

FROM A PRODUCTION-BASED TO A SERVICE-BASED ECONOMY:

The Role of Tokenization in Decoupling Growth

with analytical support from 



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Executive summary

Context

The linear economic model that underpins all industries that manufacture and retail goods is at odds with planetary boundaries. Growth in this model happens by selling more and more products that are made using mostly virgin raw materials extracted from the ground.

To reconcile their economic and environmental ambitions, companies need to explore new models that enable them to decouple the relationship between revenues and production.

Opportunity

The good news is that there are already companies exploring ways to create this decoupling. For this paper, we analyzed best-practices across consumer industries and interviewed experts and practitioners (cf. contributors section). This enabled us to identify two main strategies to achieve decoupling: first through product circulation, second by creating value added services.

Product circulation is where a lot of exploration and scaling is already happening and where the economic case is increasingly clear in many industries. It includes repair, resale, and remanufacturing. Those models allow companies to create multiple revenues from one product. To unlock their full benefits, companies need to see them as core to their business and customer strategies.

Value added services is the more emerging opportunity, but some pioneers are already exploring how to create revenues from existing products. They include services that support product circulation like warranties, that add value over time like upgrades, or that substitute the need for physical products like virtual goods. Developing value added services can enable brands to move beyond discreet customer interactions towards continuous ones.

The role of tokenization

Tokenization is the creation of a digital passport for a product in an open, interoperable, and transferable format. It can help companies capture the opportunities of decoupling by making it easier to attach and share information throughout the life of a product. For example the authenticity, provenance of a product can easily be accessed and its maintenance history updated.

By providing a layer of transparency and trust, it can help align the interests of brands, regulators and customers. For example, regulators can audit the relevant information about a product, the circular journey of a customer can be streamlined, and brands can create relationships with the successive users of their products.

Finally, tokenization can act in practice as an enabler of product circulation and value added services. It facilitates access to information from the relevant actors, allowing to add to the history of the product, deepening customer relationships, and acting as a hub for diverse functionality like access to relevant content.

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Summary Of Benefits Of Decoupling

Benefits	Customers	Businesses
Value Generation	<ul style="list-style-type: none">• Realignment of goods industries with shifts in consumption patterns towards services.	<ul style="list-style-type: none">• Opportunity to serve customers' 'higher' needs.• Opportunity to create low marginal costs sources of revenues.
Ownership Value Enhancement	<ul style="list-style-type: none">• Transparency on product history that provides added trust in provenance, quality and authenticity.	<ul style="list-style-type: none">• Added services like maintenance and simplification of the resale process.• Creation of ownership certificate.
Relationship Extension	<ul style="list-style-type: none">• Move beyond the endless cycle of consumption.• Create a sense of belonging to a community.	<ul style="list-style-type: none">• Access to data from use phase.• Increased lifetime customer value and lower acquisition costs.

Contributors

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Context

The linear economic model that underpins all industries that manufacture and retail goods is misaligned with planetary boundaries. Growth in this model happens by selling products that are made using mostly virgin raw materials extracted from the ground. To sustain growth in this model, companies have to find strategies to sell ever more products, which has led to ever faster production and consumption cycles over the past few decades.

This exponential growth in manufacturing is putting significant pressure on nature, through CO2 emissions and acceleration of climate change, ecosystem destruction and damages on biodiversity, and exponential waste generation that ends-up mostly burnt, or landfilled.

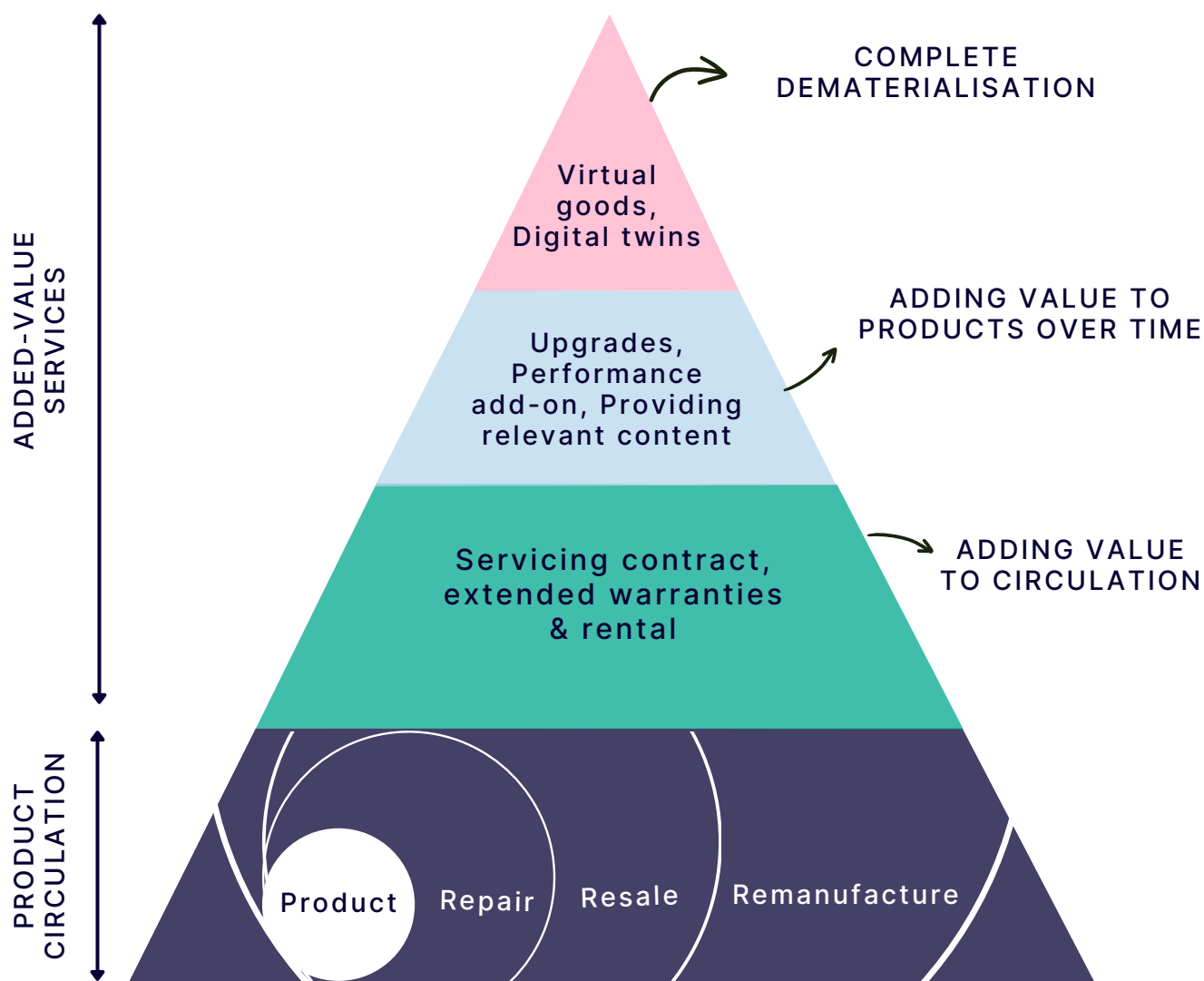
For goods industries to achieve the ambitions of the Paris agreement, and remain within planetary boundaries, it is increasingly clear that an absolute decoupling – which means a total decorrelation between business success and production of goods – will be necessary.¹ To achieve it, companies will have to find ways to create more value while making less but better goods.

