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Digital Product Passport (DPP) – Implications for SMEs

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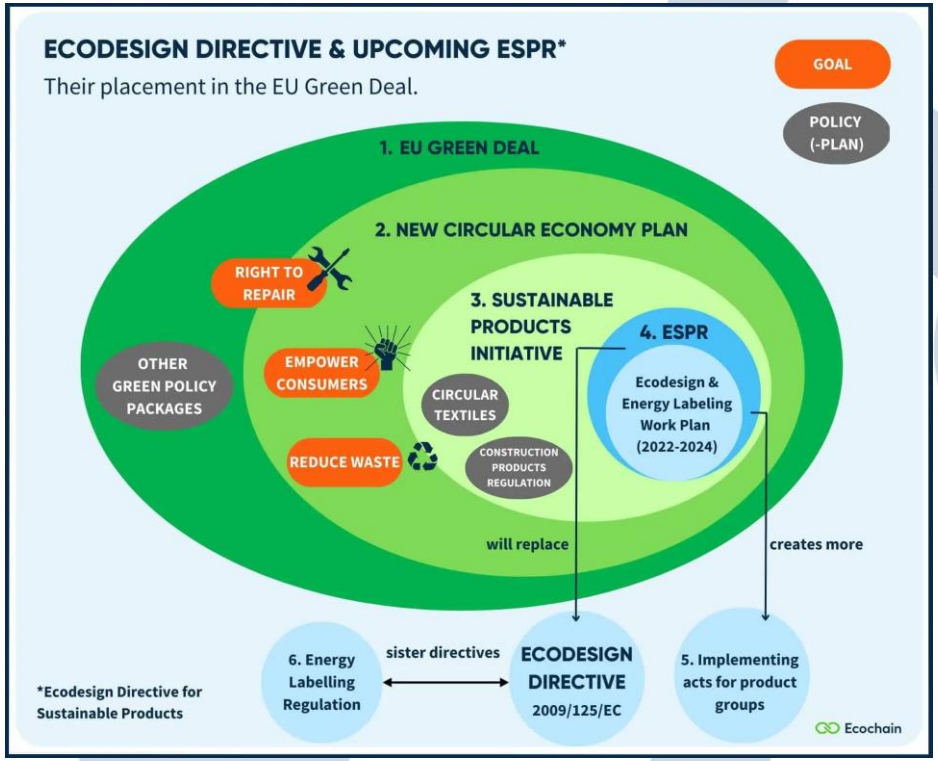
Legislative background

European instruments under EU Green deal

European Green Deal aims to transform the EU into a modern, resource-efficient and competitive economy, ensuring:

- Decarbonisation of the energy systems (no net emissions of greenhouse gases by 2050)
- Transition to a Circular Economy
- Preserving and restoring ecosystems and biodiversity
- Development of cleaner public and private transport



Source: Ecochain

Legislative background

The Ecodesign for Sustainable Products Regulation (ESPR)

The Ecodesign for Sustainable Products Regulation (ESPR), which entered into force on 18 July 2024, is the cornerstone of the Commission's approach to more environmentally sustainable and circular products.

A sustainable product is likely to display one or more of the following characteristics:

- *Uses less energy*
- *Lasts longer*
- *Can be easily repaired*
- *Parts can be easily disassembled and put to further use*
- *Contains fewer substances of concern*
- *Can be easily recycled*
- *Contains more recycled content*
- *Has a lower carbon and environmental footprint over its lifecycle*

Source: European Commission | Ecodesign for Sustainable Products Regulation

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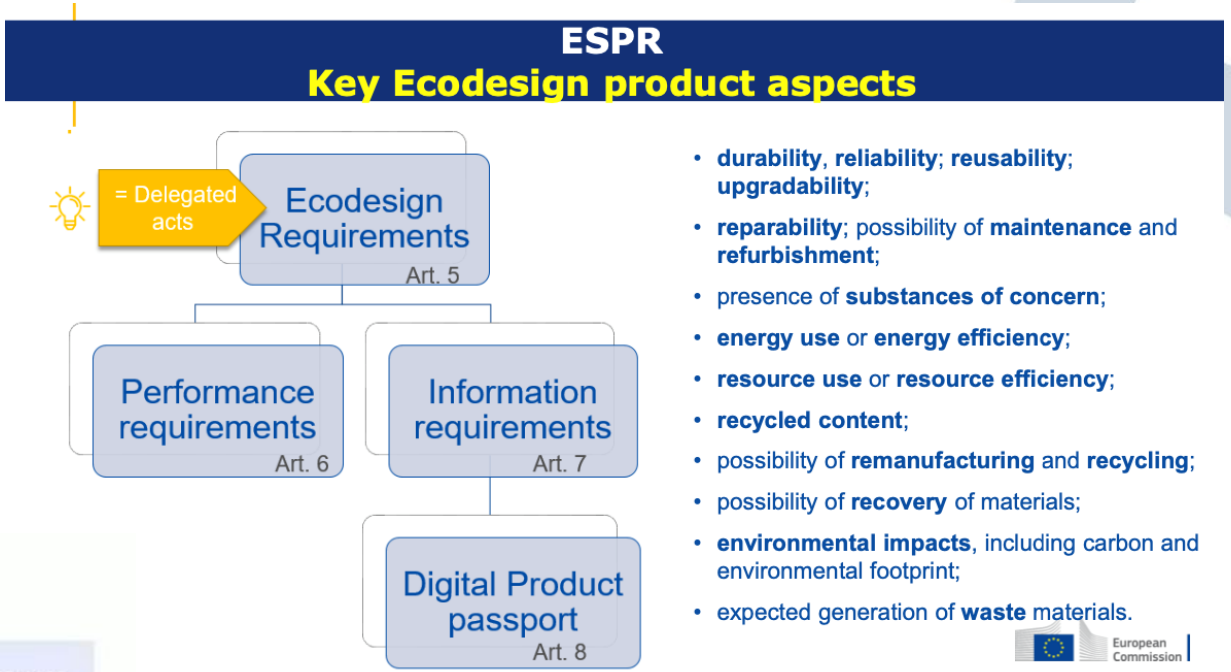
Legislative background

The Ecodesign for Sustainable Products Regulation (ESPR)

The ESPR, being a framework legislation, does not specify the requirements per product group.

It leaves that role to the delegated acts.



Source: European Commission (2024)

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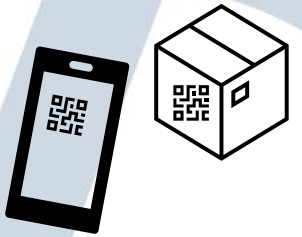
The Digital Product Passport (DPP)

A **Digital Product Passport (DPP)** is a structured collection of product related data with pre-defined scope and agreed data ownership and access rights conveyed through a unique identifier and that is accessible via electronic means through a data carrier. The intended scope of the DPP is information related to sustainability, circularity, value retention for re- use, remanufacturing, and recycling.



The DPP is based on a **decentralized** approach for data storage and is always uniquely linked to a product.

The DPP is an **information system for the circular economy.**

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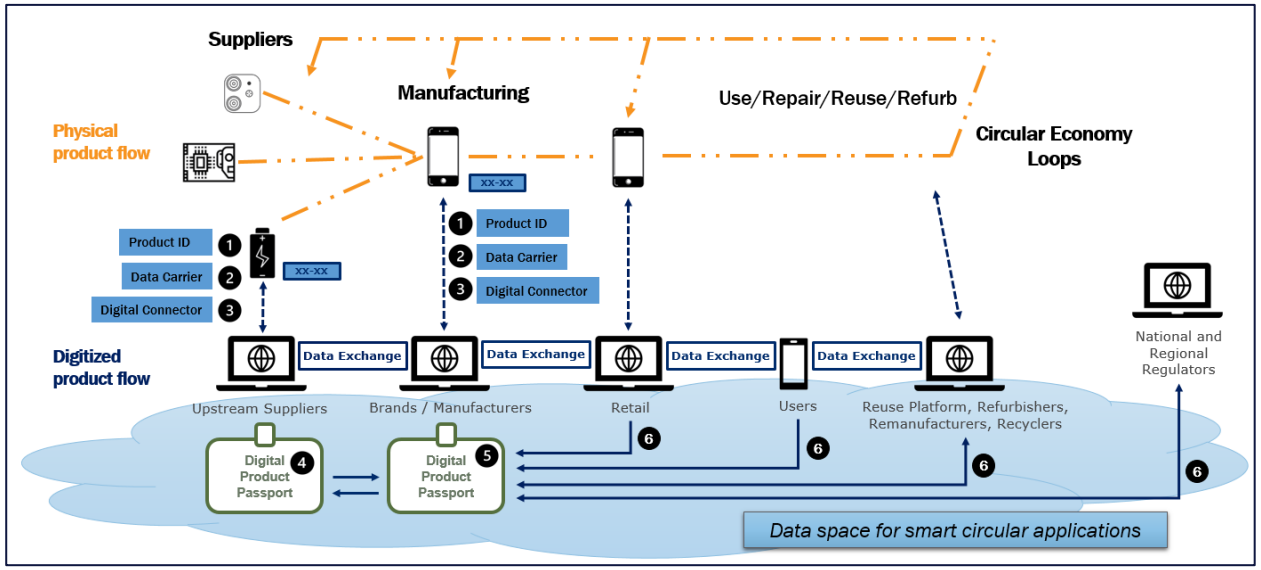
The Digital Product Passport (DPP)

