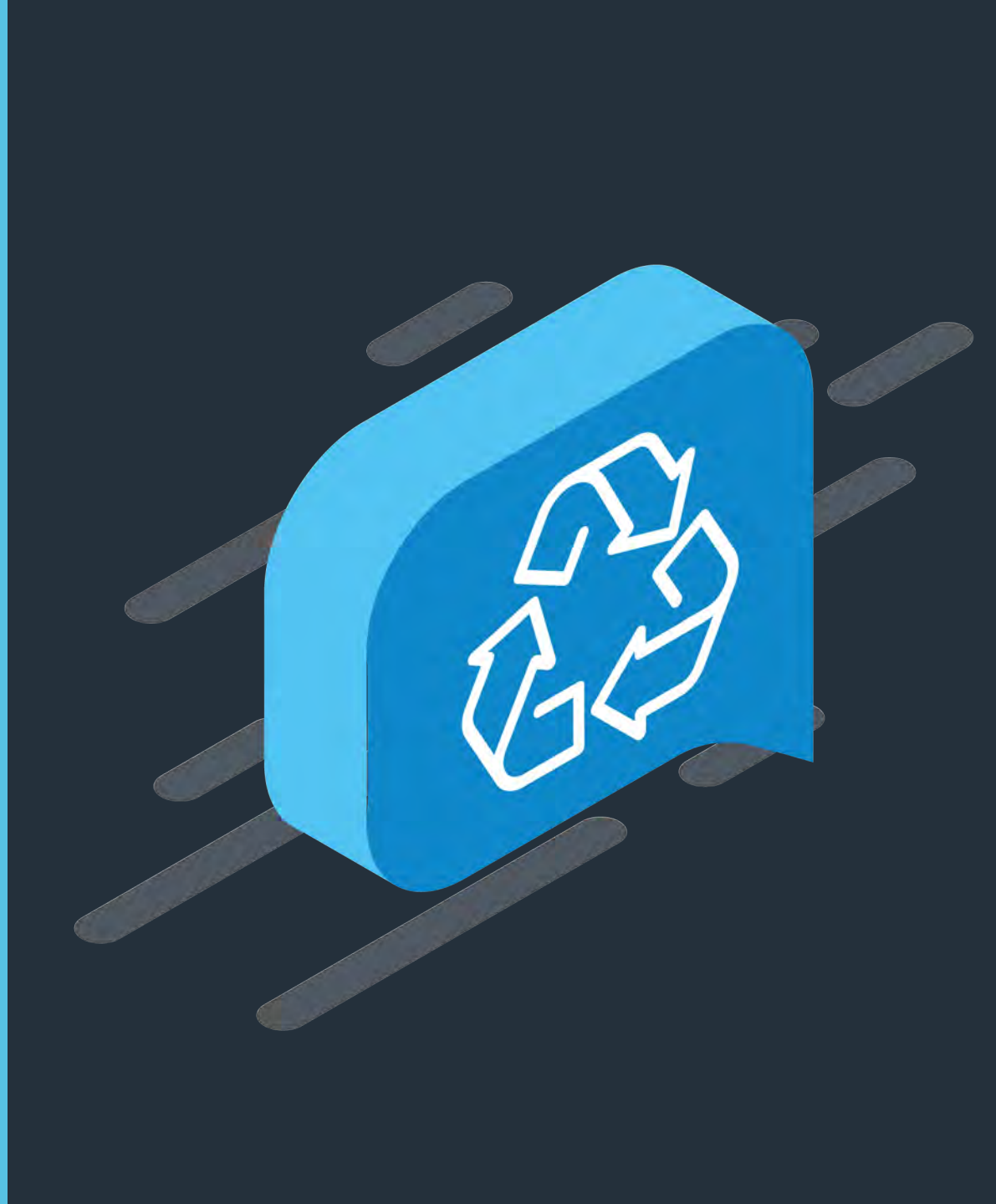
In a future where information isn’t just ‘at our fingertips’ but selected for us moment by moment via smart wearable devices, we will be able to connect automatically with products and services we use, guiding and supporting our experience.