The first challenge for companies is a change in mindsets, from both leaders and investors who currently measure success through the quarterly – or over longer periods in private markets – growth of volumes. In addition, the current economic model and value chains of those companies have been designed and refined over the years to optimize profitability by transforming raw materials into coveted products, and numerous regulations have been developed to support the effectiveness of this model.²

A new paradigm, where the value added to customers comes from other sources than raw material transformation, will be necessary to achieve absolute decoupling while maintaining economic development opportunities for companies.

Opportunity

For companies to achieve absolute decoupling, we identified two main strategies. The first one is to grow revenues from product circulation, where options include repairs, resale, and remanufacturing. The second strategy, and the most emerging one, is to create new revenue sources from added-value services. Using those strategies, companies can move away from the constant search for newness, towards unlocking a breadth of dematerialised opportunities for their customers.





The good news is that those models are already demonstrating their economic potential. For example, between 2023 and 2028 the global second hand fashion market is expected to grow by 12% cagr, or 3 times faster than the overall global apparel market.³ Although early data from pure players in the space shows that the profit potential from product circulation models might be lower than the margins currently experienced by brands and retailers through the creation of new products, there are significant upsides to be captured when those are fully integrated into a company's business model.

In the next two chapters we unpack the opportunities and practical considerations to implement those strategies.

There are growing opportunities to use existing products as future feedstock through advances in recycling technologies, but we left this part out of our study as it cannot be entirely considered as part of a hard decoupling.

Growing Revenues From Product Circulation

We focused on three of the most common loops in this study: repairs, resale, and remanufacturing. What emerges is that for those models to deliver attractive profit margins, they need to be integrated in the full business model and customer experience of the brands. Seeing them merely as bolt-on solutions or as glorified customer loyalty tools decreases their economic potential.

By engaging their customers in circulating products, companies can maintain and extend relationships beyond the checkout counter and empower them to perform a different type of mental accounting considering the value retention of a product and see them as liquid assets that they can monetise.

1. Repair

Repair services are a great way for brands to extend the life of products and create new sources of revenue while increasing customer satisfaction, as frustration can build when products fail. Repair services seem especially successful when combined with customisation and embellishment offerings.

\$190 billion⁴

expected valuation of the global personal goods repair and maintenance market by 2026 (including home equipment and appliances, furniture, and footwear), up from \$124.5 billion in 2021.

For people to adopt repair services, there are important considerations around costs, convenience, timings, and quality of process.



Pricing considerations:

Costs must seem fair, given for example the expectations people have of what the durability of the product should be, and should not exceed around a third of the price people paid for the product according to empirical data. For example, over 70% of appliances are not repaired because the cost of repair compared to the price of a new product makes it unreasonable to repair.⁵

Role of regulations:

Regulations, like the ones in France⁶ or Sweden⁷ that aim at lowering the costs of repairs can encourage adoption. In addition, right to repair regulations, that require companies to create repairable products, are a great way to develop this sector, as the feasibility, cost, and quality of repairs are strongly conditioned by design and production choices.⁸



Minimising complexity:

Convenience is a critical factor, with adoption an inverse function of the effort required from customers. Solutions should be easy to find, and simple to activate. Every added complexity to the process can either delay when customers will send their products, or encourage them to buy new, either way growing their frustration with the brand.

Role of online platforms:

The growth of online platforms intermediating repairs can help bridge the accessibility gap and mainstream the behavior. In cities like Paris,⁹ organizations have even created web platforms to help people find repair shops.



Transparency & live updates:

Providing transparency about the process and live updates on the timing of the repairs can increase customer satisfaction. If they have to wait for their products for months without any visibility once they send them, customers will grow dissatisfied and become less likely to use such service again.¹⁰ Providing customers with an equivalent product for the duration of the repair could significantly improve satisfaction.

Sale of spare parts:

Brands can sell spare parts or consumables to their customers to empower them to repair their products themselves. For example iFixit has partnered with a number of brands like Google or HP to provide guides, tools and genuine spare parts for people to repair their devices.¹¹



2. Resale

By developing resale, companies can generate multiple revenues from one product, increasing the amount of times it is used while reducing the need to produce new ones. Resale is a fast-growing market across all categories, including luxury goods, and electronics, allowing customers to both monetise what they already own, and access quality goods at a cheaper than retail price.

\$64.3 billion

the global refurbished mobile and used phone market in 2022

10%

of the size of the global smartphone market¹²

\$185.8 billion

expected valuation by 2032

Success in the resale market relies on building a dynamic ecosystem of buyers and sellers, and in effectively intermediating trust between them. As the resale market is becoming increasingly competitive, getting quality listings is a priority.



Enrolling sellers

Convenience:

Convenience and simplicity of the listing journey are critical. For example, Vestiaire Collective is offering multiple ways for sellers to list their items, either by listing it themselves on the marketplace, or with the support of the VIP service that will take on the listing process and the storage.

Fair retribution:

Perceived fairness of the proposed selling price and platform fees condition satisfaction. With 30k new items listed on the platform everyday globally, Vestiaire Collective is able to recommend the best price to its sellers that can make up to 100% of the listed price on certain brands.

Resale price transparency:

To increase the perceived fairness of the proposed resale price, reputable sources of truth can be helpful. For example, in the car market companies like Parker or l'Argus provide valuable insight to sellers about the second-hand value of their cars.



Engaging buyers

Authenticity and product history:

For buyers, the appeal of resale comes from trusting that the platform lists authentic products with, when relevant, verifiable service history.

Fair perceived value:

Value for money is one of the key drivers of second-hand adoption. The perceived value of the products on offer is an important factor of satisfaction for buyers.¹³ Providing transparency on the maintenance and preparation operations that have been conducted prior to resale can help customers better understand certain price variations.

Quality listings:

To increase conversion and retention, high quality imagery and descriptions combined with conformity between the listing and the received products are key.



