

AAS: A Standardized Foundation for the EU Digital Product Passport

The DPP is set and the industry needs an actionable foundation

The Digital Product Passport (DPP) is moving from policy concept to industrial reality. For many companies, the key question is no longer whether they will have to deal with it, but how to implement it in a way that is interoperable, scalable, and economically meaningful. The industry needs a technical foundation that meets regulatory requirements while supporting broader digitalization. This is where the Asset Administration Shell (AAS) comes in.

The Digital Product Passport (DPP), introduced through the Ecodesign for Sustainable Products Regulation (ESPR), represents a fundamental shift in how product information will be provided in the European Single Market [1-2].

For many users, access to this information will begin in a simple way: by scanning a QR-code or another digital carrier attached to the product. But the DPP is more than the website or document opened through that QR-code. It is a broader system for structured product information, combining regulated content requirements with a standardized technical framework for identification, access, and interoperability.

Conceptually, the DPP consists of two complementary layers. The content layer defines what data the DPP contains. Delegated acts are legal acts used by the European Commission to supplement legal frameworks with detailed rules. In the case of ESPR those delegated acts are used to define rules and required data points for particular product groups. At present, however, those concrete data requirements are still pending.

The second layer is the technical framework that defines how the DPP works. Here, European standardization is advanced. CEN-CENELEC JTC 24 [6] is developing the standards for the DPP system environment, including the foundations for identification, data carriers, access, interoperability. As liaison partner within JTC24, the Industrial Digital Twin Association (IDTA) has actively been participating in this standardization effort. In parallel, the European Commission is preparing the operational framework of the DPP through secondary legislation and technical infrastructure. In addition to ESPR, the EU Battery Regulation introduces mandatory battery passports, with requirements becoming effective from February 2027. [4-5]

Beyond batteries, several upcoming product and market regulations incorporate DPP-related concepts, including the Construction Products Regulation, Toy Safety Regulation, Packaging and Packaging Waste Regulation, the Detergents Regulation, and the actualization of the New Legislative Framework. These initiatives indicate that the Digital Product Passport is evolving into a broader infrastructure for product information within the European Single Market.

Why the Asset Administration Shell is a Strong Foundation for DPP

The DPP requires a technical basis that can handle structured product data, evolve with product-specific requirements, integrate information from different sources, and support exchange across company boundaries. The AAS is a mature and standardized (IEC 63278) approach which was designed for exactly this type of problem.

Utilizing proven concepts and ecosystems

The AAS is a strong foundation for implementing the DPP because it was not created as a dedicated compliance solution, but as a standardized approach for the digital representation of physical and logical assets. This is exactly the type of architecture that DPP requires: structured, machine-readable product information that can be integrated from different backend systems, extended as product-specific requirements emerge, and exchange across organizational boundaries. Additionally, AAS supports standards such as the identification link (IEC 61406) for representing asset identifiers in a globally unique manner. Companies can use the AAS as the

operational digital twin of a product and derive the required DPP representation from it.

The Battery Passport is an example showing that AAS provides practical support for industrial implementation. While Submodel Template (SMT) Specifications for future ESPR product groups can only be developed once the corresponding delegated acts define the required data points, the relevant requirements for the Battery Passport have already been specified [7]. The corresponding IDTA Battery Pass Submodels implement these requirements directly. This already enables companies to create Digital Battery Passports aligned with DIN DKE SPEC 99100 [8] using the AAS and IDTA Submodels. The work on the Battery Passport therefore provides tangible proof that the AAS-based approach can be implemented in practice.

The same principle can be applied to future ESPR product groups and other DPP-related regulations: Once the European Commission publishes a delegated act and defines the required product-specific data points, IDTA can provide the corresponding Submodel Templates within the AAS framework. Companies can then use their AAS infrastructure to create an AAS and add the required DPP-related Submodels for a given product and integrate the necessary information from relevant backend systems.