CIRPASS

Collaborative Initiative for a Standards-based Digital Product Passport for Stakeholder-Specific Sharing of Product Data for a Circular Economy



Source: CIRPASS consortium

DPP Pillars

1. A unique persistent ID for the product (including batch and/or serialization as necessary) (1)
2. A persistent data carrier (RFID, QR Code, digital watermark, Bluetooth tag, etc.) (2)
3. A Digital connector between physical product and the digital place of information on the product (e.g., URI address) (3)
4. An IT architecture for facilitating the data exchange (6) composed of:
   - Standardized vocabulary
   - Standardized data exchange protocols and formats
   - Standardized stakeholder-dependent access mechanisms (read/edit rights)
   - Distributed storage of information (in connection with EU dataspaces)
   - A stakeholder-dependent interaction layer

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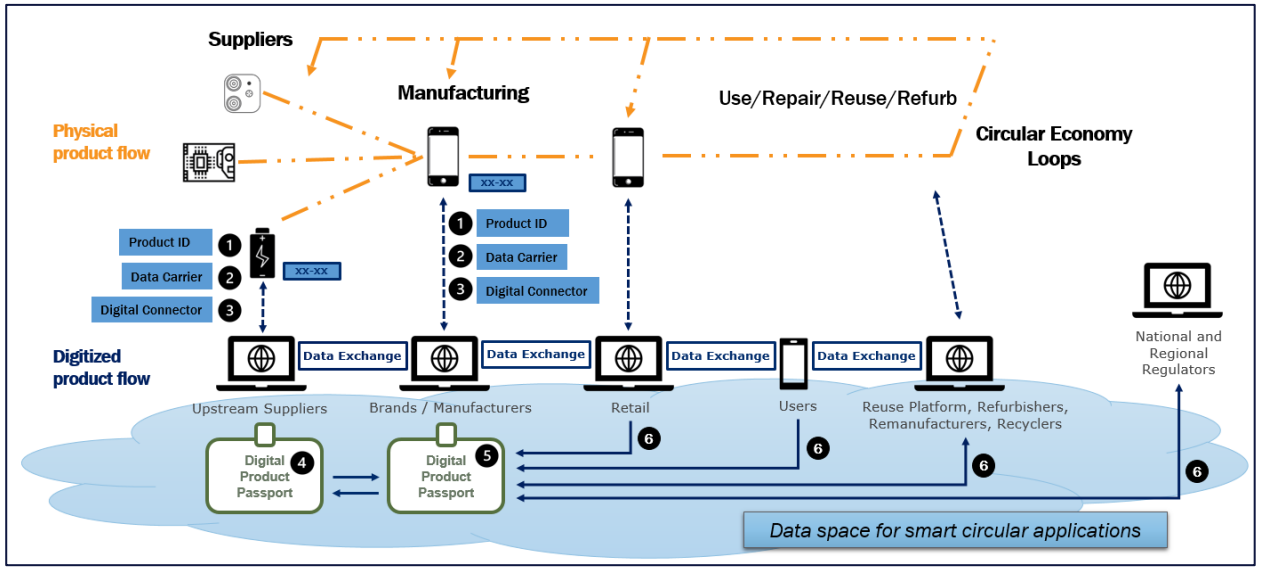
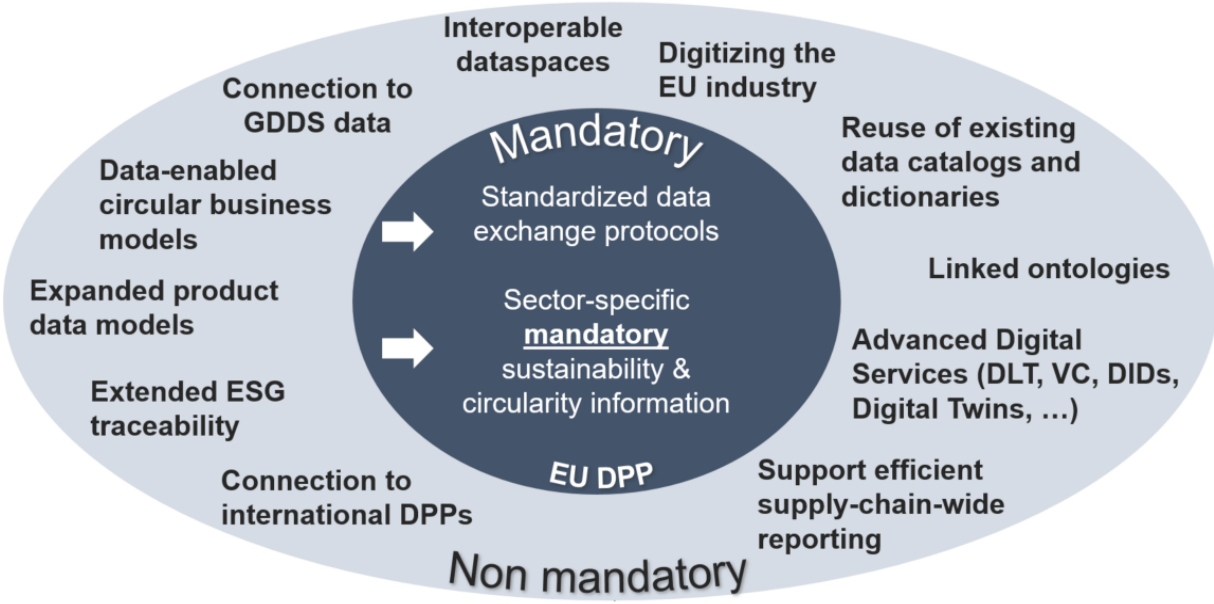


