Educational **Cases**

What is the true story behind your clothes?

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Can a textil product tell a story? How can textil and clothing companies navigate the Digital Product Passport maze? This article will share inspiration and ideas for textile & clothing organizations.

Upcoming legislation will require much deeper data collection and insights into supply chains and products lifecycles. Therefore, you can as a reader use this article as a help to get an overview of what is coming and inspiration for how to get started.

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trace
a transition towards
circular economy

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Key Insights

→ By 2030 the EU's regulation on the Digital Product Passport (DPP) will be enforced for textiles and clothing products sold in the EU (European Commission, n.d.-b)

→ Blockchain and Internet of Things technologies possess beneficial characteristics that could support complying with upcoming legislation

→ In preparation for the DPP, the industry needs to know why these technologies are relevant, what prerequisites are necessary and how to get started

→ The technologies alone are not the solution but also the (human) network and community, i.e. good relations with everyone in your supply chain are key
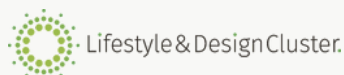
Exploring the Implications of a Digital Product Passport

In a landscape where new legislation in the shape of a Digital Product Passport (DPP) is bearing down on the textile and clothing (T&C) industry, and technology providers are flooding the market with centralized solutions such as those offered by EON, The ID Factory, and Protokol, to name a few, companies are feeling the heat to adapt quickly. However, there's an array of uncertainties: understanding legal requirements, leveraging the benefits of a DPP, selecting the right technology, and delineating responsibilities. Furthermore, blockchain (BC) and the Internet of Things (IoT) have been praised as possible enabling technologies, but how (well) they fit into the picture is yet to be determined.

This article aims to lend a helping hand to organizations, by sharing insights from our research on the requirements for a digital product representation (DPR) and the role of BC and IoT in this context. It's crucial to acknowledge that while technologies have immense potential, implementing them in isolation is not the silver bullet. Our narrative emphasizes the importance of clarity on requirements, and the necessity for engagement and collaboration between organizations, technology providers, and governmental agencies.

This article won't have all the answers but aims to equip you with the insight to ask the right questions and make more informed decisions.

Digital Product Passport facts

As a tool to create transparency and unlock circularity, the European Commission (EC) proposes Digital Product Passports (DPPs) that share product information across the entire product lifecycle. The EC is currently drafting a regulation on DPPs with final approval expected in 2024. Although the final DPP format and content remain unclear at this point, it is expected to be drafted for the majority of industries, including textiles, by 2030 (European Commission, n.d.-a; European Commission, n.d.-b).
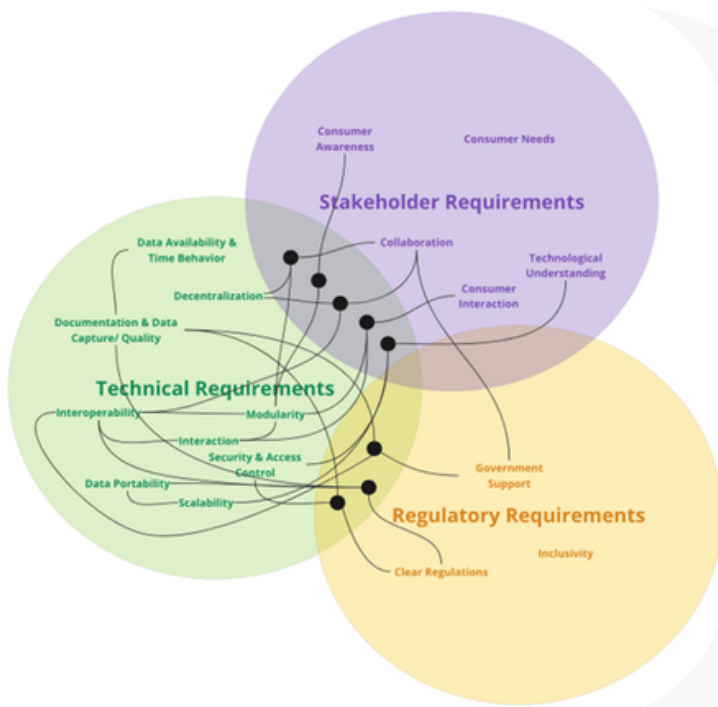
The Digital Product Passports (DPPs) are designed to collect and distribute product data throughout its entire life cycle, highlighting the sustainable, environmental, and recyclability characteristics of the product. The DPP captures recorded data from different stages of the supply chain, such as sourcing raw materials and the manufacturing process, and facilitates sharing among various stakeholders and participants. This sharing unlocks a range of benefits, use cases, and value across entire ecosystems.

