

DIGITAL TWINNS

**Revolutionizing
Compliance in a
Fragmented Data
Landscape**



STRACCOON



Introduction

In today's fast-paced and highly regulated business world, data drives everything from strategic decisions to operational efficiency. However, for many organizations, this vital resource is fragmented—locked away in silos such as printed records, disconnected digital systems, and proprietary formats. This lack of cohesion creates significant hurdles, especially when it comes to meeting increasingly strict regulatory requirements. Compliance is no longer just a checkbox; it's a critical business imperative that demands accurate, accessible, and unified data.

Digital twins offer a groundbreaking solution to this challenge—especially when used not to model physical assets visually, but to manage complex, compliance-relevant data. In this context, a digital twin is not a 3D rendering, but a standardized, machine-readable data container that structures information such as product passports, CO₂ footprints, and material traceability.

By focusing on digital products rather than physical replicas, this new generation of digital twins enables automated reporting, seamless integration, and auditable transparency across the product lifecycle. This white paper explores how these data-centric digital twins help overcome fragmented information landscapes, simplify regulatory compliance, and open up entirely new possibilities for how data is exchanged and leveraged across manufacturing and supply chains.



Challenges of the Status Quo

Lack of a Unified Data View

Business data today is often a patchwork of incompatible sources. Information resides in paper files, legacy systems, and modern platforms that don't integrate seamlessly. This fragmentation means there's no single, reliable perspective on critical data across departments or functions. For example, supply chain teams might track materials differently than manufacturing teams, leading to inconsistencies that undermine decision-making and reporting.



Compliance Complications

The stakes for regulatory compliance are higher than ever, driven by an expanding array of regulations targeting product safety, environmental impact, and supply chain ethics. Businesses must aggregate and verify data from multiple sources to meet these requirements, a task made exponentially harder by fragmented data landscapes. For instance, the EU's Ecodesign for Sustainable Products Regulation (ESPR) mandates compliance for a wide range of product categories, each with specific timelines and requirements:

- **Final Products (2026)**
Textiles/apparel, furniture, mattresses, and tyres require detailed lifecycle data, such as material composition and recyclability, to comply with Digital Product Passport (DPP) mandates.
- **Intermediate Products (2026)**
Iron, steel, and aluminium must meet sustainability criteria, including traceability of raw materials and recycled content.
- **Horizontal Requirements (2026-2030)**
Repairability scoring (2026 for labeling, mid-2030 for ecodesign) and recycled content/recyclability for electrical and electronic equipment (EEE, 2027) demand consistent data across product lifecycles.
- **Energy-Related Products (2027-2030)**
Categories like low-temperature emitters, displays, EV chargers, household appliances (dishwashers, washing machines, washer-dryers, refrigerating appliances), professional laundry and dishwashers, electric motors, variable speed drives, light sources, welding equipment, mobile phones, tablets, local space heaters, tumble dryers, and standby/off-mode consumption face phased compliance deadlines. Each requires precise energy efficiency and lifecycle data.

These diverse product categories and staggered timelines—spanning 2026 to 2030—create a complex compliance landscape.

Without a unified data view, preparing for audits or responding to regulatory inquiries becomes labor-intensive and error-prone, often taking weeks or months.

This increases operational costs and the risk of penalties, particularly for businesses managing multiple product lines.

In a fragmented data environment, ensuring compliance across such varied requirements remains a constant struggle.

How Digital Twins Help

What is a Digital Twin?

A **digital twin** is a dynamic, digital replica that can represent not only a physical entity—such as a product, machine, or supply chain—but also a digital data product in its own right. Whether modeling a complex mechanical system or serving as a structured, machine-readable container for regulatory data, a digital twin integrates multiple data sources into a unified, real-time model. This makes it possible to monitor, analyze, and simulate both physical operations and compliance-relevant data with precision, transparency, and efficiency.

Key Features of Digital Twins

Digital twins rely on standardized frameworks, such as the Asset Administration Shell (AAS), to ensure interoperability across systems. A key element is semantics—structured data models that provide context and meaning to raw information. This allows data from diverse origins to be harmonized and used effectively, making digital twins a powerful tool for managing complexity.

Benefits for Compliance

Digital twins deliver tangible advantages for regulatory compliance:

- **Unified Data Access**
By consolidating fragmented data into one model, digital twins streamline the collection and validation of compliance-related information.
- **Real-Time Monitoring**
Continuous updates allow businesses to track compliance metrics proactively, spotting issues before they escalate.
- **Improved Traceability**
Every stage of an asset's lifecycle is documented, providing a clear audit trail for regulators.

