



DIGITAL PRODUCT PASSPORT

USING SHARED SUPPLIER DATA INSTEAD OF ONE-OFF INTEGRATIONS



WHAT

SHORTCUT

WHY

Because the DPP is coming as part of the EU's Ecodesign Regulation anyways, and building it on the AAS turns that one-time obligation into infrastructure that pays off well beyond compliance.

The Asset Administration Shell (AAS) is used as the data backbone for the Digital Product Passport. Instead of building a new integration for every supplier, every component, machine, and raw material provides its data as a standardized AAS. The finished product's DPP is then assembled by combining these shells, not by collecting files one supplier at a time.

For manufacturers who need to meet the ESPR and similar circular economy requirements, especially those sourcing components from multiple suppliers who all deliver data in different formats.

WHO



GEORG STAWOWY, CEO @BÜRKERT FLUID CONTROL SYSTEMS

THE DIGITAL PRODUCT PASSPORT IS FAR MORE THAN A REGULATORY REQUIREMENT FOR BÜRKERT. IT OFFERS THE OPPORTUNITY TO CONSOLIDATE PRODUCT INFORMATION MORE EFFECTIVELY THROUGHOUT THE ENTIRE LIFECYCLE, EXCHANGE IT IN A STANDARDIZED WAY, AND THEREBY MAKE PROCESSES ACROSS VALUE NETWORKS MORE EFFICIENT. AT THE SAME TIME, IT LAYS THE FOUNDATION FOR NEW DIGITAL SERVICES, GREATER TRANSPARENCY, AND MORE SUSTAINABLE SOLUTIONS FOR OUR CUSTOMERS.



DOES YOUR PRODUCT FALL UNDER THE DPP, AND YOU HAVE NOT STARTED YET?

ARE YOU ALREADY COLLECTING COMPLIANCE DATA, BUT EVERY SUPPLIER SENDS IT DIFFERENTLY?

DO YOU WANT TO BUILD THIS ONCE, NOT AGAIN FOR EVERY NEW REGULATION?

IF YOU ANSWER ONE OF THE Q'S WITH „YES“ - YOU SHOULD CONTINUE READING.



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01 | THE DIGITAL PRODUCT PASSPORT IS COMING- READY OR NOT

WHAT IT IS AND WHY IT EXISTS

The linear model of buying resources, using them, and throwing them away does not hold up anymore. Resources are running out, and both buying new ones and discarding used ones is getting too expensive. The EU's answer is the Ecodesign for Sustainable Products Regulation (ESPR), part of a broader push toward a circular economy. It introduces obligations like a right to repair from 2030, minimum recycled content, and proof of what a product is actually made of, and it will become mandatory across industries, not just for a handful of early movers.

The Digital Product Passport is how that proof gets delivered. A DPP is a structured, standardized set of data attached to a product, retrievable through something as simple as a QR code, covering whatever a regulation like the ESPR asks for: a carbon footprint, technical documentation, recycling information, or all of it at once. It does not matter which specific requirement is driving the need. The DPP is the data behind the requirement.

That sounds simple from the customer's side: scan a code, see the data. From the manufacturer's side, it means the data has to exist somewhere in the first place, and it usually does not, at least not in one place or one format. It is spread across ERP, MES, and supplier catalogs, in whatever structure each of those systems happens to use. And because a finished product is made of components sourced from other companies, this problem does not stop at the company's own walls. It has to work across organizations, with suppliers who are all solving the exact same problem for their own products.

So the DPP is not a nice-to-have digitalization project a company can pick up when there is time for it. It is coming with a deadline attached. The only real choice left is how to build it.