Benefits for Textile & Clothing companies implementing a digital product passport:
- Transparency: Build trust through detailed product information.
- Sustainability Communication: Showcase eco-friendly practices to attract conscious consumers.
- Supply Chain Optimization: Improve efficiency and reduce environmental impact.

Challenges for Textile & Clothing companies implementing a digital product passport:
- Data Collection and Standardization: Gather and organize comprehensive data.
- Integration with Existing Systems: Ensure seamless integration with company databases.
- Collaboration and Stakeholder Engagement: Foster cooperation and participation across the supply chain.

The Role of Blockchain & Internet of Things

While BC and IoT have certain capabilities that could support the requirements for a DPR/DPP, our research highlighted that these technologies alone are not a one-size-fits-all solution. Especially in the case of decentralized solutions, the need for collaboration becomes even more significant.

Both technologies hold the potential to significantly contribute to a DPR/DPP by enabling more secure data exchange, thereby enhancing transparency, traceability, and authentication.

Factbox: Internet of Things
The Internet of Things (IoT) refers to a network of everyday physical objects (like devices, appliances, and sensors) that are connected to the Internet and can communicate with each other and exchange data.
IoT is a technology that has been rapidly evolving since the millennium change (Sorri et al., 2022). At its core, IoT involves the connection of various devices and objects through a network, allowing them to interact and cooperate in achieving common objectives (Pal & Yasar, 2020). This interaction primarily involves data collection and -sharing through sensors and other devices, which are then transmitted via networks, commonly known as gateways, to users (Lockl et al., 2020).

In the T&C industry, IoT has gained substantial attention due to its ability to enhance information sharing across the supply chain, including aspects like manufacturing, transportation, and consumption.
This is achieved through technologies such as radio-frequency identification (RFID) tags, barcodes, and Quick Response (QR) codes. RFID, for instance, employs electromagnetic fields to automatically identify and track tags attached to objects. These tags carry information that can be read by an RFID reader, facilitating the tracking of products throughout the supply chain (Hussain et al., 2021).

Unraveling the Requirements for Digital Product Representation

During the initial phases of our research, we found existing work on the T&C industry and technologies that are trying to revolutionize it (Alves et al., 2022; Raza & Singh, 2022), however, given the novelty of the DPP regulation, there was a lack of research on the requirements to enable it. Therefore, our research approach involved engaging Danish companies in the T&C industry and industry experts through interviews and design workshops, wherein we focused on understanding the general needs for enabling DPR/DPP without presupposing the use of any specific technology.

Our findings revealed high-level requirement groups that fall under three broad categories: **regulatory**, **stakeholder**, and **technical**. Within these groups, sub-categories such as interoperability and modularity showcased the intricacy and interconnection of requirements (see figure).

For instance, ensuring security & access control (a **technical** requirement sub-category) is crucial for both clear regulations (**regulatory**) and the stakeholders' technological understanding (**stakeholder**). It's evident that enabling a DPR/DPP is not just about the technology; it involves an intricate web of interdependent requirements that necessitate collaboration across the ecosystem.

Factbox: Blockchain

Blockchain is a decentralized and distributed data structure, which stores data in chronological blocks, eliminating the need for central authorities and enhancing security through cryptographic hashing (Nakamoto, 2008; Tripathi et al., 2021).

BC is a transformative technology that has found utility in the T&C industry. In the T&C industry, BC traceability and immutable record-keeping would be invaluable.
The industry, known for its complex and fragmented supply chains, could leverage BC to trace materials, verify authenticity, and uphold sustainability practices (Ahmed & MacCarthy, 2021; Bullón et al., 2020).

Moreover, BC's smart contracts can automate transactions based on preset conditions, fostering efficiency and trust among parties (Agrawal et al., 2021; Hewa et al., 2021). By offering transparency, security, and traceability, BC has the potential to revolutionize the T&C industry's supply chains.

However, the actual contribution and implementation of these technologies might vary depending on the company's capabilities, objectives, and market positioning. It's also important to consider that some brands might be primarily motivated by compliance with regulations, rather than a full-scale transformation, especially if reaping additional benefits like consumer engagement and increased brand loyalty are harder to achieve. Our findings suggest that while the technical capabilities of BC and IoT can cater to some of the requirements of a DPR/DPP, companies need to critically assess their own capabilities, specific needs, and the complex changes involved in adopting these technologies.