Starting the Digital Twin Journey

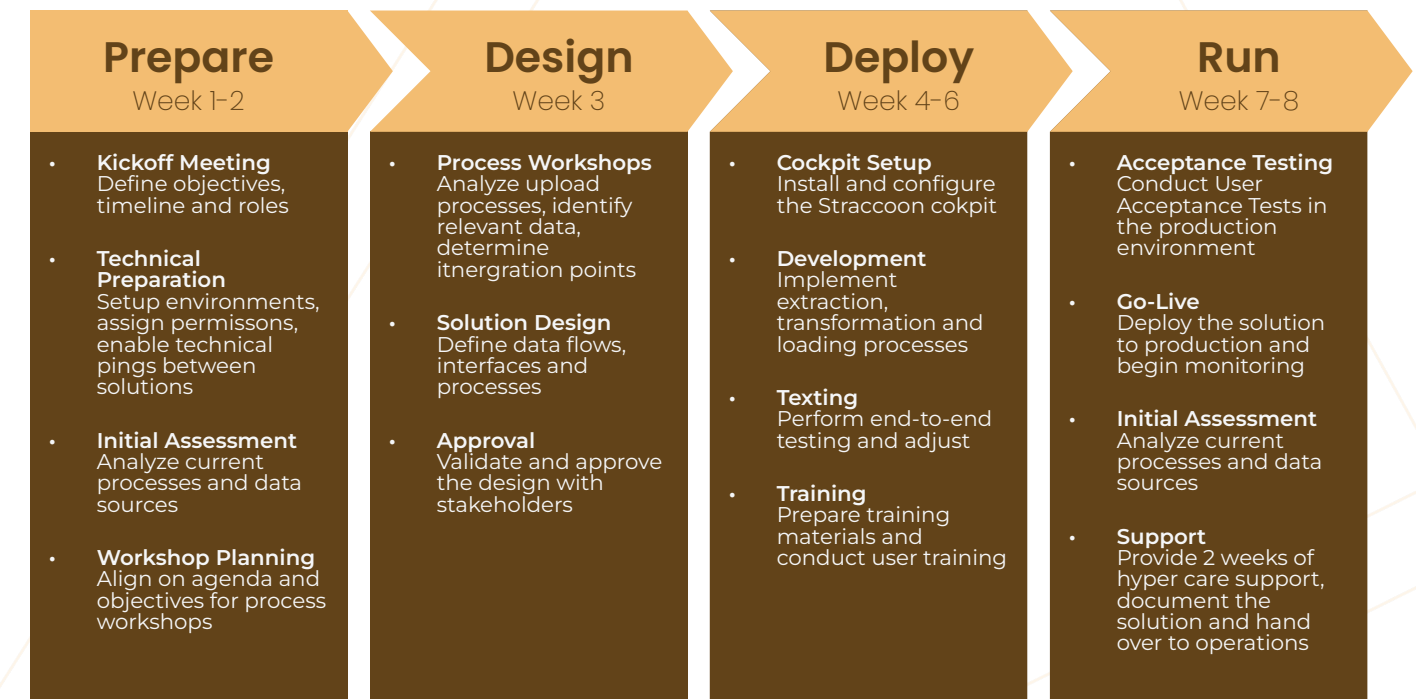
Avoiding Common Mistakes

Adopting **digital twins** requires a clear strategy, especially for compliance- focused initiatives. A frequent misstep is deploying the technology without defining specific goals. Organizations should start by identifying key compliance challenges—such as meeting sustainability targets or improving audit efficiency—and design their digital twin to address these priorities directly. This focus ensures measurable outcomes and a strong return on investment.

Leveraging Existing Infrastructure

Businesses don't need to start from scratch. Existing systems, like ERP platforms (e.g., SAP Material Master) or sustainability tools (e.g., Sustainability Footprint Management for CO2 tracking), already house valuable data. Integrating these into a digital twin framework accelerates the implementation and ensures compliance data is both accessible and actionable from day one.

Our 4-Phase Approach



The visual illustrates a structured 8-week enablement path that empowers customers to rapidly experience the value of Straccoon's digital twin solutions. This journey is designed to unlock tangible outcomes quickly: validating product or service ideas, accelerating innovation cycles, and establishing a foundation for scalable implementations.

In the Prepare phase (Weeks 1-2), the groundwork is laid through kickoff sessions, technical onboarding, and strategic planning. Design (Week 3) focuses on process mapping, integration scoping, and stakeholder validation of a lean yet functional concept. The Deploy phase (Weeks 4-6) brings the prototype to life with cockpit configuration, data flow implementation, and initial user training. Finally, Run (Weeks 7-8) enables real-world testing in a controlled environment, supported by documentation and feedback loops to inform future scaling decisions.