Source: CIRPASS consortium



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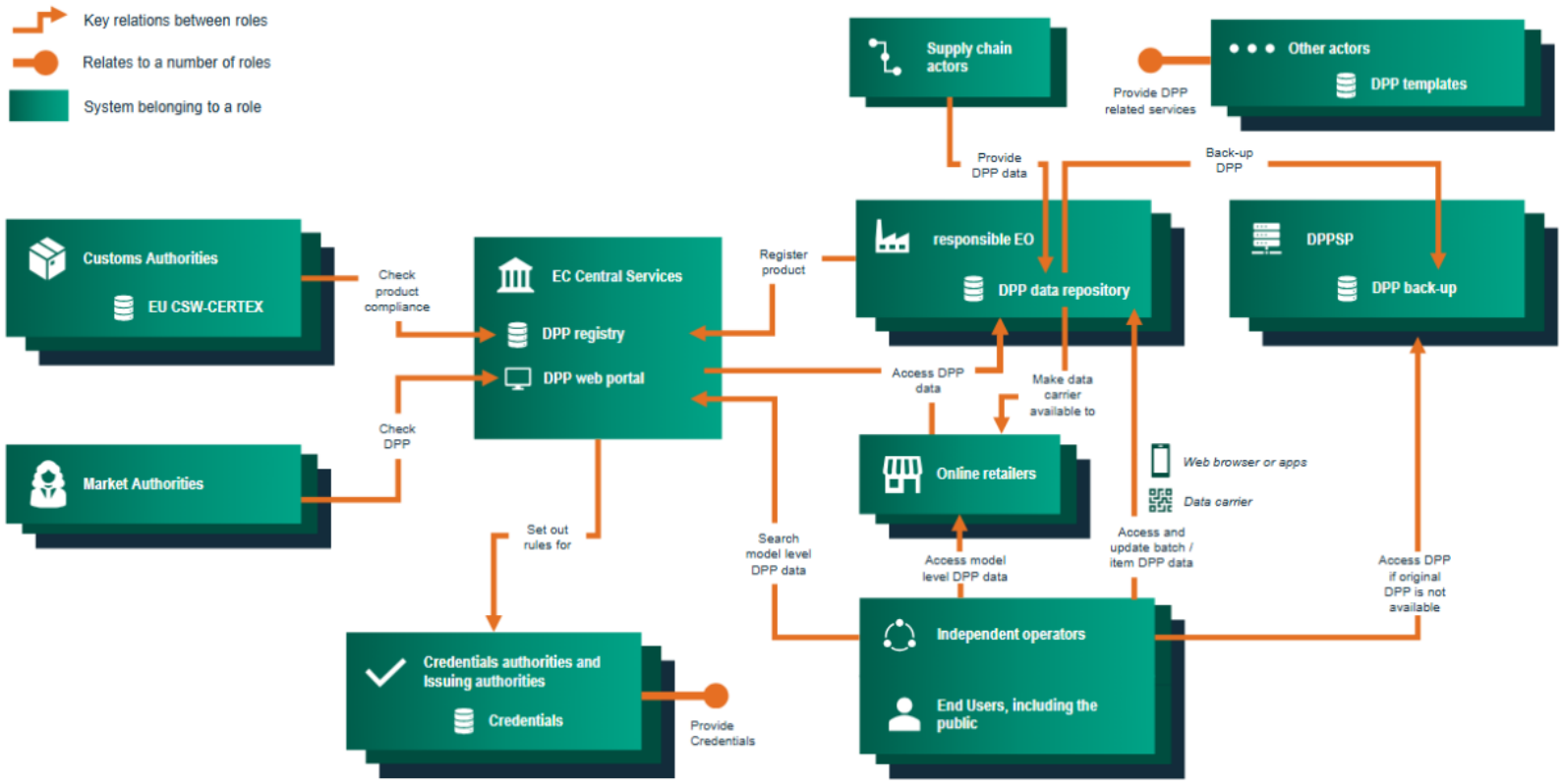
DPP Reference architecture



Source: CIRPASS-2 reference architecture (2026)

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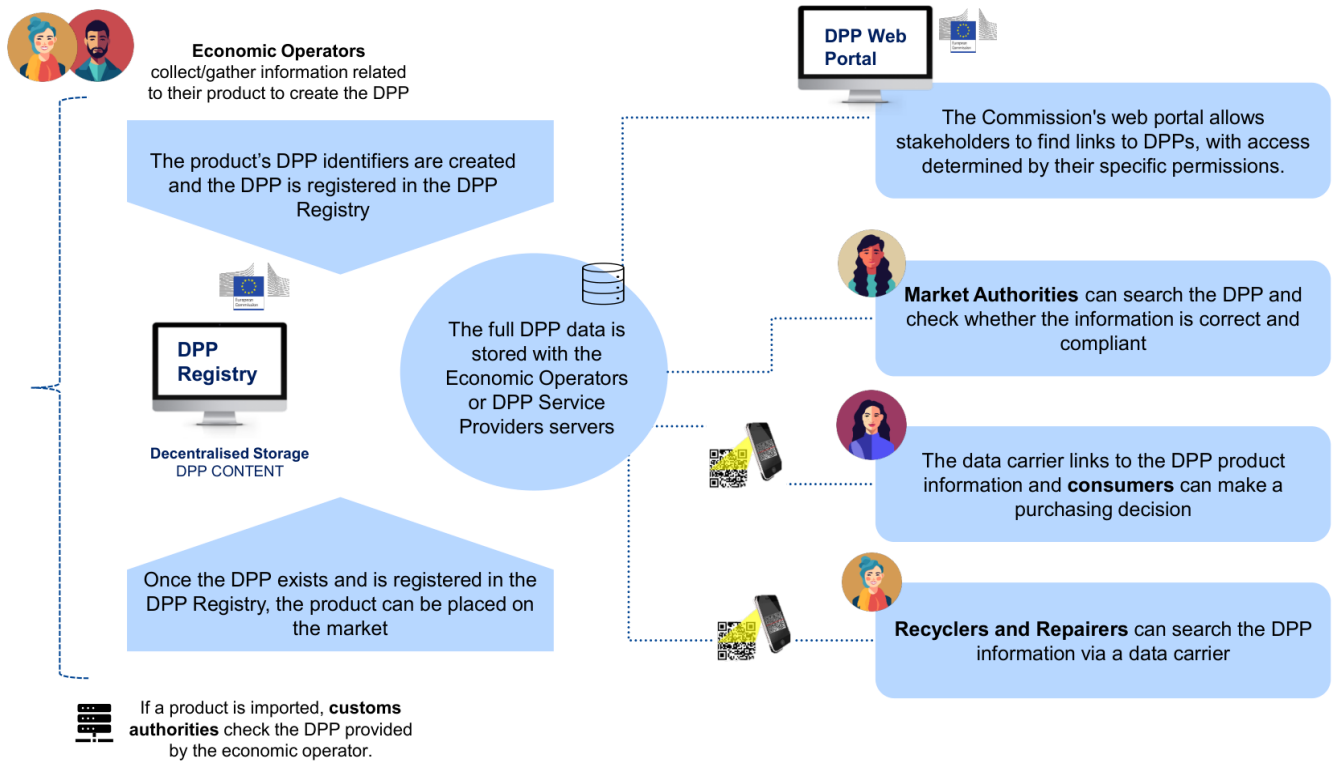
DPP Reference architecture



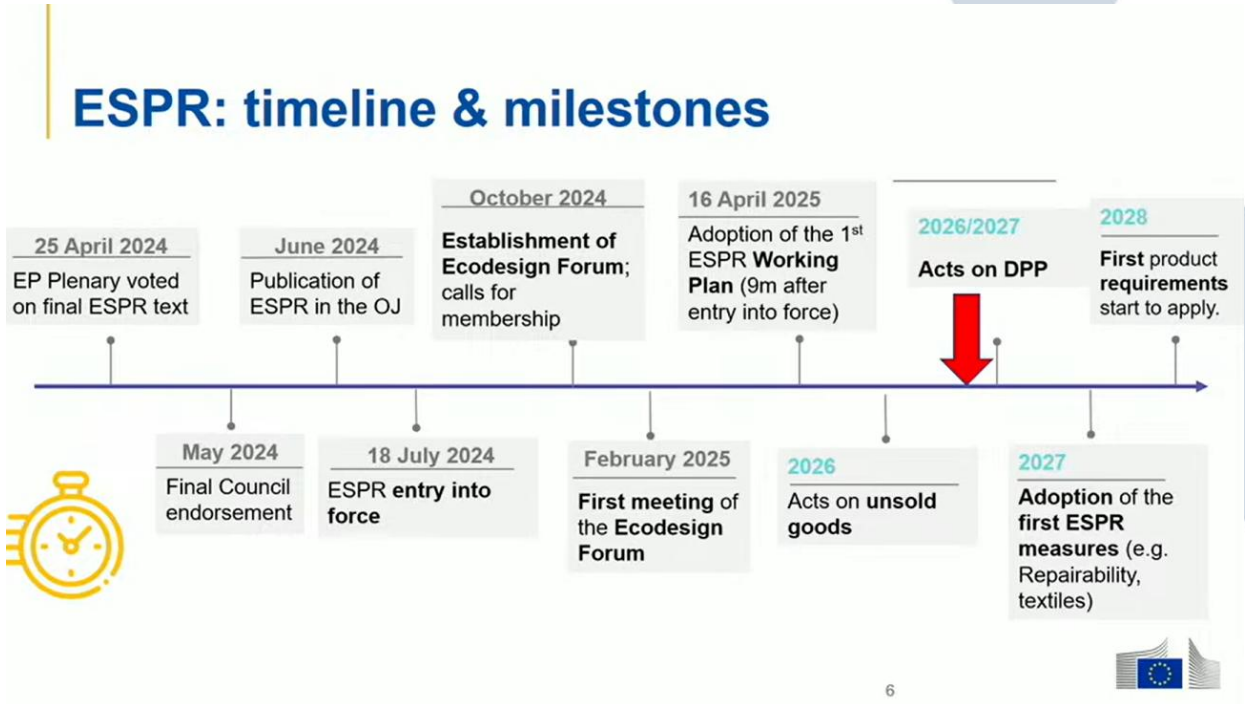
Source: European Commission – DG Grow

Priority products for DPP

Batteries (>2kWh)
- Types: Electric vehicle, Light Means of Transport, industrial
- Mandatory DPP in February 2027