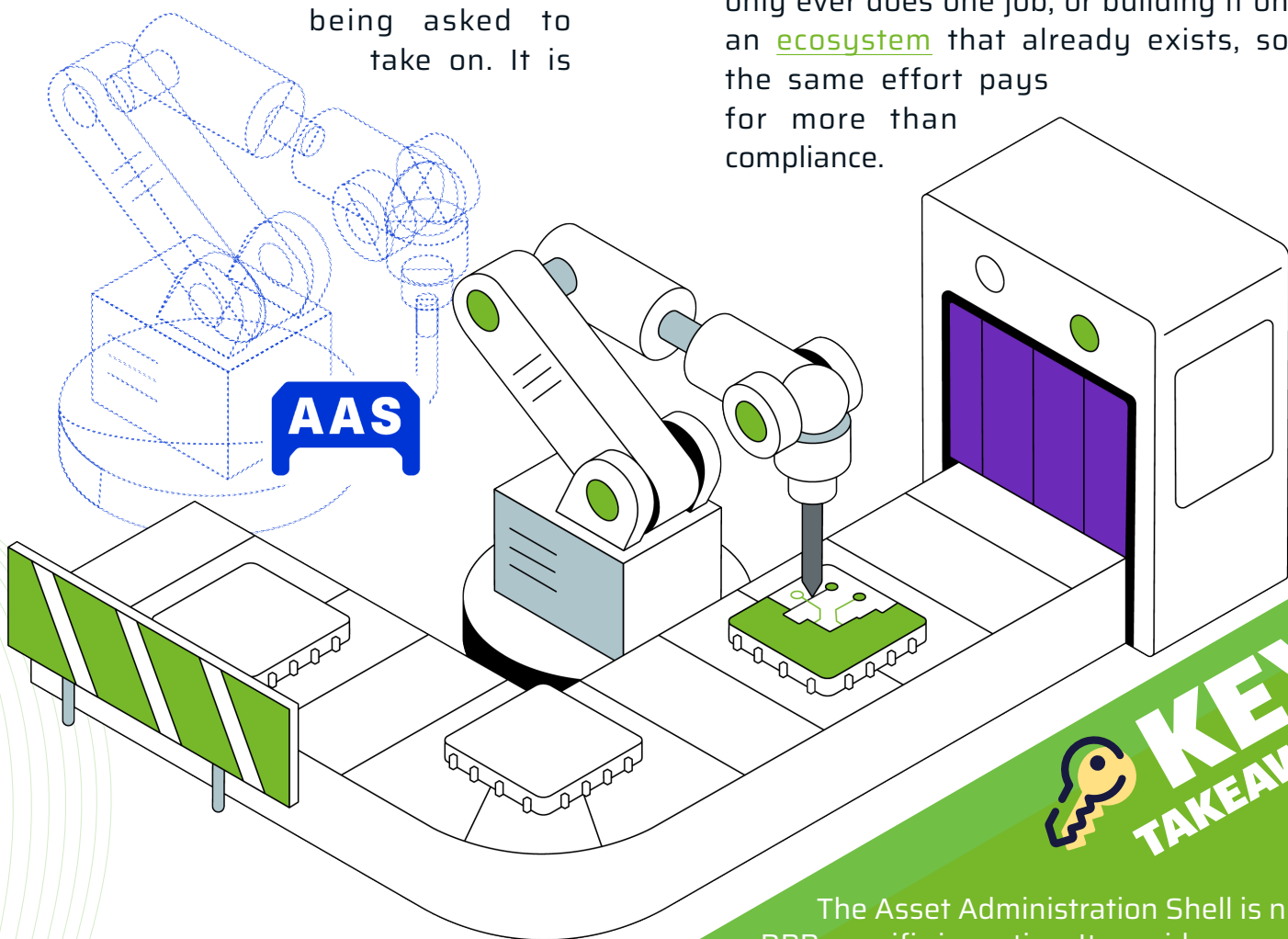


02 | WHY BUILD IT ON DIGITAL TWINS? TURNING A DEADLINE INTO AN INVESTMENT FOR THE FUTURE THAT WORKS

A digital twin, in its plain definition, is a virtual representation of a physical asset, connected to that asset through a data exchange. The Asset Administration Shell is where that representation happens. It is not something invented for the DPP. It is a standardized, semantically interoperable format, defined in an IDTA specification, funded through BMBF and BMW, and built on already established technologies like JSON and REST. In other words, it is not a new risk companies are being asked to take on. It is

infrastructure other people have already built, tested, and maintained.

