The Digital Product Passport:

Transparency for a Sustainable Circular Economy

A whitepaper by objective partner

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1. Executive Summary & Key Takeaways

Supply chains are becoming increasingly complex, and consumers demand transparency. Companies not only face the challenge of offering high-quality products, but also being transparent about their origin and sustainability. The days of implicit trust are over, since the desire for ethical and green products is continuously growing. The demand for transparency leads to a growing interest in digital solutions to track products along the entire supply chain and to comply with the principles of the circular economy.

The digital product passport (DPP) seems to be the answer to all questions - a data set that contains information about a product from production to sale and beyond. It offers the possibility to create a new network that can store and share all relevant information about the entire life cycle of a product. This creates significant added value for all stakeholders in industry, business, government, and for consumers.

While the introduction of the digital product passport is rather complex, it offers many benefits. Consumers are able to make buying decisions based on sound knowledge and select products that meet their ethical and environmental standards. Companies have the opportunity to ensure the quality and safety of their products, check compliance and make their supply chains more efficient. The digital product passport also promotes the development of a circular economy, as it enables companies to monitor the entire life cycle of their products and use resources more efficiently.

The EU Commission decided to introduce the digital product passport on a mandatory basis to use it as a tool for promoting the circular economy and sustainability within the EU. Deadline for all product groups will be end of 2030 at the latest, but some sectors will already have to comply with official regulations by 2027.

To ensure the success of a digital product passport, companies need to address standardization, interoperability, a federated system landscape, and the democratization of information.

This whitepaper examines the background, technological prerequisites, and possible implementations of the digital product passport. A solution that meets the key success criteria is based on the digital twin and an asset administration shell.

Key Takeaways

1. The digital product passport promotes transparency and traceability in the supply chain for a sustainable circular economy.
2. It contains comprehensive product information such as origin, materials, repairability and recycling.
3. The European Commission makes the digital product passport legally binding for technical and digital products.
4. Consumers and businesses benefit from increased trust, safety, and environmental awareness.
5. Implementation requires strategies, standardization, and technological solutions, such as the digital twin and asset administration shells.
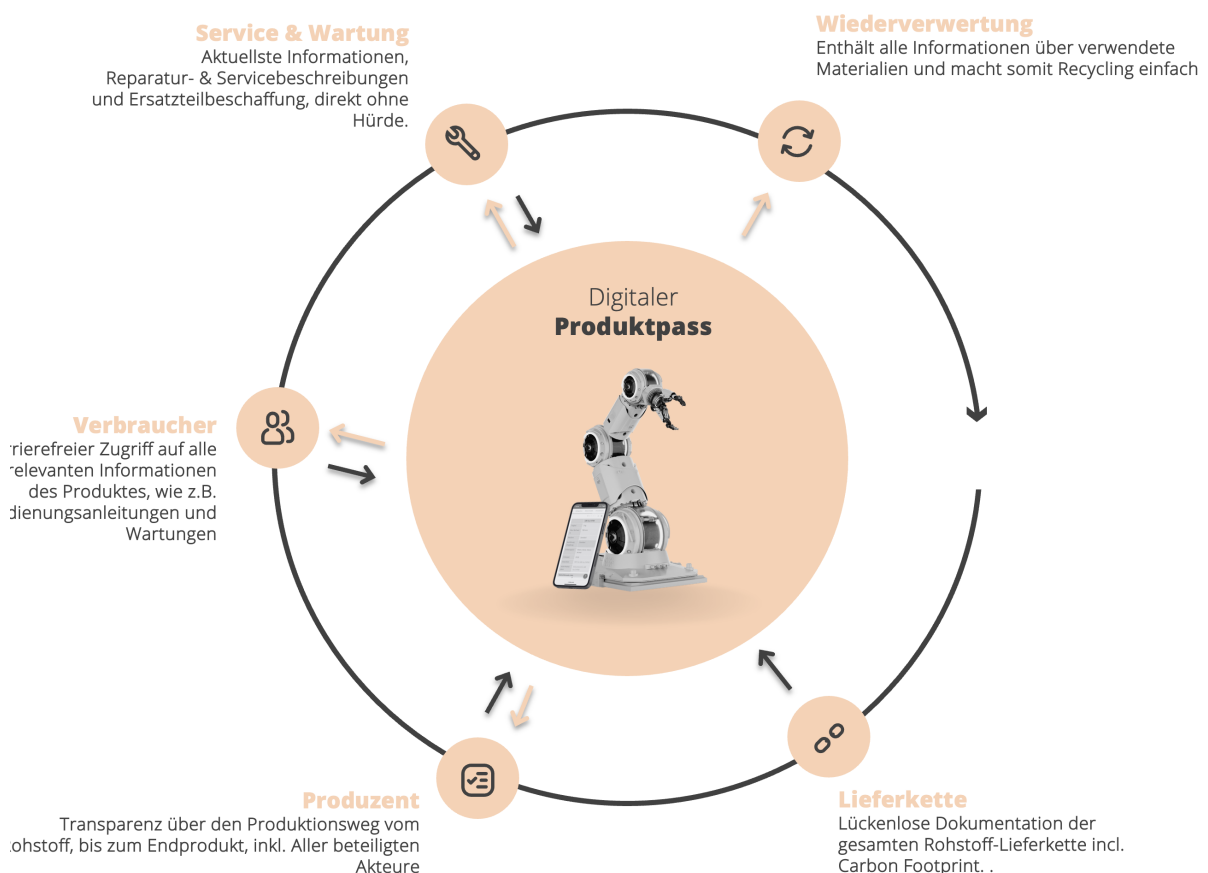
2. The Digital Product Passport