This fast-track approach is ideal for organizations looking to explore digital twin capabilities with clarity, speed, and strategic focus.

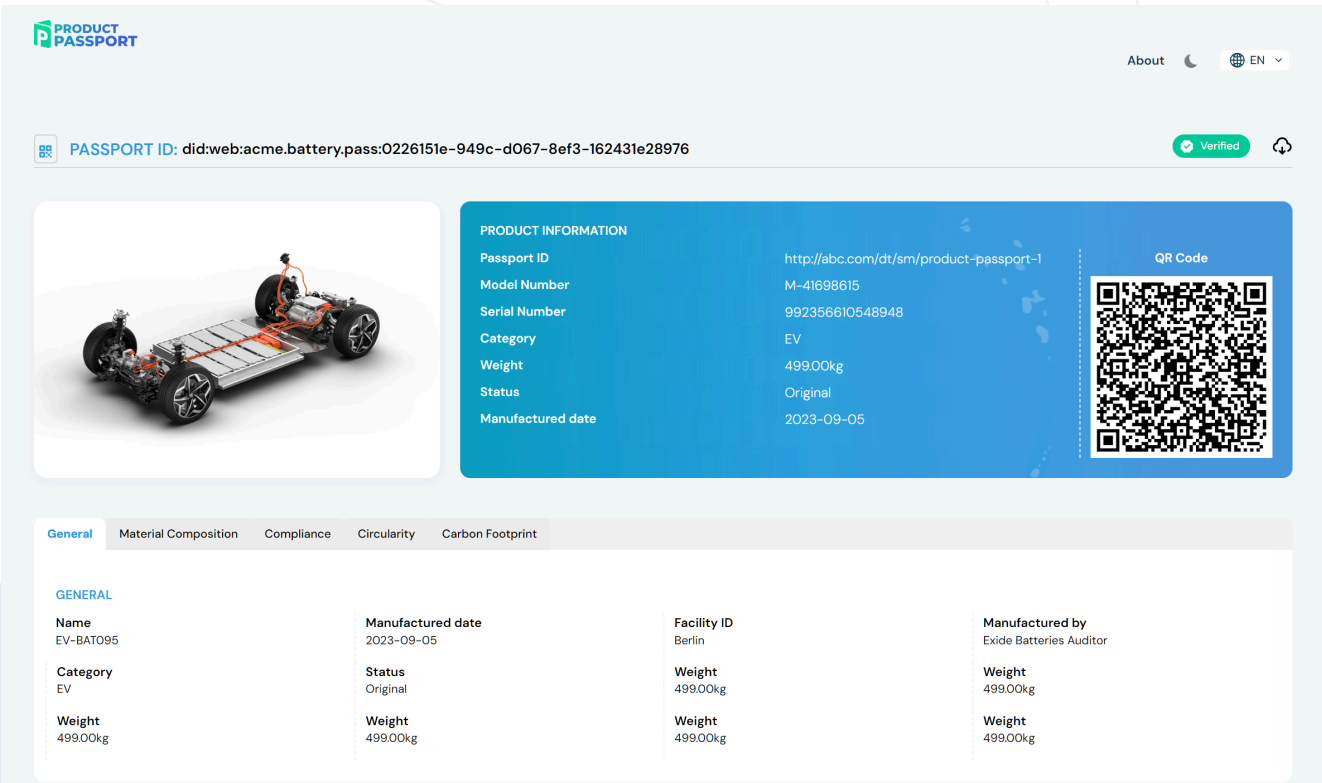


Digital Twin Use Cases

Digital Product Passport

The **Digital Product Passport (DPP)** is a global regulatory requirement demanding transparency on materials, origin, and environmental impact. Digital twins serve as the backbone, enabling structured, lifecycle-wide data access. For manufacturers, suppliers, and OEMs—especially in the EU—now is the time to prepare. Product managers, compliance leads, and sustainability teams must get ready to expose and transmit product data in line with evolving EU requirements. While details are still emerging, it’s clear that dedicated data projects will be essential.

Beyond compliance, DPPs also unlock value—boosting reliability, enabling smarter maintenance, and building customer trust.