Emerging opportunities

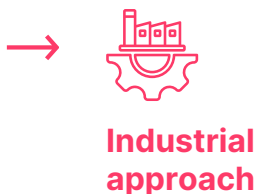
Creating partnerships between brands and resale platforms can allow them to retribute the brand for supporting the platform, either through royalties or affiliation. We see such partnerships emerging in the luxury sector where brands are enabling one-click listing by sharing data with the resale platforms, easing sellers' acquisition. In addition, their communications support can help attract new buyers.

3. Remanufacturing

By remanufacturing products, companies can bring old products back to their original performance, or to make new products using used components. Remanufacturing can generate high margins while significantly reducing the environmental impact of products.

For example, the Renault Group has been expanding its remanufacturing operations since 1949. Those operations are highly profitable, enabling the group to offer parts that are 40% cheaper than new ones, with the same quality control and warranty, while cutting water and energy consumption by over 80%.¹⁴

We see two main approaches, the first to develop industrial solutions for high-volume products, the other to recraft and elevate smaller volume products.



Remanufacturing has shown great promise in industries where parts and components are standardized, high costs, and where manufacturing operations are local.

Standardized high-volume products:

The more standardized the products, the easier it is to develop replicable solutions that can be industrialized. This scale helps bring the cost of remanufacturing operations down.

Localized operations:

Local operations help to reduce logistics cost and carbon footprint, improving the environmental and economic case.

High-value products:

Remanufacturing high-value products allows companies to reach a wider market by offering genuine and verified products at a cheaper price point. For example, Apple is offering refurbished iPhone with new batteries, fresh cables, cleaned shells, and one year Apple Care plus warranty.¹⁵



Recrafting approach

Remanufacturing can also help reinvent and elevate products that would otherwise be discarded.

Creative reinvention:

Companies can generate revenues from inventory, or returned items, using craft and creativity to transform them into more desirable products.

Value through uniqueness:

Those reinvented products have usually limited availability, allowing them to retail at higher prices. For example, Ferragamo' Icon-Up project reinvented shoes from their inventory to resell them at a premium.¹⁶

Operational implications:

The uniqueness of reinvented products can be challenging to manage with existing processes for companies, and will require onboarding the relevant teams early to be managed effectively.



Emerging opportunities

Broadening access:

Sharing details about products' assembly and components would allow more actors to enter this market.

Automating solution identification:

The use of Artificial Intelligence can help identify solutions to reinvent products in a commercially viable way.

Creating New Revenue Sources From Value Added Services

Offering value added services allows companies to create revenues from existing products, opening decoupled development pathways. It also enables brands to move beyond discreet customer interactions towards continuous ones. This is the most emerging side of decoupling.

Solutions in the space can include extended warranties, servicing contracts, community activations, access to relevant content, and other connections between physical and digital worlds.

Not just wishful thinking

Numerous companies are generating significant revenues tapping into this space.



Services are the fastest growing side of the business and represented 22.2% of Apple's revenues in 2023, up from 18.7% in 2021.¹⁷ Besides legacy services like Apple Care, Cloud Services, and fees from the Apple Store, the company is investing heavily in the development of its content platforms like Apple TV, Fitness, Music, and News.



FNAC DARTY

The group has generated 15% of its revenues from 'Other products and services' in 2023.¹⁸ Although they do not break revenue further, this includes insurance and repairs which the group has identified as strategic growth levers.



Adding Value to Product Circulation

Servicing Contracts and Extended Warranties:

Servicing contracts and extended warranties can enable customers to both benefit from products that constantly perform at the best of their potential, but also better maintain their value on secondary markets where full-service history from certified providers is a source of trust and higher perceived value. Leasing solutions can allow both to facilitate access to a product while bundling servicing contracts to make it easier for customers.

Rental:

Mutualizing products with infrequent or short usage periods between users can reduce production needs, help maximize revenues, and reduce costs for customers. Rental can be performed as a one off, for punctual needs like for DIY tools where retailers like Leroy Merlin are offering rental alternatives for tools.¹⁹ It can also be offered on a subscription basis, to replace purchasing and under-utilizing products. For example, to allow for regular wardrobe refresh without having to constantly buy new clothes, Rent the Runway is offering subscription plans where customers can rotate their wardrobes on a monthly basis.²⁰





Adding value to products over time

Upgrades:

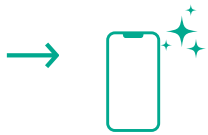
Adding new features and improving the performance of a product over time through upgrades can help grow revenues from past customers, while continuing to delight them. For example, Tesla is successfully selling upgrades like autopilot after the car has been purchased. Pay for upgrades have to be navigated carefully, as demonstrated by BMW who tried to offer features like seat heating on a subscription basis, which generated significant backlash.²¹ Overall it seems that software based upgrades are more accepted than paying for hardware that is already installed.

Performance add-ons:

Offering subscriptions or pay per use access for value added services that improve the performance of products can enable users to make the most of them for a longer period. For example, BMW refocused on providing subscriptions for driving or parking assistance, and tech companies are offering Cloud Storage subscriptions.

Providing relevant content:

Adding value to customers by providing tips, information, or entertainment can create entirely new revenue streams. In this space there is a mix of approaches. Tech companies, news organizations and streaming platforms have monetized their content. Brands however seem to use it more as a marketing tool to sell more products and have not yet done so. For example, Nike has multiple running clubs across major global cities alongside apps to support the training of their customers, that they all offer for free. For example, Thermomix customers can subscribe to Cookidoo, which gives them access to over 80,000 recipes, and helps plan their grocery shopping.²²



Complete dematerialisation

Virtual Goods:

This is currently a fairly niche but highly engaged customer base, mainly in the gaming community, who are showing the potential to replace or complement physical goods with digital ones. For example, brands are entering Roblox²³ or partnering with Meta²⁴ or Snap²⁵ to create dedicated products.

Digital Twins:

Brands can create limited edition releases of products that are connected to digital twins as ways to provide more experiences and create a community to elevate their client experience.

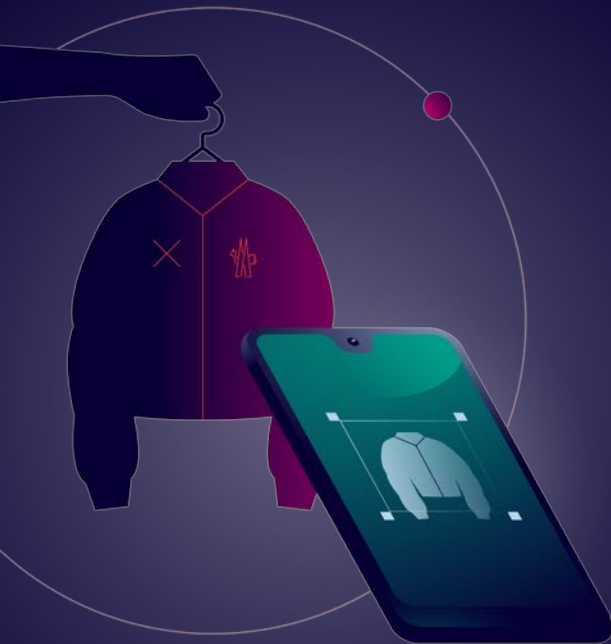
Reducing waste:

Digital sampling can help reduce the waste generated during production, and digital try-on for customers can minimize returns.