The AAS can serve as the standardized information model and interoperability layer within a broader DPP architecture: standardized, cross-company access to asset data. Building a DPP means building this kind of infrastructure regardless of which technology carries it. So the real question is not whether to invest the time and money, that part is already decided by the regulation. The question is whether to spend that investment building a proprietary, one-off pipe that only ever does one job, or building it on an **ecosystem** that already exists, so the same effort pays for more than compliance.



The Asset Administration Shell is not a DPP-specific invention. It provides a proven foundation for standardized and interoperable asset data. Building the Digital Product Passport on this foundation reduces implementation effort while ensuring compatibility with a broader industrial ecosystem.

Because once the infrastructure is there, the DPP stops being the only thing it is good for. The same AAS-based setup can carry product configuration, goods receipt validation, worker guidance on the shop floor, machine integration, whatever comes after the DPP. Nobody knows exactly what the next regulation or the next digitalization use case will demand. What a company can control is whether it has to start from zero again when it arrives.

This is exactly why OI4 runs an Industrial Digital Twin Working Group in the first place. Not because the AAS needs another champion, but because none of this is worth figuring out alone, twenty times over, in twenty different companies. The people in this group are the ones actually building the pipeline, comparing notes on what worked and what did not, and putting it back into the community instead of keeping it as a competitive secret. That is the point of the whole exercise: one company's hard-won integration effort becomes everyone's starting point.

03 | FROM COMPONENT TO CARBON FOOTPRINT

THE OI4 NEXT BIKE EXAMPLE

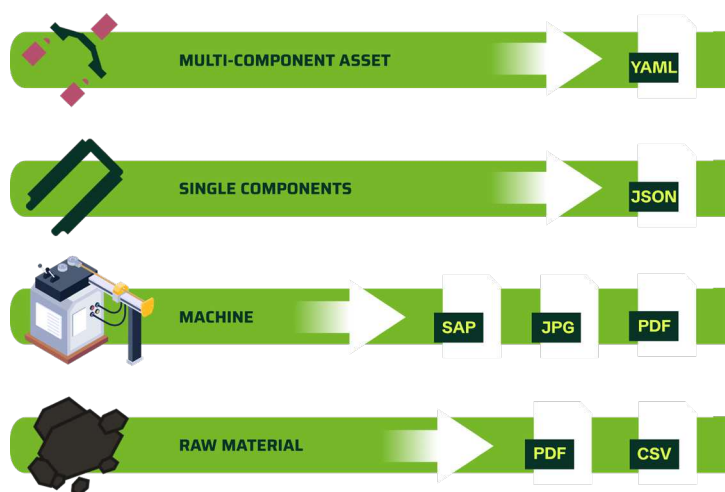
Take Lisa. She is 36, just had her second child, and is thinking about what kind of world she is leaving behind. She