Textiles
- Garments, shoes
- Mandatory DPP in summer 2027

Likely upcoming priority groups:
- **Construction** products
- Iron, **steel**, **aluminium**
- **Furniture**, including mattresses
- **Tyres**
- Detergents, paints, **lubricants**, chemicals
- **Energy** related products
- Information & communication technology products and other **electronics**



Source: EC presentation in DPP4EU (2026)

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Coffee break (5’)

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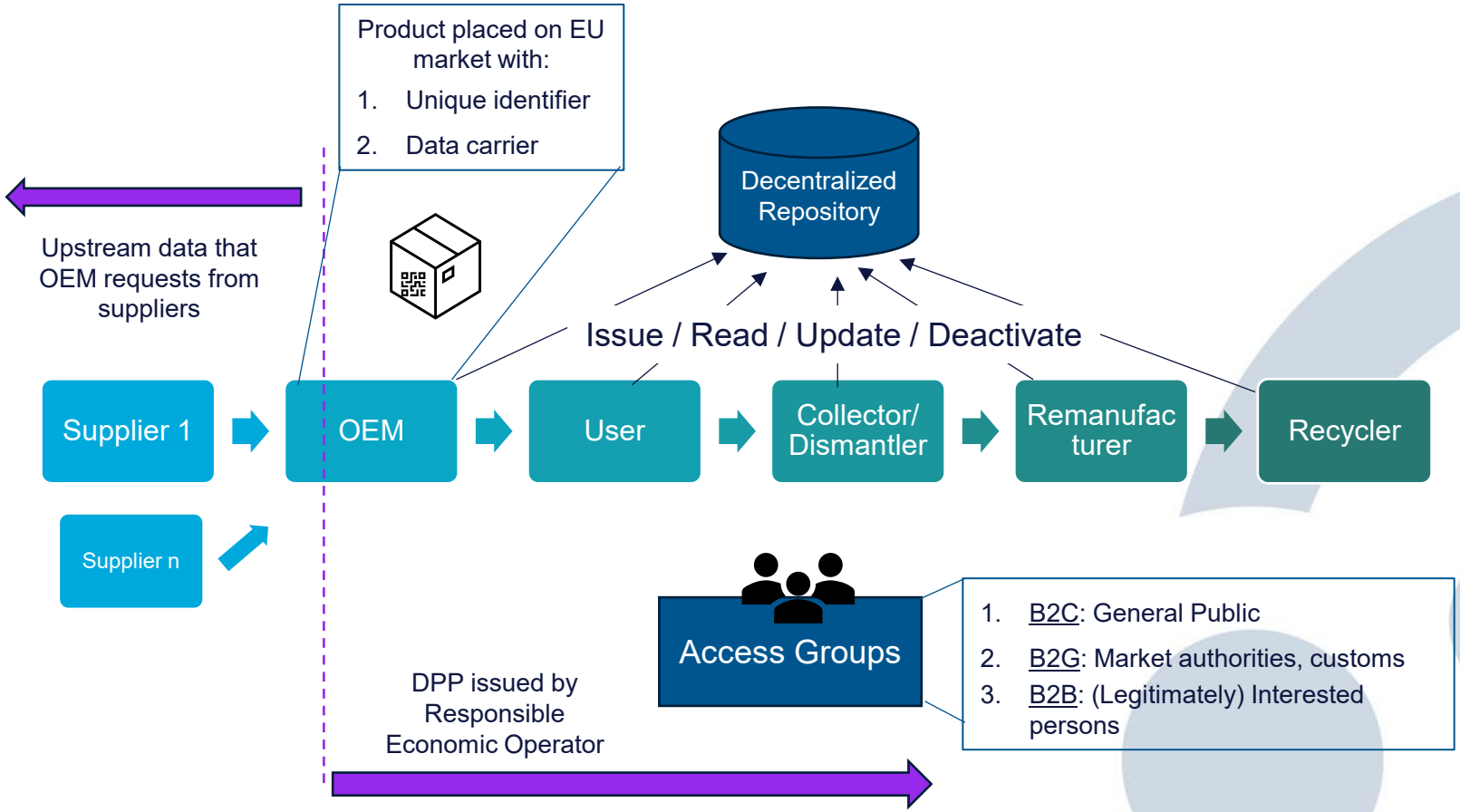
Actors in a DPP ecosystem



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DPP user stories

Source: CIRPASS-2 User Stories V3 (2024)
Visual adopted from “The Lifecycle of the DPP” presentation by Abdalla