Levers of Change

For decoupling to happen at scale, the strategies that we outlined above need to become more attractive for businesses. This means that:



Cost

The cost of deploying them becomes easier to forecast, and shared infrastructure limits the investment required from individual companies.



Information

Information about products provenance, history, components is more widely available and easier to access.



Customer connections

Connections with customers are easier and cheaper to maintain.

To achieve this, policy intervention, financial support, shared infrastructure and technology all play a critical role.

Existing regulations, like AGEC or the Climate and Resilience law in France, and a number of upcoming ones in the context of the EU Green Deal, like the Ecodesign regulation introducing Digital Product Passports, or the Green Claims directive for explicit environmental claims and labels, are going to force brands to attach persistent data to every single object sold in the EU and incentivise them to produce better. Their goal is to push users to choose better, and to reuse, resell or recycle.

For the rest of this paper, we are focusing on the technology side, and more specifically on the role of tokenization in creating a shared data infrastructure that enables easier information sharing and allows to create deeper customer connections.

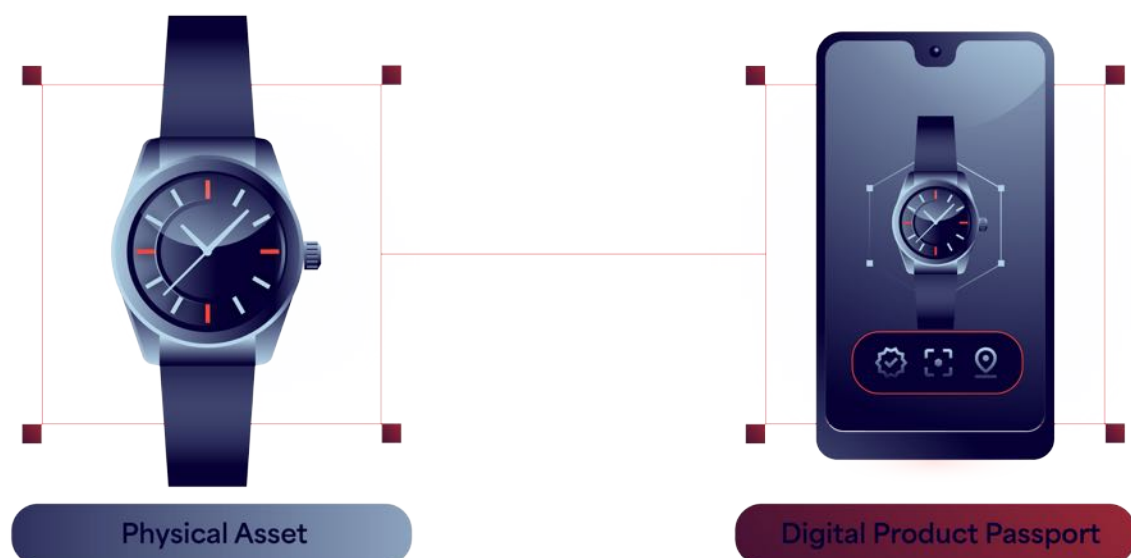
Tokenization: Transformation at the product level

Products also need to be traceable before, and after the point of sale. To create the conditions for a successful circular economy, it is necessary to attach information throughout a product's life cycle and make that information available to successive owners and all parties involved in repairing, maintaining, modifying, or recycling it.

What is tokenization?

Tokenization involves creating a digital passport for a product in an open, interoperable, and transferable format. This will serve as the foundation for all information and interactions between a brand, the distributor, the owner, and all other parties who will work on the product.

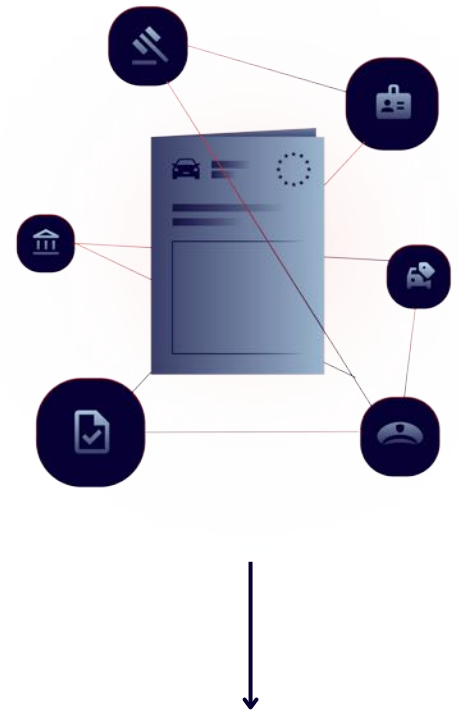
The product will be equipped with its own unique and dynamic identification, which simplifies the process of understanding its production, ownership history, current status, and future end of life requirements.



Data we can truly own

Tokenization transforms products into native components of the web by connecting them to the blockchain. Unlike digitisation, which simply converts something into a digital format tied to a proprietary infrastructure, tokenization transforms something into an electronic format while preserving its evidential value on an open and decentralized infrastructure. This means the ownership is securely recorded on the blockchain, providing immutable proof of ownership and authenticity.

This enables users to assert ownership of their favorite products in the digital environment, independently of any single provider's platform, much like they truly own the physical products in the real world and can exercise their rights at will.



Data that is persistent & provable

Underpinned by the robust security and transparency of blockchain technology, each token carries with it a cryptographic signature, validating its immutable record on the blockchain. The introduction of this technology allows for the sharing of information between users who may not trust one another, within an open and decentralized framework.

Tokenization streamlines the identification, authentication, and monitoring of products across their lifecycle milestones. Consequently, it minimizes reliance on intermediaries, streamlining circular business models and curbing associated costs.



Data with native utilities

A token provides numerous advantages compared to traditional forms of identity for a product:



- **Evolutivity:**
They can record dynamic data and adapt over time.
- **Portability:**
They are easily movable across different platforms and devices, which can be operated from the user's wallet.
- **Interoperability:**
They allow different systems and protocols to use and exchange data.
- **Composability:**
They can combine with other tokens for augmented functionalities.

Tokenized assets can take various forms, such as digital product passports or e-maintenance booklets, ensuring that crucial information and records are securely stored and easily accessible, enhancing trust and transparency in product transactions.