Boeing engineers already use next-gen wearables to assist in assembling hundreds of complex parts. AI and AR guide the engineers to ensure 100% accurate build and delivery.

Future drug delivery devices could be monitored and assisted by wearables, showing when, where, and how to administer drugs, providing a fully supported delivery service (versus a physical IFU).

Digital guides – personalized to the users’ needs – to support comfortable and confident drug delivery could be available at each step of the journey, whether someone is receiving the package for their first independent injection or several years down the line of chronic disease therapy.

Better for the planet



Recyclable AIs

The challenge for the pharmaceutical industry is more complex than switching to more sustainable materials.

The industry is caught in a balancing act between satisfying the demands of industry regulators and meeting the needs of eco-conscious consumers.

Long term, testing more sustainable new materials and designing these into new autoinjectors should be part of a strategy for material transitions.

Short term, we are seeing a push towards autoinjectors (AIs) that are sent back to the manufacturer to be partially recycled.

Because most autoinjectors are disposable or have disposable components, they make up a sizeable share of the healthcare industry's environmental impact.

There is a push to improve the sustainability of AIs, so what changes can we expect to see?

- Many of the materials AIs use for health and safety factors create problems for sustainability – increased testing and trialing of alternative sustainable materials is key.
- Sustainability cannot be shoehorned into existing packaging design – it must be inherent in all aspects of the device from the design stage.

The key for pharma packaging manufacturers is identifying materials that can fulfill green requirements – without compromising regulatory approval, integrity, safety, or performance. The risks associated with failing safety standards are far greater than in other industries.

While finding sustainable materials is key to recyclable AIs, other challenges must also be overcome, including supporting infrastructure and the end of the product's usable life.

Reusability in AIs

Reusable auto-injectors can potentially reduce the waste footprint and environmental impact for manufacturers and patients.

Disposing of only the drug container and needle components (not the entire device) could also reduce cost per injection.

Extended Producer Responsibility (EPR) is being rolled out for packaging waste in the consumer sector and will likely impact other areas.

The need for removable batteries in consumer electronics is already being legislated. While legislation still shows reduced requirements for medical devices, extended producer responsibilities will come to affect the medical sector.

Manufacturers of consumer goods such as cleaning products and deodorants are being forced to investigate reusable options – but there are also benefits for the manufacturer (for example, cost and material reduction) and new business opportunities to sell directly to the consumer.

We have seen the evolution of reusable models in drug delivery. In the 1970s, insulin was injected via reusable needles that diabetic patients sterilized before each use. Today, reusability needs to be compatible with up-to-date sterility and hygiene requirements.

For reusable models to be more widely adopted, new systems and infrastructures that ensure pharma companies can take ownership of the lifecycle of their products will need to be developed.

With reusability, it's not enough to pick the right materials. You need to contextualize that choice in the recycling/disposal systems that will be used.

Good for the manufacturer

New technologies and emerging trends, such as increased digital connectivity and AI, as well as more empowered patients, are disrupting the pharma industry and creating opportunities and challenges for manufacturers.

There is a greater emphasis on moving care into the home, with the patient at the center demanding more value and better experiences from their healthcare and medicines.

Preparing for the future will mean embracing digital health and creating a patient-centered approach to innovation and developing drug delivery systems.

If you'd like to understand how the themes discussed here could impact Drug Delivery manufacturers, get in touch with the Drug Delivery team:

drug.delivery@cambridge-design.com

AUU-0134-GD-B

CAMBRIDGE
DESIGN
PARTNERSHIP

UK OFFICE

Bourn Quarter, Wellington Way,
Caldecote, Cambridge CB23 7FW

+44 (0)1223 264428

US OFFICE

801-120 W Morgan Street,
Raleigh, NC 27603, USA

+1 (919) 901 0909

hello@cambridge-design.com

TEMPLATE VERSION: AUU-0134-GD-B

ISO 13485:2016 CERTIFIED QMS

ISO 9001:2015 CERTIFIED QMS