How to make the AAS ready for the European DPP

IDTA is preparing comprehensive guidance through white papers and will provide specification updates (API and metamodel) that make AAS fully DPP-compatible. This work is planned to be ready when JTC24 standards [6] are published, ensu-

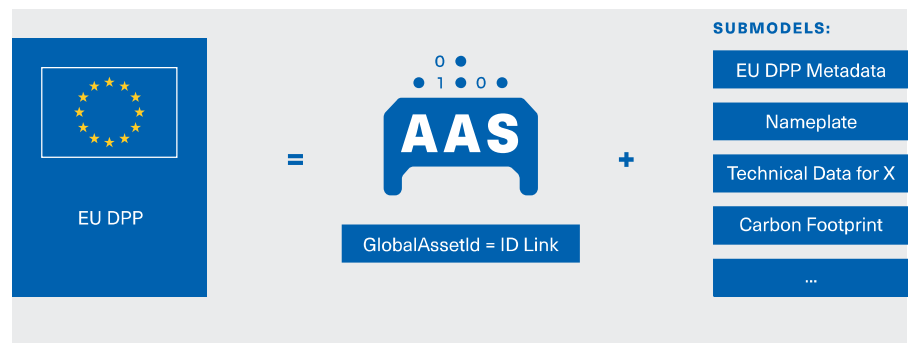


Figure 1: AAS and submodels representing DPP content.

ring industry has access to conformant implementation paths. An API as well as model mapping between AAS and DPP exchange formats is being addressed to ensure seamless interoperability.

This makes sure that companies can confidently plan with AAS for their EU DPP implementation.

- **Specification Updates:** Updates to AAS specifications will ensure DPP compatibility. Valid DPPs, compliant with JTC24 standards can be provided by systems implementing the AAS specification.
- **Submodel Templates:** Development of SMTs that directly address DPP requirements across various delegated acts that will be published, providing reusable, standardized information models that reduce implementation effort and ensure consistency.
- **High-Level Architectural Approach:** Treating DPP as a subset of AAS capabilities allows organizations to implement DPP requirements within a broader digital twin framework that supports multiple use cases simultaneously.

This structured approach means that the AAS will provide a conformant implementation basis for JTC24-compliant DPPs while maintaining full compatibility with existing AAS deployments and ecosystem tools.

Value Beyond Compliance: AAS as Strategic Asset

Viewing DPP purely as a compliance obligation misses significant strategic opportunity. When implemented on an AAS-based digital twin architecture, DPP becomes an investment in sustainable digital value creation rather than merely a regulatory cost center.

End-to-End Scenarios Across Value Chains

Unlike point solutions that treat DPP as an isolated reporting obligation, AAS-based implementation enables end-to-end scenarios across supply chains and value networks.

This continuity means that data collected for DPP compliance becomes immediately usable for business purposes, for example, master data maintenance, maintenance and re-manufacturing / refurbishment. Another example is the usage of Digital Handover Documentation based on VDI 2770 supporting the handover processes between suppliers, OEMs, and operators. They benefit from the same structured, semantically enriched product information.

Data Spaces and Cross-Organizational Integration

The AAS serves as an integration anchor within emerging data space architecture. As industries move toward federated data ecosystems – such as Catena-X in

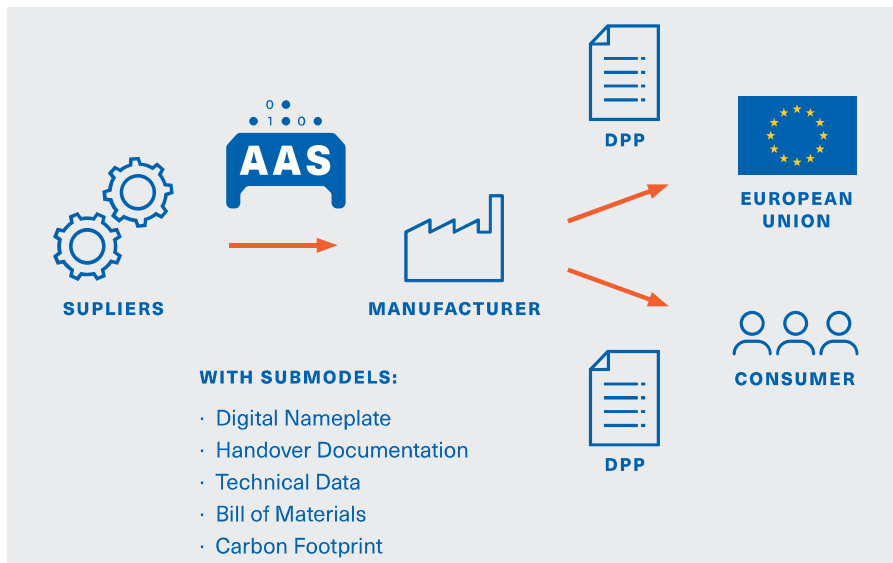


Figure 2: The AAS as strategic asset in End-to-End Scenarios.

automotive, Factory-X across manufacturing sectors, and other domain-specific data spaces – the AAS provides the standardized format for data exchange.