The digital product passport contains information about a product from its production to its sale and beyond. It is a data record that summarizes the components, materials and chemical substances. It also offers information on reparability, spare parts or proper

disposal. The data comes from all phases of the product life cycle and can therefore be used for different purposes. Goal is a holistic product traceability that enables companies to monitor the quality and safety of their products, comply with regulations and have a fast responsiveness.

Digitizing product passports enables real time insights, which allows companies to take efficient measures to refurbish, repair or recycle products and thus extend their life cycle. This not only helps to reduce waste and environmental impact, but also creates new economic opportunities and promotes the development of a sustainable circular economy. Companies can also collect new data on product usage, changes and maintenance in real time.

In addition, the digital product passport contains information about the manufacturer, including its unique operator ID, as well as information about the person or company that distributes the product in the EU domestic market. The relevant legal acts also specify which data carrier is to be used and whether the information must be model-, batch- or item-specific. Regulations also specify how the DPP will be made available to the customer prior to the purchase of the product.

In a nutshell: The digital product passport can create a new information network that can store and transfer relevant data about the entire life cycle of a product. The following sections will go into more detail about how a digital product passport works, its advantages, and implementation possibilities.

Service & Wartung
Aktuellste Informationen, Reparatur- & Servicebeschreibungen und Ersatzteilbeschaffung, direkt ohne Hürde.

Wiederverwertung
Enthält alle Informationen über verwendete Materialien und macht somit Recycling einfach

Digitaler
Produktpass

Verbraucher
rierefreier Zugriff auf alle relevanten Informationen des Produktes, wie z.B. dienungsanleitungen und Wartungen

Produzent
Transparenz über den Produktionsweg vom .ohstoff, bis zum Endprodukt, inkl. Aller beteiligten Akteure

Lieferkette
Lückenlose Dokumentation der gesamten Rohstoff-Lieferkette incl. Carbon Footprint. .

3. Background and Stakeholders

The digital product passport is a concept that is being taken up by a wide range of actors, including companies, industry associations, governments, and technology companies. Together, they want to realize the vision of a transparent, traceable and sustainable product life cycle.

In 2018, the European Commission (EC) introduced the Circular Economy Package, which includes several measures to promote the circular economy in the EU. Among other things, it includes instructions to ensure product traceability, facilitate recycling, and reduce waste. The digital product passport could be used to implement these measures.

In 2020, the European Commission passed the new Circular Economy Action Plan (CEAP).

In March 2022, the EC published a proposal for an Ecodesign for Sustainable Products Regulation (ESPR), which builds on the Ecodesign Directive and covers energy-related products. The EU's Ecodesign Directive aims to reduce the environmental impact of products and improve energy efficiency.