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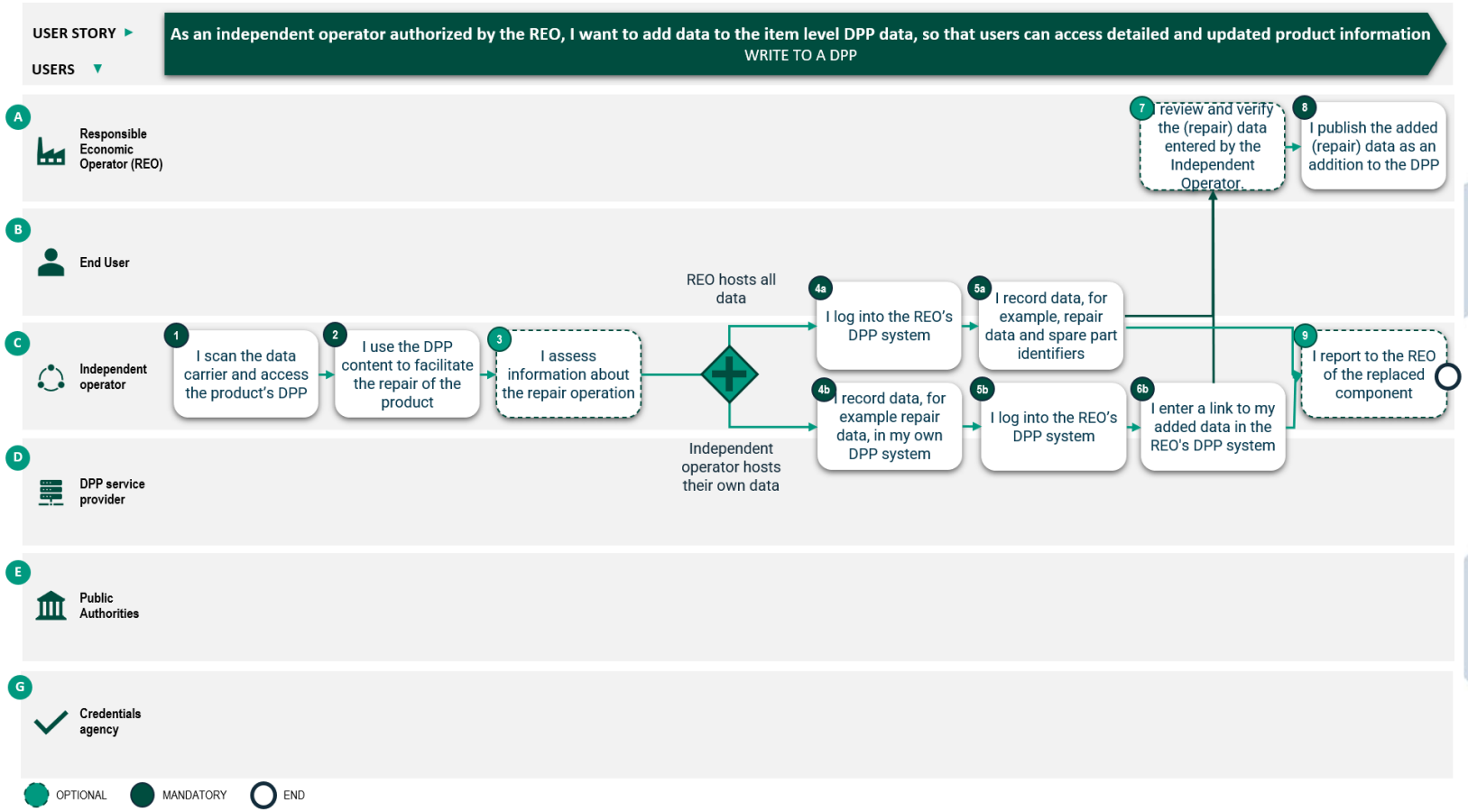
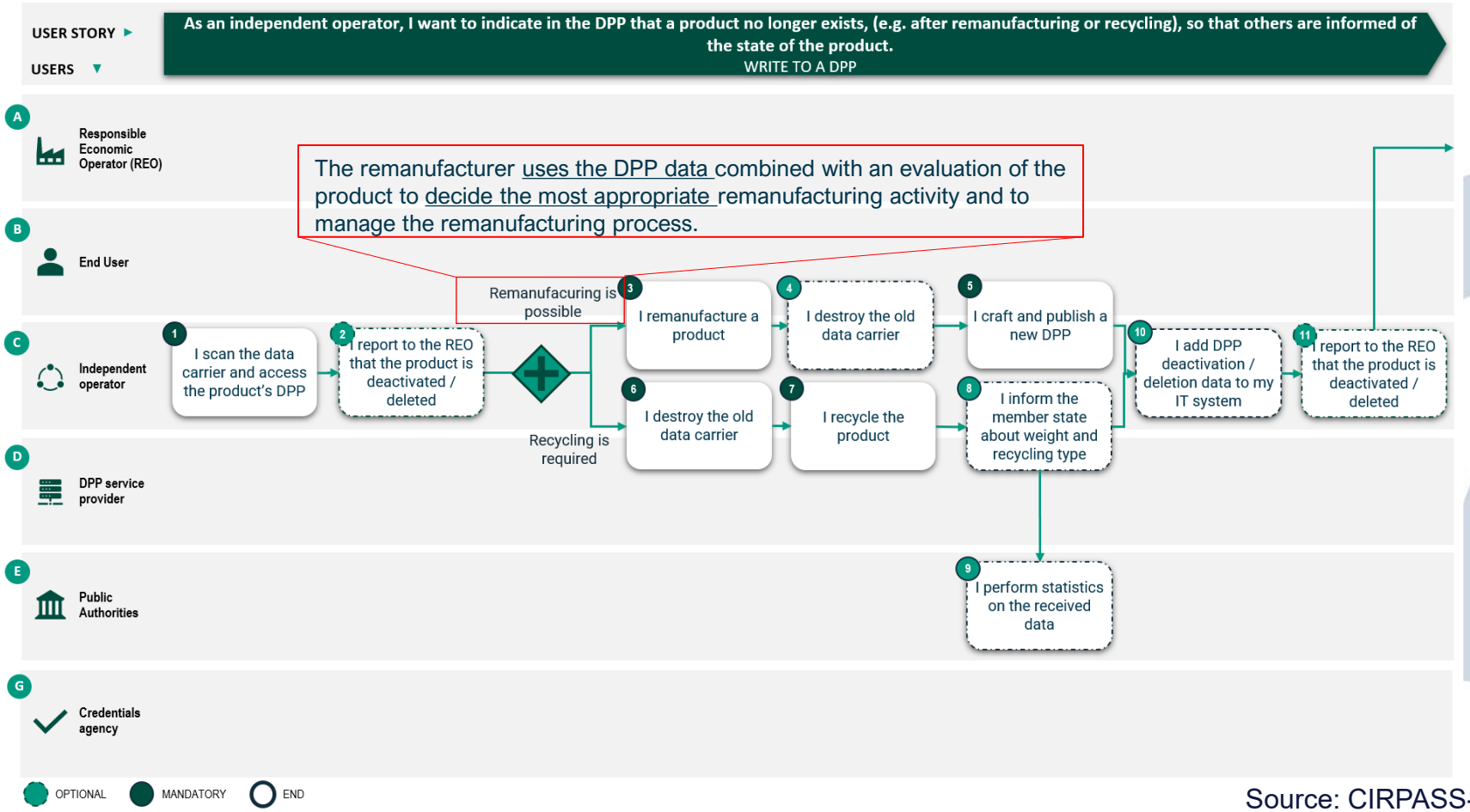
Deep dive into DPP users stories (1/2)



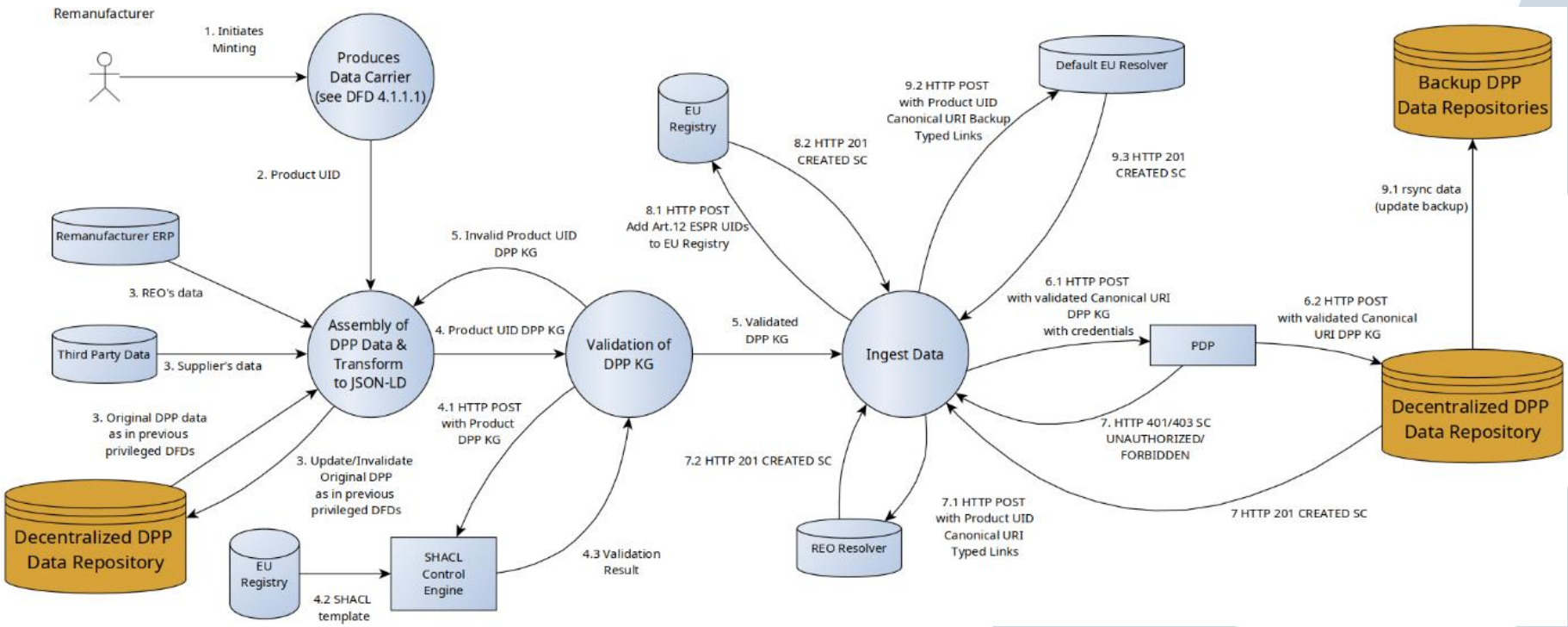
Source: CIRPASS-2 User Stories V3 (2024)

Deep dive into DPP users stories (2/2)



Source: CIRPASS-2 User Stories V3 (2024)

Deep dive into DPP users stories – Reman Journey



Source: CIRPASS consortium, DPP blueprint (2024)