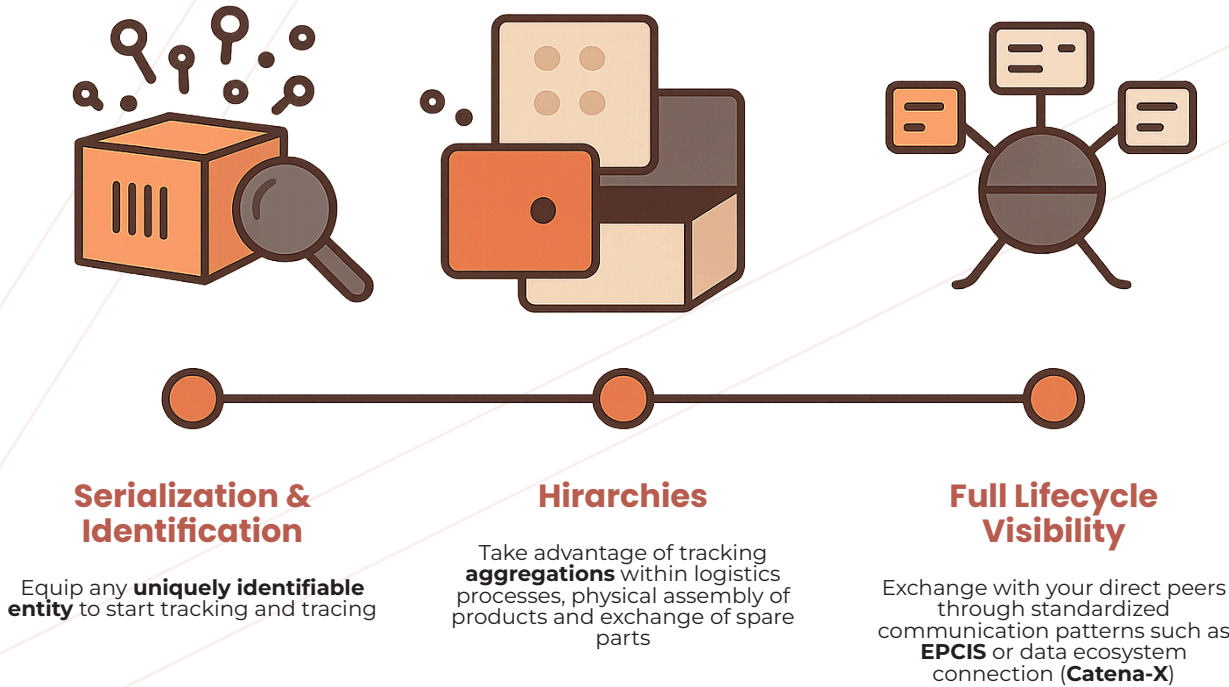


Product lifecycle and Sustainability information at your fingertips

Supply Chain Transparency

Regulations around ethical sourcing and supply chain practices demand end-to-end visibility. Digital twins unify supply chain data, enabling continuous tracking of components and processes to ensure compliance and support risk mitigation.

In B2B environments, standardized data exchange is essential. **GSI’s EPCIS (Electronic Product Code Information Services)** enables structured sharing of supply chain events—such as shipping, receiving, and transformation—based on globally unique **EPCs (Electronic Product Codes)**.



By integrating EPCIS into digital twins, companies can exchange trusted, real-time data across enterprise boundaries.

This improves collaboration, ensures provenance, and reduces manual reconciliation in complex multi-tier networks.

In addition, connecting to data consortia such as Catena-X provides a proven, standardized way to communicate across organizational and system boundaries—further strengthening transparency and interoperability at scale.