Berlin, 30 March 2022: The EU Commission presented plans that would offer extensive possibilities for environmental specifications, also for technical and digital products. The EU wants to introduce the digital product passport for products that are extremely resource- and energy-intensive, such as computers, communication devices and electrical appliances. This will be embedded and implemented with the Ecodesign Directive. Bitkom Chief Executive Dr. Bernhard Rohleder explains:

> *„With the revision of the Ecodesign Regulation, the EU Commission is taking an important step toward a sustainable and climate-neutral Europe. [...] Users of digital and electronic devices will soon also benefit from the fact that aspects of the circular economy, such as the durability and recyclability of devices, will become even more important. Bitkom particularly welcomes the fact that the Ecodesign Directive will be turned into a regulation, thus ensuring consistent application of the regulations. This creates legal security and strengthens the European domestic market. [...] digital technologies can most certainly contribute to a holistic circular economy. The digital product passport, in particular, is an example of how technology can be used to create more transparency for consumers and companies alike.“*

A sophisticated DPP standardizes information and provides access to all stakeholders in the supply chain. This helps companies in their efforts to be CO_2-neutral and encourages them to make products more sustainable, as customers can compare products more easily with this improved access to information.

The introduction of the circular economy will positively influence the transition to more sustainability in supply chains. It also enables new business models, products, services, and green markets, becoming one of the central sustainability strategies in politics, industry, and business.

4. Benefits of the Digital Product Passport

The introduction of the digital product passport has numerous advantages. Companies and decision makers have access to reliable information on product sustainability and liability. In addition, new data sources can be used for sustainable investment decisions and the optimization of resource and energy efficiency. Consumers can also base their decisions on solid information. All this leads to more transparency and traceability in the value chain. The digital product passport can also promote innovative circular economy approaches and enable new business models.

4.1 Consumer Benefits

Transparency & Trust
Consumers benefit in many ways from a digital product passport. They receive transparent and reliable information on the sustainability of products, enabling them to base their purchasing decisions on solid data. DPPs also provide details on production conditions, reparability, and recyclability, which enable even greener decisions. Transparency creates trust in the brand and the company.

Product Safety & Quality
A digital product passport improves product safety and quality by providing information on manufacturing processes, certifications, and traceability. This is of particular importance for sensitive products such as food or pharmaceuticals.

Consumer Protection
In addition, a DPP protects against counterfeit products and fraud, as consumers can verify authenticity and origin.

Environmental Awareness
The digital product passport also promotes environmental awareness by providing information on environmentally friendly materials, energy efficiency and recyclability. This allows consumers to make conscious choices about sustainable products and support environmentally committed companies.

Customer Experience
A digital product passport also provides personalized recommendations and instructions on how to use or care for the product to enhance the customer experience.

4.2 Manufacturer Benefits

Product Integrity & Brand Protection
The DPP enables the manufacturer to prove the integrity of its products and to protect against product piracy.

Traceability & Quality Management
The manufacturer can track the entire life cycle of a product with a digital product passport. This enables the identification of quality issues, product recalls and quick responses to complaints or customer enquiries. By monitoring product quality and performance in real time, the manufacturer can also take proactive measures to improve production processes and increase customer satisfaction.

Supply Chain Optimizations & Efficiency Enhancement
Real-time tracking of products and inventory allows the manufacturer to optimize stock levels, improve logistics and make the production flow more efficient. This leads to cost savings, shortened delivery times and an overall more efficient supply chain.

Customer Retention and Value-Added Services
Using a digital product passport, the manufacturer can offer personalized and value-added services to its customers. This strengthens customer loyalty, encourages repeat purchases, and increases customer satisfaction.

Sustainability Commitment & Circular Economy

Integration of sustainability and recycling information allows the manufacturer to communicate its commitment to environmental protection and circular economy in a transparent way. This not only improves the brand image, but also allows the manufacturer to benefit from the growing consumer preferences for sustainable products.

4.3 Ecosystem Benefits

Faster Problem Solving
DPPs provide detailed product information, which makes customer service more efficient. The fast provision of relevant information enables quick problem solving and increases customer satisfaction.

Better Customer Understanding
Access to the digital product passport allows a better understanding of customers' concerns, enabling personalized recommendations and more targeted support.

Proactive Customer Communication
Proactive communication enables customer service to provide early information about product updates, safety warnings or recalls and to strengthen customer confidence.