This positioning means DPP data implemented via AAS automatically becomes compatible with broader data space initiatives, enabling participation in collaborative ecosystems without additional integration effort.

Open Ecosystem

The AAS ecosystem is founded on open standards that guarantee interoperability and avoid vendor lock in. With both commercial and open source implementations available (see IDTA Solution Hub [9]), organizations have real flexibility in choosing tools, platforms, and providers that best fit their requirements.

As an internationally recognized IEC standard supported by multiple independent implementations, AAS ensures that solutions remain compatible, scalable, and future proof.

AAS as Enabler of DPP and Digital Transformation

The DPP will become a central component of product regulation within

the European Single Market. With the ESPR framework and additional sector-specific regulations already underway, companies must prepare for a future in which structured, interoperable product information is required across entire value chains.

The AAS provides a standardized and scalable foundation for implementing these requirements. By adapting AAS specifications, APIs to comply with emerging DPP standards, IDTA is establishing a clear and practical implementation path that enables organizations to derive compliant DPP representations directly from their digital twins.

This approach allows companies to address regulatory obligations while simultaneously building a scalable digital infrastructure for product data. Instead of isolated compliance systems, organizations can leverage the AAS ecosystem to integrate product information across engineering, production, operation, and circular economy processes. The DPP is therefore not only a regulatory requirement but also an opportunity to establish interoperable digital product information across industries.

Implemented on top of the AAS, it becomes a catalyst for broader digitalization and data-driven collaboration across value chains.

References

- [1] European Union. (2024). EU's Digital Product Passport: Advancing Transparency and Sustainability. Retrieved from: <https://data.europa.eu/de/news-events/news/eus-digital-product-passport-advancing-transparency-and-sustainability>
- [2] European Commission. (2024). Regulation (EU) 2024/1781 of the European Parliament and of the Council of 13 June 2024 establishing a framework for the setting of ecodesign requirements for sustainable products, amending Directive (EU) 2020/1828 and Regulation (EU) 2023/1542 and repealing Directive 2009/125/EC. Retrieved from: <https://eur-lex.europa.eu/eli/reg/2024/1781/oj>
- [3] Zibold, F. (2026) Digital Product Passport (DPP). Retrieved from: https://www.bundesnetzagentur.de/DE/Fachthemen/Telekommunikation/Technik/DMUEF/DL_Vortraege/zibold.pdf?__blob=publicationFile&v=6
- [4] European Commission. (2025). Batteries. Retrieved from: https://environment.ec.europa.eu/topics/waste-and-recycling/batteries_en
- [5] European Commission. (2023). Regulation (EU) 2023/1542 of the European Parliament and of the Council of 12 July 2023 concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC. Retrieved from: <https://eur-lex.europa.eu/eli/reg/2023/1542/oj>
- [6] CEN-CENELEC. (2025). CEN/CLC/JTC 24 - Digital Product Passport - Framework and System. Retrieved from: https://standards.cenelec.eu/orders/f?p=205:7:::FS_P_ORG_ID:3342699&cs=152A83699C987EFA-564209B7AC7311C86
- [7] Industrial Digital Twin Association (IDTA). (2026). Digital Battery Passport: Use Case Guideline of the Asset Administration Shell. Retrieved from: https://industrialdigitaltwin.org/en/wp-content/uploads/sites/2/2026/02/IDTA_Catena-X_Guideline_Digital_Battery_Passport.pdf
- [8] DIN, DKE. (2025). Requirements for data attributes of the battery passport. Retrieved from: https://thebatterypass.eu/assets/images/content-guidance/pdf/DIN_DKE_SPEC_99100.PDF
- [9] Industrial Digital Twin Association (IDTA). (2026). AAS Solutions Hub. Retrieved from: <https://industrialdigitaltwin.org/solutions-hub>

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