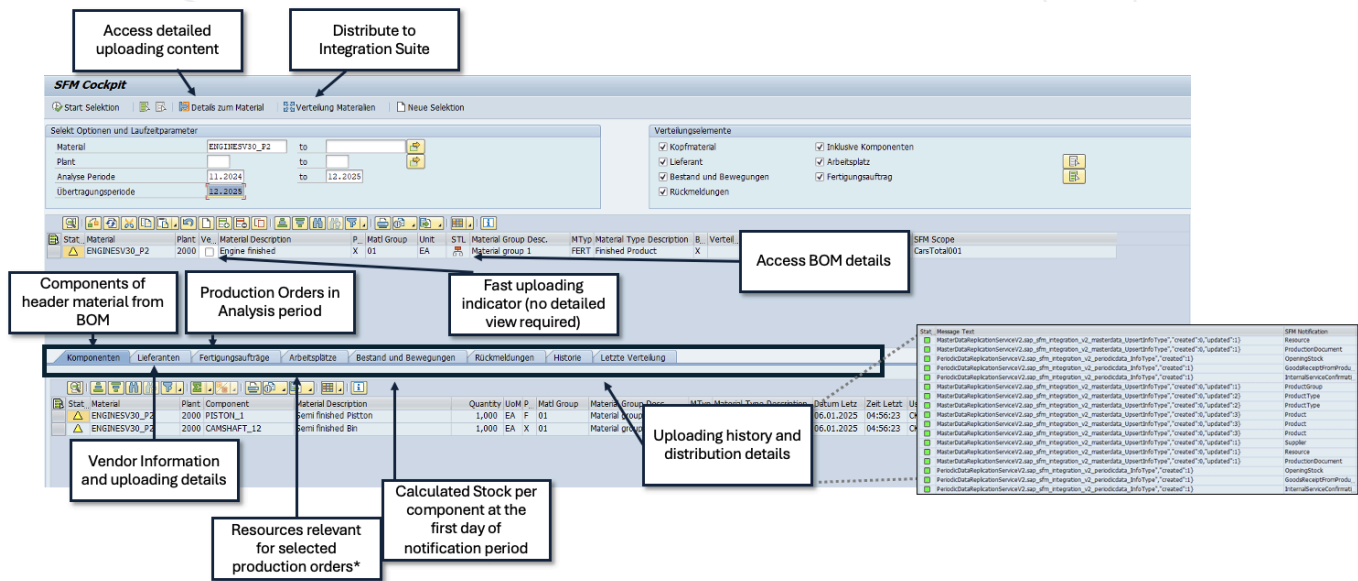
Sustainability and Circular Economy

To support circular economy goals, companies have implemented Material Twins—digital representations of materials enriched with lifecycle and sustainability data—deeply integrated into their SAP ERP and sustainability systems.

In a typical use case, the Material Twin links operational data from SAP (e.g., material movements, production batches) with environmental indicators from tools like SAP Product Footprint Management. This enables:

- Fast, automated footprint calculations during standard SAP transactions such as production orders or goods movements
- Embedded sustainability insights within purchasing, manufacturing, and design processes, improving decision-making without disrupting workflows
- Structured data exchange with partners, using formats like the Digital Product Passport or EPCIS events, to track material origin, carbon content, and recycling status across the value chain

This approach has helped customers reduce processing times, eliminate manual data reconciliation, and drive scalable circular initiatives such as reuse, remanufacturing, and take-back—all based on a unified Material Twin anchored in the SAP system.



The Straccoon Cockpit streamlines the handling of material twins by giving users a clear, production-order-based view of BOM components, stock levels, vendor data, and upload history.

With built-in integration tools and real-time upload tracking, customers can quickly prepare and share data—reducing manual work and speeding up adoption.

This approach cuts processing time, eliminates reconciliation issues, and supports scalable circular programs like reuse and take-back, all anchored in the SAP system.

The Future of Digital Twins

Artificial intelligence (AI) is poised to redefine compliance, but it thrives on structured, meaningful data. **Digital twins**, with their semantic foundations and real-time integration, provide the perfect input for AI tools by translating complex regulatory data into standardized, machine-readable formats. These systems can predict compliance risks, automate reporting, simulate scenarios, and streamline documentation processes, keeping businesses ahead of shifting regulatory demands.

However, raw data alone—unstructured, scattered, and lacking context—is insufficient for modern compliance use cases. **Digital twins** elevate raw data into actionable knowledge by layering semantics, validation logic, and traceability onto the information. This added intelligence enables organizations to meet audit requirements faster, monitor sustainability metrics in real time, and make strategic decisions with greater confidence. Furthermore, digital twins create a scalable foundation for AI-powered compliance monitoring, where real-time policy checks and automated data reconciliation become part of everyday workflows. As ESG data becomes a strategic asset, businesses can use digital twins to analyze supplier behavior, model regulatory outcomes, and adapt faster to legislative change.

As regulatory frameworks continue to evolve—demanding not just more data, but smarter data—this transformation will be critical for businesses that want to remain agile, compliant, and competitive.

Ready to Make Data Work for You?

Fragmented data no longer has to be a barrier to compliance. Digital twins offer a proven way to unify information, meet regulatory demands, and drive measurable business value. To help you get started, we offer a free strategy call—a no-obligation session where our experts assess your use case, outline a tailored digital twin architecture, and provide a clear roadmap aligned to your compliance, traceability, and ESG goals.

This is your opportunity to explore how a data-centric Digital Twin can eliminate manual effort, accelerate audit readiness, and adapt to regulatory changes—all within your existing systems.

Contact us today to schedule your strategy call and take the first step toward unlocking the full potential of your data with digital twins.



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