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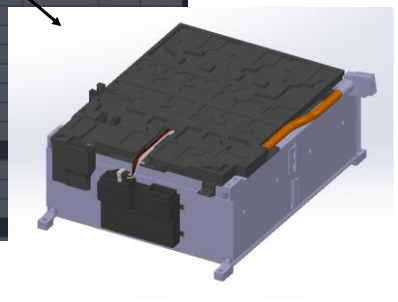
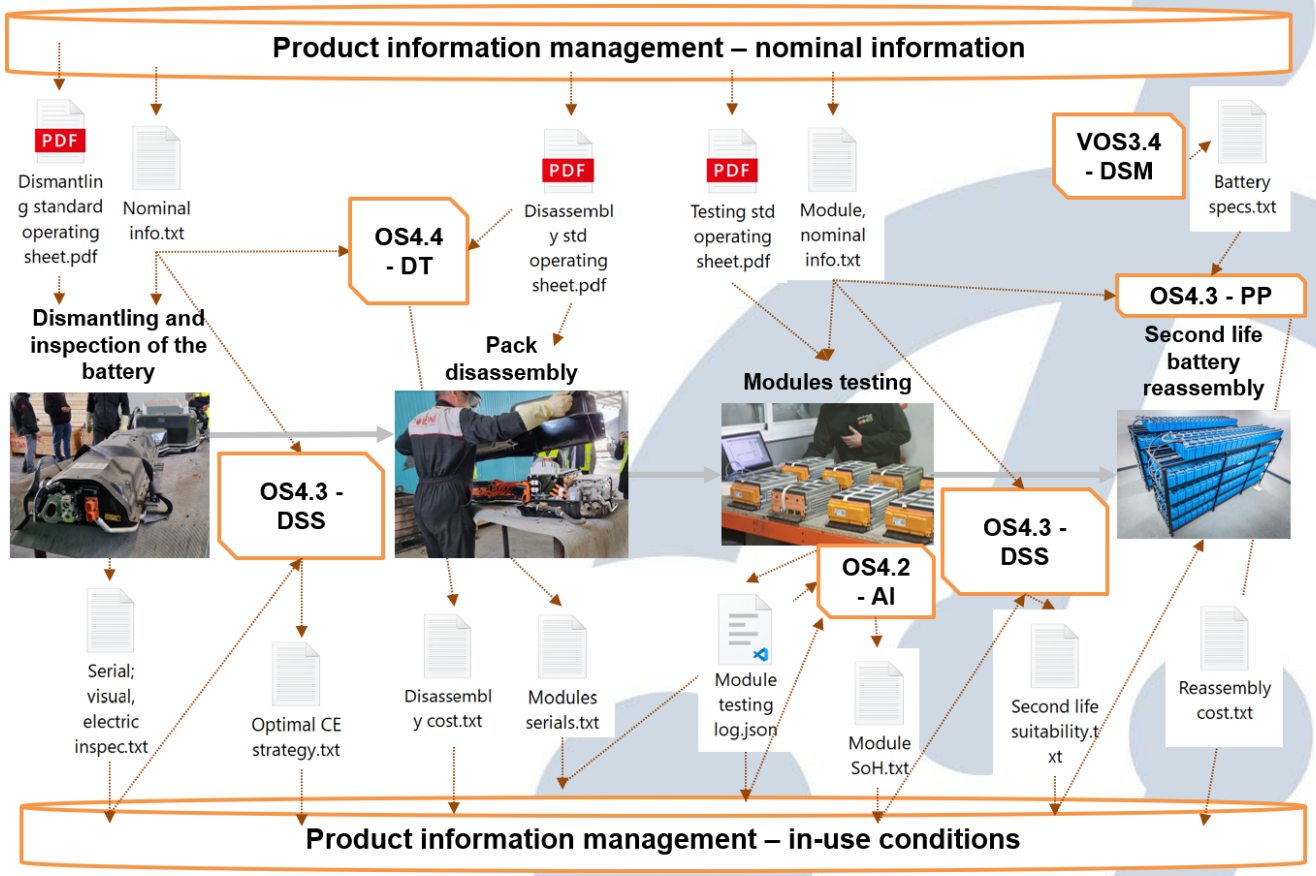
DPP Prototypes – Batteries

String based and technical files datasets to effectively test the early developments

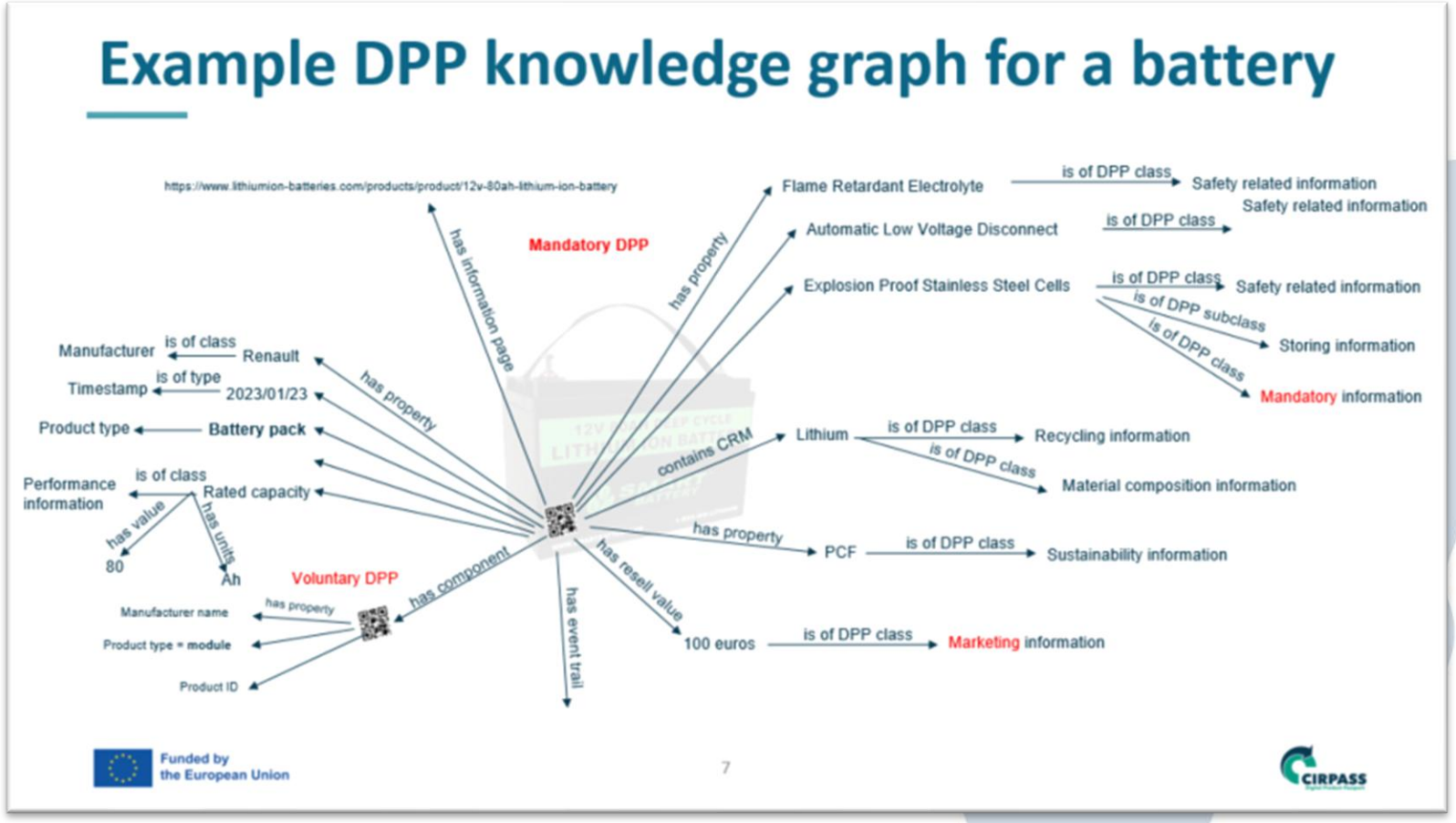
Car model	Car Brand	Type	Number of modules	Module Voltage (V)	Module Capacity (Ah)	Cell chemistry	Module Weight (kg)	Module Length (mm	dle Width	dle Height
A3 Sportback e-t…	Audi	PHEV	8	44	25	NMC, PHD	15	320	160	110
Q7 TFSI e	Audi	PHEV	14	45	28	NMC	15	320	160	110
A7 Sportback TFS…	Audi	PHEV	8	48	37	NMC	19	350	250	150
A8 TFSI e quattro	Audi	PHEV	8	48	37	NMC	19	350	250	150
e-tron	Audi	BEV	36	44	60	NMC	19	350	250	150
i3/i3s	BMW	BEV	8 (12 celle)	47	60	NMC LiFePO	25	360	310	145
Series 2e	BMW	PHEV	6	47	26	nan	nan	nan	nan	nan
330e	BMW	PHEV	6	47	26	nan	nan			
i8 Coupé/Roadster	BMW	PHEV	6 (16 celle)	60	34	NMC	16			
Series 5e	BMW	PHEV	8 (12 celle)	47	34	NMC LiFePO	25			
Series 7e	BMW	PHEV	8 (12 celle)	47	34	NMC LiFePO	25			
Volt	Chevrolet	PHEV	4 (32 cells) 3 (24 cells)	60 44	52	nan	nan			
Bolt	Chevrolet	BEV	8 (30 cells)	37	150	NMC	45			
Bolt 2	Chevrolet	BEV	2 (24 cells)	30	150	NMC	36			
C-Zero	Citroen	BEV	10 (8 cells) 2 (4 cells)	30 15	50	nan	24 12			
E-Berling Multis…	Citroen	BEV	nan	nan	nan	nan	nan			
E-Mearl	Citroen	BEV	nan	nan	nan	nan	nan			
Pacifica	Chrysler	PHEV	nan	nan	nan	nan	nan			
500e	Fiat	BEV	7 (6 cells) 11 (5 cells)	23 20	63	nan	15,2 12,6			