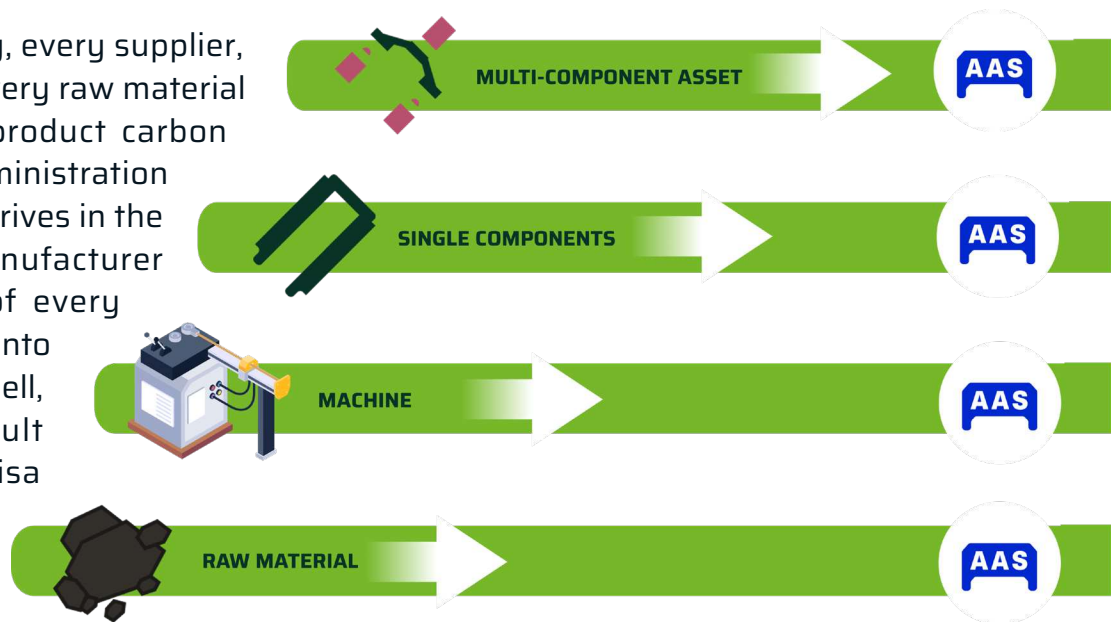
commutes 12 kilometers a day and is considering selling her car and buying an e-bike instead. Price plays a role, but so does the actual carbon footprint of the bike she is about to buy. She compares a few options. On each one, a QR code on the bike tells her the product carbon footprint from production and transport. For Lisa, this is simple: she scans a code and gets a number.

For the bike manufacturer behind that number, it is not simple at all. To provide the carbon footprint of a finished bike, the manufacturer needs the footprint of every component in it, the machines used to produce those components, and the raw materials that went into them.

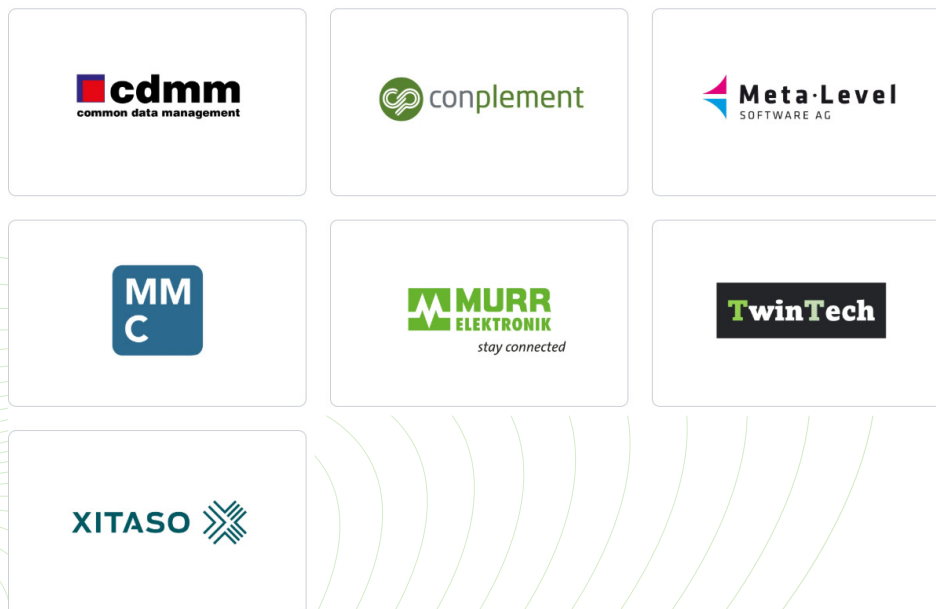
Done the proprietary way, this means collecting a YAML file from one supplier, a JSON file in a different structure from another, an SAP export from a machine, an OPC UA model from somewhere else, and a manual export from a supplier's website for raw materials that were never digitized at all. Every one of these has to be interpreted and integrated separately, for every single bike.