Collaboration & Knowledge Management
The digital product passport serves as a central knowledge base, promotes collaboration between customer service teams and improves efficiency in responding to customer enquiries.

Training & Empowerment
Customer training and self-service resources provided through the DPP enable customers to better understand their products and solve problems on their own, making customers more productive and satisfied, while reducing the workload on customer service.

5. Why It is Relevant for Your Company

The digital product passport is relevant for all companies, as it collects product data and continuously updates it throughout the entire life cycle. Companies must become more transparent and use the opportunity to differentiate themselves from the competition. It provides the relevant data points for an automated calculation of the CO_2 footprint of the entire value chain according to Scope 3 reporting. This will also enable the framework parameters for ESG reporting (Environmental Social Governance) and GHG reporting (Green House Gas Protocol) to be fulfilled.

The resulting transparency is likely to lead to a rethinking of products and thus of the entire value chain (from supplier to consumer).

By 2030 at the latest, the digital product passport will be required by law for all product groups. However, some industries will have to comply with the EU-regulations as early as 2027, including:

- Textile
- Construction
- Automotive
- Consumer Electronics

6. Plan Your Journey

The digital product passport offers great potential as it modernizes and digitalizes product information and supports the industry's shift towards carbon neutrality and a circular economy.

Many companies face the challenge of successfully transitioning their physical products into the digital age and offering their customers added value with the digital product passport. To make this transformation successful, some important questions need to be addressed, including:

- Lack of clarity about legal requirements
- Missing strategy
- Insecurity in technology selection

6.1   Key Success Factors

Key success factors for the introduction of a digital product passport, regardless of the chosen technology, are:

- Standardization
- Interoperability
- Federal system landscape
- Democratization of information

Ultimately, it is these factors that create investment security and are decisive for success. Implementing a coherent, consistent approach to the digital product passport, aligned with existing EU regulations, is certainly the best approach.

6.2   Way Forward

The successful way to implement a digital product passport is to use a digital twin, implemented with the Asset Administration Shell (AAS) and a management framework. Implementation should start with pilot projects focusing on clearly defined products and sectors. Transparency and accountability are important aspects where sufficient data points need to be provided and supply chain partners need to be involved.

The recommendation is to introduce the digital product passport based on the principles of coherence and consistency, flexibility and exploration, transparency, and accountability. DPPs should be aligned with other EU regulations and initiatives and have an interoperable digital infrastructure. With these steps, companies can benefit from a digital product passport and better serve their customers.

Sources

Website: Ökodesign für nachhaltige Produkte

https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/ecodesign-sustainable-products-regulation_de?etrans=de

Website: **Report: Digital Product Passport: the ticket to achieving a climate neutral and circular European economy?**

https://www.corporateleadersgroup.com/digital-product-passport-ticket-achieving-climate-neutral-and-circular-european-economy

Website: **Bitkom zu den Plänen der EU-Kommission für Produkt-Umweltvorgaben**

https://www.bitkom.org/Presse/Presseinformation/Plaene-der-EU-Kommission-fuer-Produkt-Umweltvorgaben

Website: **Der BMU Design-Sprint zum Digitalen Produktpass für die Elektromobilität**

https://www.bmuv.de/digitalagenda/produktpass/pkw-batterie

Website: **Auf einen Klick: Produktpass Lückenloser Lebenslauf (BMVU)**

https://www.bmuv.de/digitalagenda/auf-einen-klick

Website: **Bauprodukteverordnung (CPR) – Europäische Kommission**

https://single-market-economy.ec.europa.eu/sectors/construction/construction-products-regulation-cpr_de?etrans=de

Website: **Digitalen Produktpass flexibel, innovativ und zielgerecht gestalten (BDI)**

https://bdi.eu/artikel/news/digitalen-produktpass-flexibel-innovativ-und-zielgerecht-gestalten

Website: **Document 52020DC0098 - COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS A new Circular Economy Action Plan For a cleaner and more competitive Europe COM/2020/98 final**

https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN

Website: **New product priorities for Ecodesign for Sustainable Products (Europäische Kommission)**

https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13682-New-product-priorities-for-Ecodesign-for-Sustainable-Products_en