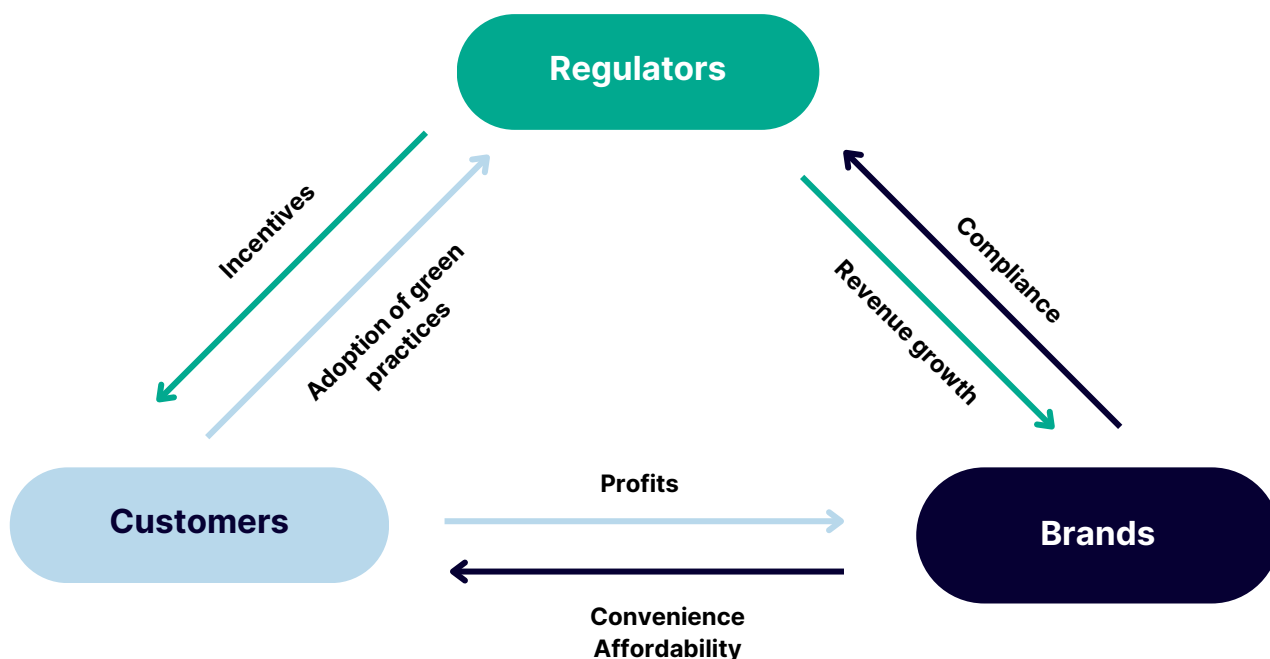


Glossary

A Digital Product Passport is a digital record detailing a product's lifecycle, materials, and environmental impact, including related services.

An E-Maintenance Booklet is an electronic document that contains maintenance procedures, schedules, and service records for specific equipment or items.

How can tokenisation be a facilitator of change for decoupling?



Blockchain technology and tokenization can help align the interests of brands, regulators and customers.



For regulators

Need-to-know access:

Cryptography and decentralized architectures allow brands to encrypt and control access to sensitive business information. Regulators can set criteria for data access, letting different stakeholders obtain needed information without compromising privacy. For example, auditors may have full access, while brand partners only access relevant data segments to respect business confidentiality and maintain competitiveness.



For customers

Single Source of Truth:

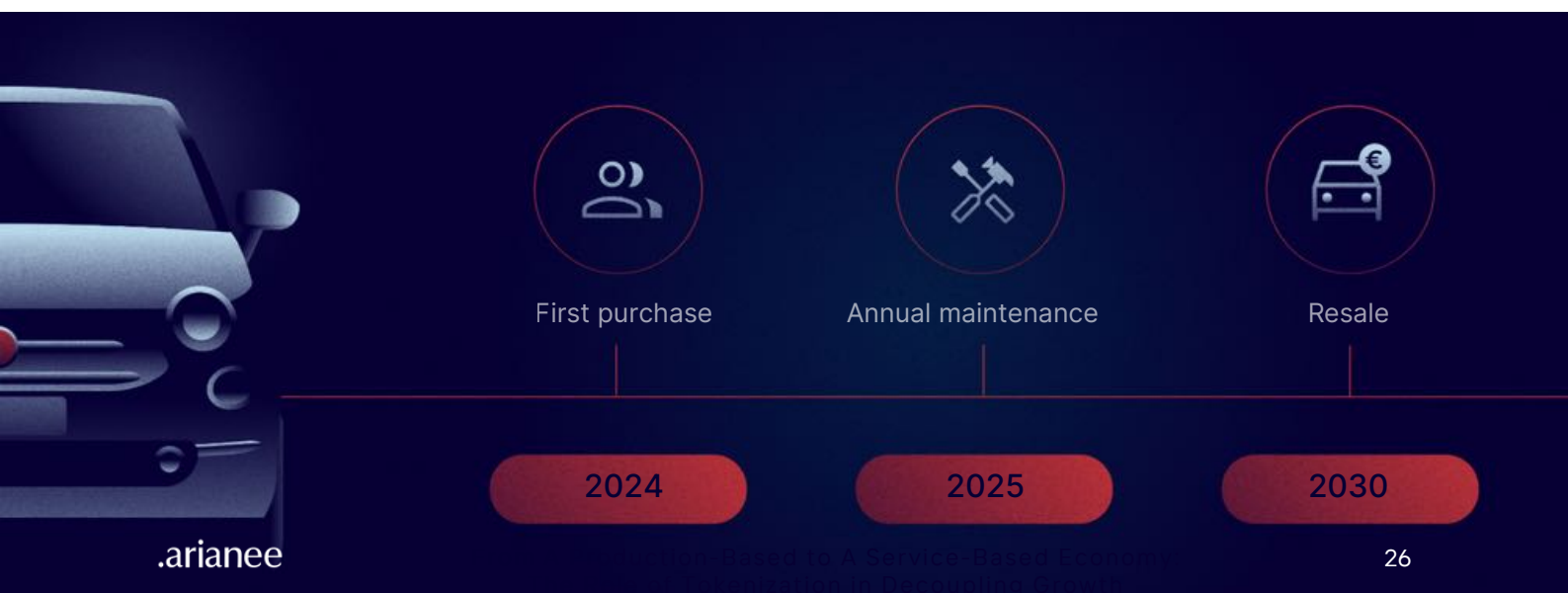
By providing a single, verified source of truth about the product, tokenization can empower customers to feel more confident participating in a circular economy. With the token tracing the product's lifecycle, buyers can access how it was made, its use and service history, and be reassured about its authenticity.