Done the AAS-based way, every supplier, every machine vendor, every raw material provider delivers their product carbon footprint as an Asset Administration Shell. The data already arrives in the same structure. The manufacturer aggregates the shells of every component and machine into the finished bike's own shell, and publishes the result through the QR code. Lisa notices nothing different. What changes is entirely on the manufacturer's side: instead of one custom integration per supplier, there is one consistent way of receiving and combining data. This is not a thought experiment.



OI4 built exactly this as a proof of concept, with companies including CDMM, complement, Meta-Level Software AG, Müller MC, Murrelektronik, TwinTech, and XITASO, exploring how an AAS can be generated automatically for a product made of several components, how the carbon footprint is calculated from those parts, and when a Type AAS and when an Instance AAS is the right tool for the job. The full project is documented at openindustry4.com under Digital Product Passport with AAS, and the demonstrator behind it is what the next section walks through in detail, including exactly where Type and Instance AAS come into play.



**PROJECT INFORMATION?
CLICK HERE.**

[AAS-DPP PROJECT](#)



04 | HOW OI4 BUILT IT: THE NEXT-BIKE DEMONSTRATOR

FROM PARTS CATALOG TO FINISHED
DPP - TYPE AAS TO INSTANCE AAS

To show this in practice, the working group built a demonstrator around an imaginary bike manufacturer, NextBike. NextBike buys in the wheel, the saddle, and the handlebar, and produces the frame itself. The demonstrator follows the AAS through the full production chain, and it is also where the difference between a Type AAS and an Instance AAS actually matters, rather than staying an abstract distinction.

A TYPE AAS IS...

a kind of thing: a bike model, a component, a configuration, before any specific physical unit of it exists.

AN INSTANCE AAS IS...

one actual, physical thing: this exact bike, with this exact serial number, these exact measured torque values, this exact calculated footprint.

SUPPLIER

AAS Types

Products that are not yet produced = **no serial number** (catalog of components by each supplier)



AAS Instances

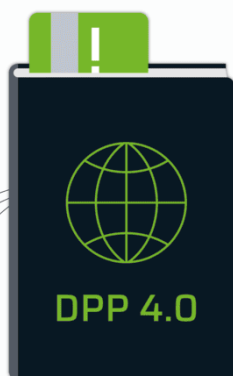
The manufactured products with a **serial number** (the digital twin of the product)



Cross enterprise AAS transfer APP

Creates a new AAS instance, assigns a new ID, and registers the AAS.

BIKE FACTORY



CUSTOMER

DPP Viewer

IDTA 02006
Digital Nameplate

IDTA 02003
Technical Data

IDTA 02004
Handover Documentation

IDTA 02023
Carbon Footprint

IDTA 02011
BoM
Wheel Instance
Saddle Instance
Handlebar Instance

The demonstrator moves from one to the other as the product itself moves from idea to physical object.

Internal parts catalog. Every component NextBike can build with is represented as a Type AAS, taken directly from the supplier's own repository. A new supplier can reuse the same standardized interfaces and data models, significantly reducing supplier-specific onboarding and mapping effort. From there, the shell is copied into NextBike's own ERP system and enriched with internal data such as storage location, pricing, and lead times.

Configurator. Once the parts catalog exists as AAS data, a customer-facing configurator can read which components are compatible with each other and offer a bike built from them, whether that is an offroad wheel with a steel handlebar or one with a carbon handlebar, each with its own price and its own carbon footprint. Configuring the bike this way generates the Type AAS for that specific configuration: the bill of materials, the digital nameplate, everything needed before a single physical part has been touched.

Goods receipt. When a supplier's delivery arrives, a QR code on the box is scanned to pull the AAS instance for that specific batch. This confirms the right parts arrived, checks that all required data is present, and flags any quality issues immediately, rather than after the fact.