Source: DigiPrime consortium

DPP Prototypes – Batteries

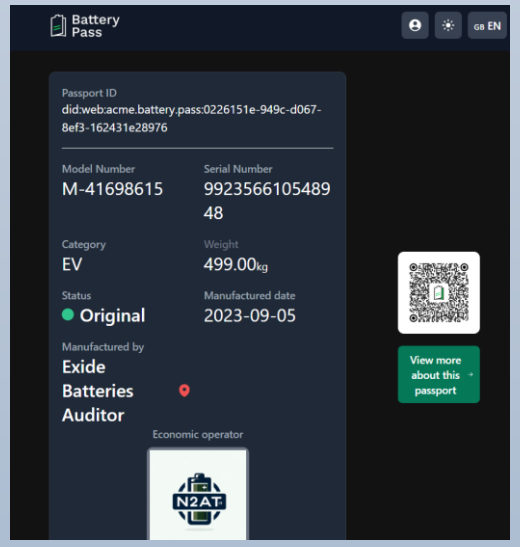


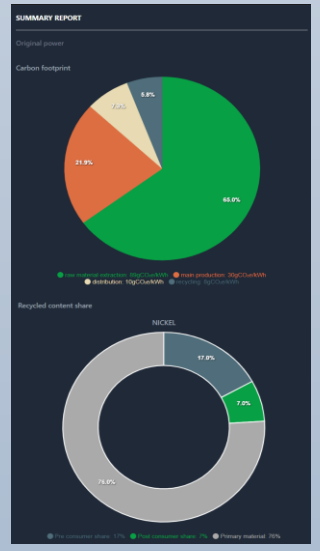
Source: CIRPASS consortium

Battery Passport – standardization work

The requirement of battery passport data attributes (from the battery pass consortium) was recently standardized (DIN DKE SPEC 99100)

Battery Pass Demo





https://thebatterypass.io/

Static Data

Identifier and product data

- Battery passport identifier (recommended)
- Battery identifier
- Operator identifier and information (recommended)
- Manufacturer identifier and information
- Manufacturing place
- Manufacturing date
- Date of putting battery into service (where appropriate)
- Warranty period of the battery
- Battery category
- Battery mass
- Battery status

Symbols, labels and documentation of conformity

- Separate collection symbol
- Symbols for cadmium and lead
- Carbon footprint label
- Extinguishing agent category
- Meaning of labels and symbols
- EU declaration of conformity
- Results of test reports proving compliance

Battery carbon footprint

- Battery carbon footprint per Functional Unit
- Contribution of raw material acquisition and pre-processing lifecycle stage
- Contribution of main product production / manufacturing lifecycle stage
- Contribution of distribution lifecycle stage
- Contribution of end of life and recycling lifecycle stage
- Carbon footprint performance class
- Web link to public carbon footprint study
- General battery and manufacturer information
- Absolute battery carbon footprint (recommended)

Supply chain due diligence

- Information of due diligence report
- Third-party assurances of recognised schemes (recommended)
- Supply chain indices (recommended)

Battery materials and composition

- Battery chemistry
- Critical raw materials
- Materials used in cathode, anode and electrolyte
- Hazardous substances
- Impact of substances on environment, human health, safety, persons

Circularity and resource efficiency

Circularity information

- Dismantling information: Manuals for the removal and the disassembly of the battery pack
- Part numbers for components
- Postal address of sources for spare parts
- E-mail address of sources for spare parts
- Web address of sources for spare parts
- Safety measures

Recycled & renewable content

- Pre-consumer recycled content share of Ni/ Co/ Li/ Pb
- Post-consumer recycled content share of Ni/ Co/ Li/ Pb
- Renewable content share

Role of end-user in waste prevention and collection

- Information on the role of end-users in contributing to waste prevention
- Information on the role of end-users in contributing to separate collection of waste batteries
- Information on the separate collection, the take back, collection points and preparation for re-use, preparation for repurposing and treatment available for waste batteries

Source: Battery Pass consortium

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Battery Passport – standardization work

Battery Passport Data: Regulation & Standardization as a base

Data categories for the battery passport[1] (select data attributes shown below)
Various data points are not defined in detail or still being specified through delegated acts and standardization efforts

Battery Pass ready

Battery ID: 0101010
Battery passport ID: 1111010
Responsible economic operator

Identifiers & product info
- Manufacturing info (identity, place, date)
- Battery category
- Battery identifiers (e.g., model, EO, facility)
- Battery & DPP status

Labels and conformity
- Symbols and labels
- Meaning of labels & symbols
- Declaration of conformity
- Compliance of test results

Carbon footprint
- Carbon footprint (5 metrics)
- Weblink to CF study
- CF performance class

Supply chain due diligence
- Due diligence report

Materials & composition
- Hazardous substances
- Battery chemistry
- Critical raw materials
- Materials used in cathode, anode, electrolyte

Circularity & resource efficiency
- Recycled content shares
- Manuals for removal, disassembly, dismantling
- Component part numbers & spare parts information
- Safety measures/instructions

Performance & durability
- Capacity, energy, power, SoH
- Expected lifetime
- Negative events

Battery Pass ready | 4 | [1] BatteryPass-Ready; https://thebatterypass.eu/; DIN DKE SPEC 99100

Source: Battery Pass ready presentation in DPP4EU (2026)