Streamlined customer journey:

All the information about the product being already stored on-chain makes it a lot easier for people to list their products for resale and prove their authenticity. This could significantly increase participation in the market by making the listing process a lot more streamlined. On the other hand, for buyers in circular markets, access to quality, reliable information and data about a product can improve appeal and increase conversion rate.

Transparency on product history:

Tokenized digital product passports can be used to store data and events in digital form, creating e-booklets that can demonstrate that products are well maintained. It can allow successive users to know when, where and how they should get their items serviced. This can increase participation in and the perceived benefits of undertaking those activities. It also creates additional peace of mind for owners where the certificate cannot be lost nor falsified.





**For
intermediaries
and platform**

Interoperability:

Tokenization allows for easier access to product data for marketplaces, as they are able to access product information that is standardized on an open and decentralized framework rather than have to integrate with brand databases. In that sense, the more universally shared a product data scheme is, the more scalable the approach is across the system.

Reach:

Brands can authorize vetted platforms to add events (e.g. repairs) to digital passports or e-maintenance booklets on their behalf, or issue tokens for products that are already in circulation. This will enhance the visibility of these partners, fostering a strong network of service providers, and driving the adoption by customers.

Trust:

This data integration can help create more traceability around the product history, including service and maintenance, in a way that increases trust for all actors and willingness to pay for buyers.

The more universally shared a product data scheme is, the more scalable the approach is across the system.





**For brands
and OEMs**

Direct connection with secondhand owners:

Since a token can be transferred from one owner of the product to the next, it offers unique opportunities for brands and OEMs to create relationships with second or third owners of a product, which today they do not have. They can then engage those owners and widen their communities, beyond their first shopper, into more aspirational customers who associate with the brand identity and values but cannot necessarily afford new. This allows for deeper and more meaningful engagement, but also enables brands to offer added value services to their entire customer base.

New revenue from royalties:

A major benefit of blockchain-based infrastructure is that it could ultimately allow brands to integrate royalties. Leveraging blockchain smart contracts, brands could include terms that entitle them to automatically receive a certain percentage of the resale price every time a product is resold. To make this acceptable by intermediaries, brands would need to support driving adoption of their platforms, while continuing to add value to customers post initial purchase.

Opportunity to offer services:

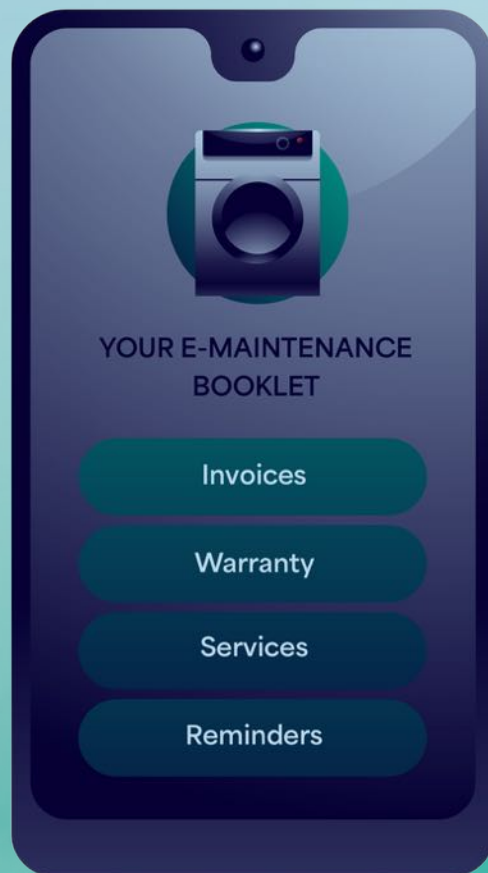
Tokens enable brands to make sure that the information associated with all the products bearing their logos in circulation have guaranteed origin. In turn this can reassure them that when some come back from maintenance or servicing, they are effectively original. Finally, by providing certificates of maintenance and authenticity, brands can incentivise all owners to engage with providers and platforms they certify.



Glossary

OEM (Original Equipment Manufacturer) refers to a company that produces parts or products that are used in the final products of another company, which then sells them under its own brand.

Towards a service-based business model: Use cases



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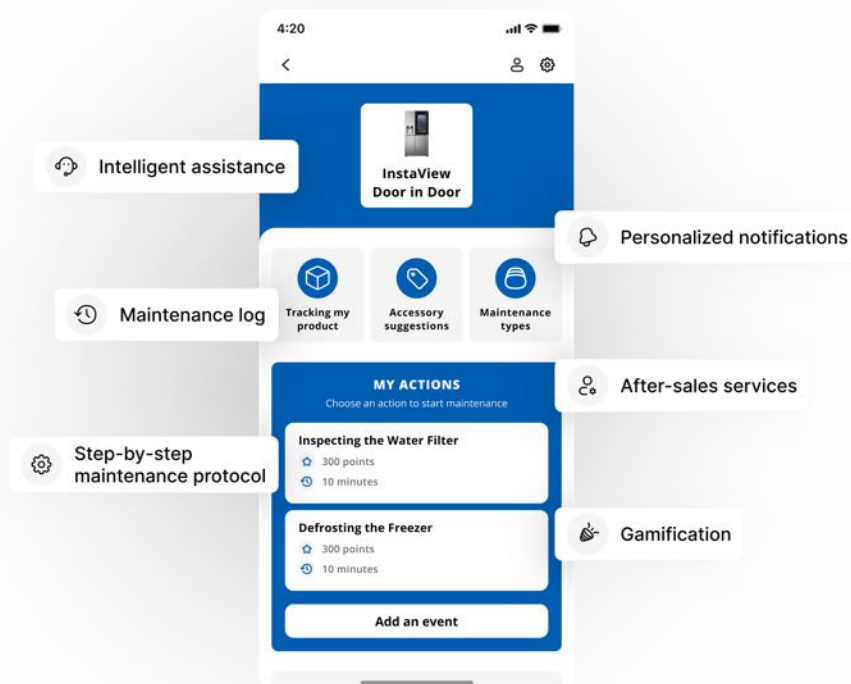
Product tokenisation can provide significant benefits to all the actors of the circular ecosystem. It can contain indicators or certifications around the repairability or reliability of a product to inform customers on its potential lifespan, such as the LONGTIME label²⁶ which complies with the Green Claims Directive. Focusing specifically on product circulation, tokenization can act as an enabler.

Repair

- Facilitates faster and more efficient repairs, by supporting technicians' work:
- Enabling more accurate diagnosis by retrieving records of past repairs, part replacements, and maintenance activities.
 - Providing detailed guidelines for repairs and maintenance.
 - Including instructions or recommendations from previous technicians.
- Integrates real-time updates for clients to follow along.
-

E-maintenance booklet

-
- Optimizes the customer experience by anticipating maintenance needs, sending out reminders, and sharing maintenance protocols, helping customers either look after the product themselves or make an appointment for maintenance.
 - Maintains an up to date record of the product's maintenance and servicing history.
 - Shares maintenance scores by product and provides data for integration into the brand's CRM system to improve customer follow-up and provide personalized rewards.