Production and worker guidance. This is where the Instance AAS is created. As the bike moves through assembly, a worker is guided by the shell: pick up the first part, and a scan of its QR code confirms it is the correct one for the configuration the customer ordered, before the wrong frame ends up on the wrong bike. Actual process data, torque values, timestamps, results, gets written back into this specific

bike's Instance AAS as it happens, not reconstructed afterward from a paper log.

Machine integration. Themselves will have an AAS as well, effectively wrapped around the physical machine and connected through whatever protocol it already offers, or through added sensors if it offers none. This is where the OI4 TwinEdge Gateway comes in, mapping real machine values onto AAS parameters. In the demonstrator this was kept deliberately simple: a torque wrench with a target torque written into the shell and an actual torque read back out, rather than mapping every one of a machine's thousand Modbus registers. The point is not to model everything a machine can do. It is to model what the use case actually needs. The AAS provides a standardized abstraction layer, allowing information models and downstream applications to remain largely unchanged when machines are replaced. Only the connection and mapping may require adaptation. It can also support a clean separation between OT networks and higher-level IT systems by enabling access through standardized interfaces rather than requiring consumers to deal with device-specific IP addresses or protocols.

Two things are worth being direct about. First, the AAS is not built for real-time, safety-critical control. That is still the job of fieldbus systems. Second, values written into the shell are supposed to already be normalized, in proper units, semantically referenced, not a raw register value with an undocumented scaling factor of ten. That normalization work happens once, at the point the value enters the shell, not every time someone reads it. The result at the end of production is one Instance AAS per bike, carrying the digital nameplate, the bill of materials built up from every component shell, and the finished product carbon footprint.

05 | START SMALL - GO BIG

THE PASSPORT IS THE START, NOT THE FINISH LINE - USE CASE SNOWBALL

Lisa gets her bike, her number, her decision. That part of the story ends the moment she scans the code. For NextBike, it does not end there at all. Every shell that made the DPP possible is still sitting in the infrastructure afterward: standardized, still cross-company, still connected to real supplier data and real machine data. This is where the investment pays off.

An increasing number of product groups, DPP requirements will be introduced through product-specific delegated acts under the ESPR and related EU legislation. The only real decision left is what shape that spending takes. Spend it on a pipe that only ever does one job, and the day after the DPP ships, the investment is finished. Spend it on the AAS instead, and the same day, the next use case is almost free, because the shells, the mappings, the supplier connections are already there, waiting to be pointed at something new. That is the actual shape of it: not one big use case, but a snowball.



Goods receipt validation reuses the same component shells. Worker guidance reuses the same instance data. A predictive maintenance service reuses the same machine connection the TwinEdge Gateway already built for the torque wrench. Each one is cheaper than the last, because the expensive part, getting suppliers and machines to speak the same standardized language, only had to happen once.

So the honest way to look at the ESPR deadline is not as a cost to survive.

It is the one moment a company has an actual excuse to build this kind of infrastructure, funded by a regulation instead of an internal business case that is always hard to justify on its own. Built well, a compliance obligation becomes the foundation for everything a company wants to digitalize next, and the passport stops being the point. It becomes the first thing that rolled down the hill.



HELLO, WE ARE OPEN

No company snowballs this alone. The moment the DPP demands cross-company shells, cross-company machine data, cross-company standards, it stops being a problem one team can solve in isolation, no matter how good that team is. The Open Industry 4.0 Alliance is where companies already doing this compare notes, test approaches together, and align on what actually works before it becomes an expensive mistake. Participation means direct access to existing implementations and real technical expertise, a faster path from idea to working system, and a lot less reason to build everything from scratch. The working group is open. Bring your use case, before someone else's snowball rolls past yours.



START WITH 014

VERSION HISTORY

VERSION	DATE	DESCRIPTION	EDITOR
1.0	Sept 28th 2026	Initial release	Lucas Wolf