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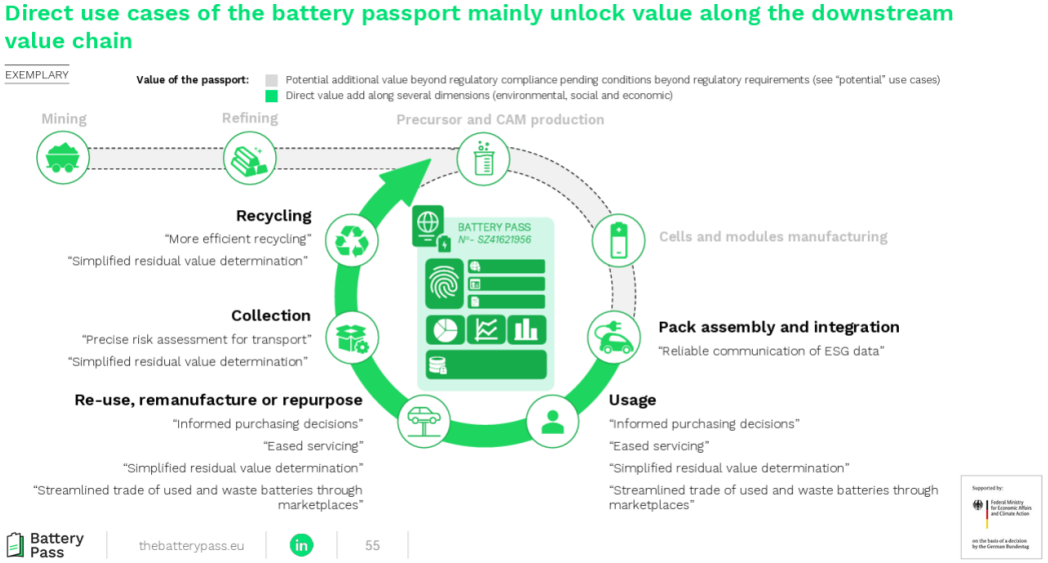
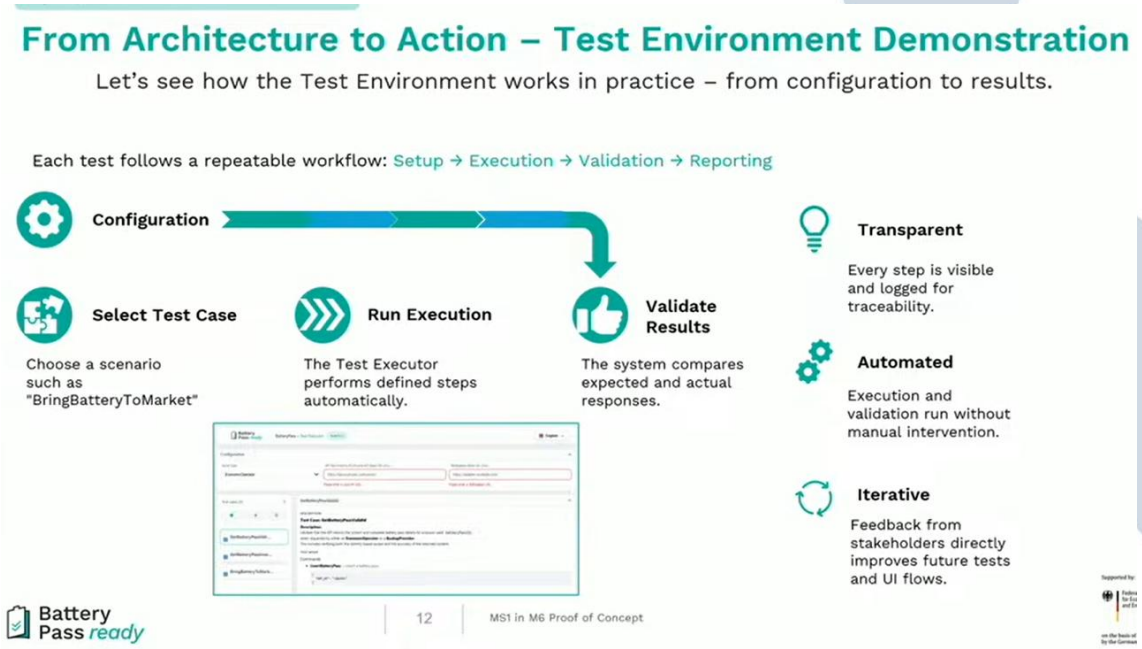
DPP Prototypes – Batteries



Source: Battery Pass consortium



Test environment to be online this month (June 2026)

Source: Battery Pass ready consortium

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DPP prototypes – Textiles

Open questions on level of granularity

Model-level DPP

- Easier for SMEs and existing ERP/product data
- Useful for pre-purchase/e-commerce information
- Limited for traceability, recalls, repair, resale, recycling

Batch-level DPP

- Better link to suppliers, facilities, materials and ESG data
- Enables more targeted audits/recalls
- Key issue: what exactly is a “batch” in fragmented textile supply chains?

Item-level DPP

- Strongest option for circular use cases: repair, resale, reuse, recycling
- Enables lifecycle updates after the product is sold
- Main barriers: cost, infrastructure, data management, SME readiness

Source: Cirpass2

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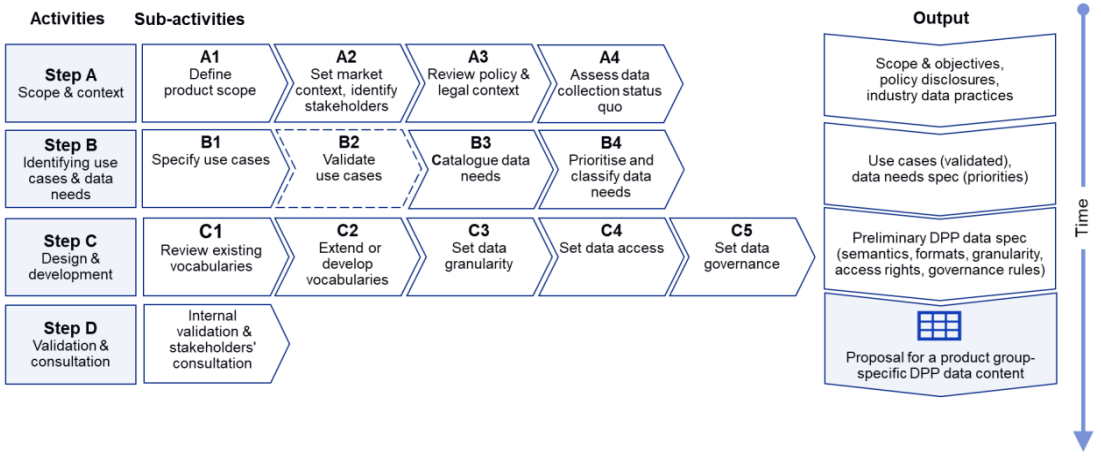
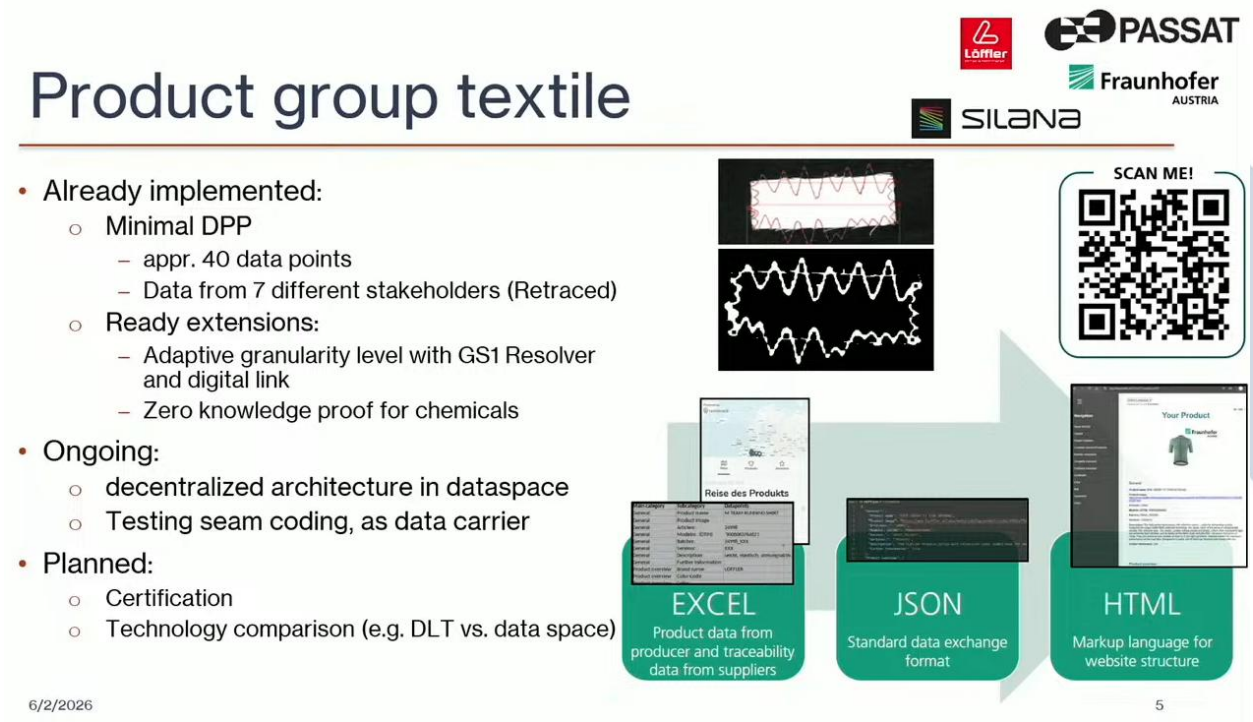
DPP prototypes – Textiles

Demonstrator by PASSAT project

No delegated act yet, but JRC published a draft study on DPP content for textile apparel products



Source: Chawla et al., (2026)



Source: A. Herbst (2026)

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