Understanding the bigger picture is vital. Companies need to assess their requirements in the context of the broader ecosystem and weigh the pros and cons of centralized versus decentralized solutions.

Takeaways

The key takeaways from our research are that companies must recognize that technology alone cannot solve the challenges of implementing a DPP. There is a need for a holistic approach that takes into account the complexity and interdependence of various types of requirements. Understanding one's technology maturity, capabilities, and clear communication of needs is essential for having informed discussions with technology vendors. Finally, collaboration across the ecosystem, including technology providers and government agencies, is fundamental to effectively navigating the evolving landscape of a DPP in the T&C industry.

In conclusion, equipping oneself with a thorough understanding of the requirements, assessing organizational capabilities, and fostering collaboration is paramount in harnessing the true potential of technologies like BC and IoT for DPR. This article is your starting point for understanding the maze that is DPR, and how to traverse it efficiently.

Sources

- Agrawal, T. K., Kumar, V., Pal, R., Wang, L., & Chen, Y. (2021). Blockchain-based framework for supply chain traceability: A case example of textile and clothing industry. Computers & Industrial Engineering, 154, 107130. https://doi.org/10.1016/j.cie.2021.107130
- Ahmed, W. A. H., & MacCarthy, B. L. (2021). Blockchain-Enabled supply chain traceability in the textile and apparel supply chain: A case study of the fiber producer, Lenzing. Sustainability, 13(19), 10496. https://doi.org/10.3390/su131910496
- Alves, L., Ferreira Cruz, E., Lopes, S. I., Faria, P. M., & Cruz, A. M. Rosado da. (2021). Towards circular economy in the textiles and clothing value chain through blockchain technology and IoT: A review. Waste Management & Research: The Journal for a Sustainable Circular Economy, 40(1), 3–23. https://doi.org/10.1177/0734242x211052858
- EON. (n.d.). EON Product Cloud. EON. Retrieved June 29, 2023, from https://www.eon.xyz/product-cloud
- European Commission. (n.d.-a). EU strategy for sustainable and circular textiles. European Commission. Retrieved June 29, 2023, from https://environment.ec.europa.eu/strategy/textiles-strategy_en
- European Commission. (n.d.-b). Green Deal: New proposals to make sustainable products the norm and boost Europe's resource independence. European Commission. Retrieved June 29, 2023, from https://ec.europa.eu/commission/presscorner/detail/en/ip_22_2013
- Hussain, M., Javed, W., Hakeem, O., Yousafzai, A., Younas, A., Awan, M. J., Nobanee, H., & Zain, A. M. (2021). Blockchain-Based iot devices in supply chain management: A systematic literature review. Sustainability, 13(24), 13646. https://doi.org/10.3390/su132413646
- Lockl, J., Schlatt, V., Schweizer, A., Urbach, N., & Harth, N. (2020). Toward trust in internet of things ecosystems: Design principles for blockchain-based iot applications. IEEE Transactions on Engineering Management, 67(4), 1256–1270. https://doi.org/10.1109/tem.2020.2978014
- Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3977007
- Pal, K., & Yasar, A.-U.-H. (2020). Internet of things and blockchain technology in apparel manufacturing supply chain data management. Procedia Computer Science, 170, 450–457. https://doi.org/10.1016/j.procs.2020.03.088
- Protokol. (n.d.). Blockchain Digital Passport. Protokol. Retrieved June 29, 2023, from https://www.protokol.com/protokol-blockchain-digital-passport/
- Raza, Z., & Singh, A. K. (2022). A framework for the blockchain and iot-based supply chain management system. International Journal of Applied Logistics, 12(1), 1–30. https://doi.org/10.4018/ijal.309090
- Sorri, K., Mustafee, N., & Seppänen, M. (2022). Revisiting IoT definitions: A framework towards comprehensive use. Technological Forecasting and Social Change, 179, 121623. https://doi.org/10.1016/j.techfore.2022.121623
- The ID Factory. (n.d.). Digital product passport - The idfactory. The ID Factory. Retrieved June 29, 2023, from https://theidfactory.com/digital-product-passport/
- Tripathi, G., Tripathi Nautiyal, V., Ahad, M. A., & Feroz, N. (2021). Blockchain technology and fashion industry-opportunities and challenges. In Intelligent Systems Reference Library (pp. 201–220). Springer International Publishing. http://dx.doi.org/10.1007/978-3-030-69395-4_12