Resell

- Helps increase sellers engagement by:
- Streamlining the listing process streamlining, including retrieval of products' details and visual documentation.
 - Simplifying the authentication process.

Increases buyers trust and engagement by:

- Providing verifiable information about the product authenticity, and lifecycle, including usage patterns, repairs, and upgrades.

Simplifies the transfer of ownership, along with a comprehensive timeline of the product's history, and images and digital documents detailing its condition over time.

In a more distant future, we could envision royalties being shared with brands every time the product changes hands, but more enabling conditions need to be in place for this to become a reality.

Remanufacture

- By providing detailed product composition data, such as materials and components used, assembly processes, or disassembly guidelines, it allows manufacturers or intermediaries to efficiently:
- Restore products by replacing worn parts.
 - Disassemble products for reuse and recycling.

Services

-
- Maintains a direct connection between the brand and the product owner, regardless of acquisition method (e.g. store bought, secondhand, gifted).
 - Acts as a hub for support resources, booking services, messaging, invitations, and personalized offers.
 - Provides credentials for accessing exclusive content and services beyond the brand's platform.

The Arianee framework

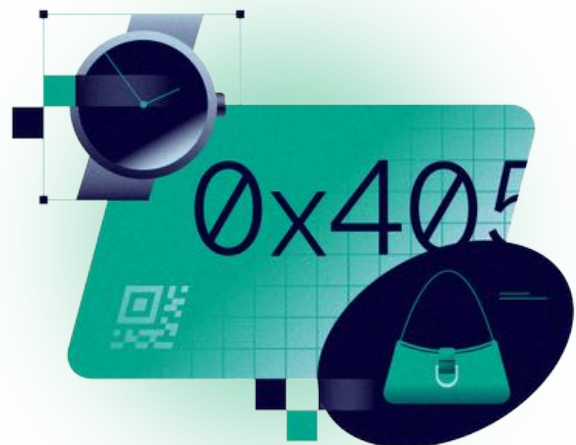
Brands hold immense potential to drive the world towards sustainability by virtue of their production capabilities and the opportunity to enact positive change. Arianee believes it is these brands that need to be equipped with open technologies, enabling them to utilize these tools and place them in the hands of their customers, creating services that are unattainable without the right technology. Arianee serves as the technological backbone for establishing a direct and lasting customer-brand connection, thereby facilitating circularity and product reuse.

A protocol built with circularity in mind

At the heart of our solutions lies the Arianee Protocol open source. The Arianee Association, the governing body behind the protocol, is a non-profit organization consisting of brands and tech partners dedicated to developing this open-source standard.

By uniting stakeholders from various sectors, the association makes sure the protocol is developed by brands and for brands.

The Arianee Protocol is a set of six open-source smart contracts deployable across various EVM chains, offering an unprecedented enrichment of the ERC-721 standard, allowing for the creation of advanced, enriched, and dynamic tokens with features specially designed for the circularity use case.



Arianee Protocol core features

- **Minting**
Enabling the distribution of ownership information controllable by clients in the form of an NFT.
- **Transfer NFT**
Facilitating the movement of NFTs between parties.
- **Prove ownership**
Allowing the creation of a verifiable proof of ownership for an NFT, both online and in real life.
- **Timestamp Events On-Chain**
Marking significant events in the NFT's lifecycle on the blockchain.
- **NFT History**
Providing access to the full history and provenance of the NFT.
- **Send Message to NFT**
Allowing an authorized blockchain wallet, typically a brand, to communicate directly with the NFT owner.



Glossary

In this paper, the term "token" is used interchangeably with NFTs (Non-Fungible Tokens), which denote a digital asset representing ownership or authentication of a high value, durable item, facilitated by blockchain technology. At Arianee, we harness NFT technology primarily for two purposes: digital product passports and electronic maintenance booklets.

This protocol is accessible to brands (to enhance the product experience and turn them into engagement platforms), developers (to access new tools and ways of building innovative applications) and community members (to explore the versatility of the ecosystem and amplify the adoption of decentralized frameworks). This open-source protocol is available for use with its accompanying documentation and with our software-as-a-service.

Our off-the-shelf solutions & APIs

Built on the foundation of the Arianee Protocol, Arianee SaaS Solutions provide a comprehensive platform for businesses to issue and manage digital product passports and e-maintenance booklets. This solution integrates seamlessly with existing brand systems and offers APIs for customized user interfaces. From the Digital Product Passport landing page to in-store companion apps, Arianee's solution prioritizes user experience and brand integration.

Product stack

→ **NFT Management Platform**

Tokenize products, communicate with holders, and extract campaign insights based on zero-party data. The NFT Management Platform (NMP) is the best way to exploit the features of the Arianee Protocol to the maximum.

→ **Dynamic Product Page**

From a simple link or QR code, users are directed to a dynamic web app where they can visualize the passport, read product transparency details and act on the passport before collecting it. Ensuring compliance with regulation requirements.

→ **Embedded Wallets**

Allow users to collect the passport and conveniently manage it in a digital wallet embedded in their client account or in a decentralized app.

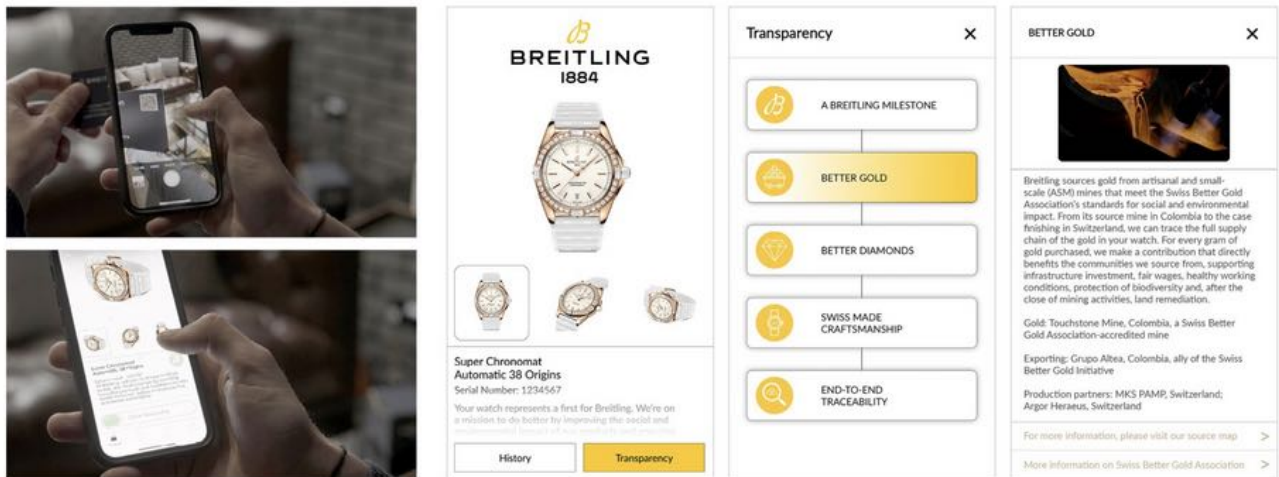
This innovative, dynamic approach, linked to brands' CRM will allow for a live update of the ownership status and offer to brands a new kind of information while letting the user control the data. This is the main difference and advantage of building digital product passports and e-maintenance booklets on a decentralized, tokenized infrastructure like Arianee.

Real-world use case: Breitling

Since 2020, Breitling has pioneered the watch industry by offering its customers a new and innovative digital ecosystem built around its watches. By partnering with Arianee, Breitling has ensured that all of its watches come with a digital passport powered by blockchain technology, providing digital security and proof of ownership.

This digital passport connects to [Breitling's digital warranty program](#), allowing customers to initiate and track repairs and soon to extend the warranty period and subscribe to insurance for theft or loss. With Arianee's protocol, customers have the ability to control their personal data.

In 2022, Breitling took its customer engagement to the next level by releasing its first-ever traceable watch, The Super Chronomat Automatic 38 Origins. Each owner of the watch has access to fully transparent information about their watch, including its raw materials, verified by Sourcingmap, and stored in the Arianee enriched NFT.



References

1. <https://www.bsr.org/en/blog/a-credible-future-beyond-growth>
2. <https://www.ellenmacarthurfoundation.org/articles/locked-in-what-is-linear-lock-in-and-how-can-we-break-free>
3. https://cf-assets-tup.thredup.com/resale_report/2024/ThredUp_2024_Resale%20Report.pdf
4. <https://www.prnewswire.co.uk/news-releases/global-personal-goods-repair-and-maintenance-market-players-take-on-cutting-edge-technology-for-improved-efficiency-814487055.html>
5. ADEME
6. <https://www.theguardian.com/environment/2023/jul/12/stitch-in-time-france-to-help-pay-for-clothes-to-be-mended-to-cut-waste>
7. <https://knowledge-hub.circle-economy.com/article/3624?n=Government-tax-break-program-for-repair>
8. https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1794
9. <https://parisgoodfashion.fr/fr/groupe/carte-du-paris-de-la-mode-durable/>
10. <https://www.mckinsey.com/capabilities/mckinsey-design/how-we-help-clients/design-blog/luxury-of-time>
11. <https://www.ifixit.com/>
12. <https://www.custommarketinsights.com/report/refurbished-smartphone-market/>
13. https://cdn-static.farfetch-contents.com/content/UP/PRODUCTION/LANDING-PAGES/SUSTAINABILITY-CALC/Understanding%20the%20Environmental%20Savings%20of%20Pre-owned_Farfetch%20Report%202020.pdf
14. <https://archive.ellenmacarthurfoundation.org/case-studies/europes-first-dedicated-circular-economy-factory-for-vehicles>
15. <https://www.macrumors.com/2023/04/25/apple-iphone-refurb-sales-2022/>
16. <https://www.marieclaire.com/fashion/a38092985/salvatore-ferragamo-icon-up-collection-2021/>
17. Apple's Forms 10-K for 2022 and 2023
18. <https://www.fnacdarty.com/wp-content/uploads/2024/02/presentation-fy2023-ang-incluantmodifsdu-01-03-2024.pdf>
19. <https://location-outils.leroymerlin.fr/>
20. <https://www.renttherunway.com/plans?lens=unlimited>
21. <https://www.wired.com/story/bmw-heated-seats-as-a-service-model-has-drivers-seeking-hacks/>
22. <https://www.thermomix.com/pages/cookidoo-app>
23. <https://fabrix.pmq.org.hk/shop/>
24. <https://wwd.com/business-news/technology/diesel-dressx-meta-avatar-store-metaverse-virtual-fashion-1235814717/>
25. <https://www.iphoneincanada.ca/2024/02/22/snapchat-dressx-bitmoji-fashion-collection/>
26. https://longtimelabel.com/wp-content/uploads/2024/05/Referentiel-en-bref_EN.pdf

Resources

The 9 planetary boundaries

<https://www.stockholmresilience.org/research/planetary-boundaries.html>

Details on the French regulations:

1. Loi Climat: <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000043956924>
2. Loi Anti-Gaspillage: <https://www.ecologie.gouv.fr/loi-anti-gaspillage-economie-circulaire>

Details on EU regulations:

1. Green Deal https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
2. Green Claims Directive:
[https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI\(2023\)753958](https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2023)753958) and an analysis of the directive: <https://longtimelabel.com/actualite/le-green-claims/>
3. Ecodesign Regulation: https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/ecodesign-sustainable-products-regulation_en

Arianee research

1. BCGxArianee study on native Digital Product Passport tokenization:
<https://www.arianee.com/post/european-digital-product-passport-from-yet-another-constraint-to-a-consumption-revolution>
2. Position paper: Reclaiming the web: Pathways to digital empowerment
3. <https://9335516.fs1.hubspotusercontent-na1.net/hubfs/9335516/Reclaiming%20the%20Web.pdf>

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About Arianee

Arianee is the most widely used open source protocol & enterprise toolkit for blockchain-based digital product passports and e-maintenance booklets. Since 2018, Arianee has been helping brands creating or distributing durable goods develop user-owned post-purchase services for the circular economy. Today, more than 2M products have been minted with the Arianee Protocol by 50+ global brands, thus powering better customer engagement and a more circular business model.

Arianee harnesses Digital Product Passports and E-Maintenance booklets, turning them into rich ownership data while respecting users' choice. We enable brands to deploy this new customer data infrastructure, distributed, user-owned, offering deep insights into customer behavior and preferences. Unlocking personalized engagement, deeper and data-driven relationships, and new circular business models. We redefine customer interaction by making every product and engagement proof a touchpoint for meaningful brand experiences.

About Swantstant

Swanstant is a boutique intelligence and advisory firm using circular economy to strengthen its clients across consumer industries, so they can outcompete their peers by capturing the opportunities of the growing correlation between business and environmental performance.

Francois Souchet

Francois is a sustainability advisor and mentor with over a decade experience in strengthening organizations using circular economy and sustainability. He initiated and led Make Fashion Circular at the Ellen MacArthur Foundation between 2018 and 2021, establishing it as a truly disruptive force within the fashion industry, championing circularity.

Since January 2024, Francois has set-up Swanstant, an intelligence and advisory firm strengthening industry leaders across the fashion and creative industries by accelerating their impact journeys.