



WEBINAR

THE PSS-PASS BRIDGE

UNIFYING MANUFACTURING DATA FOR A CIRCULAR FUTURE

30 June 2026 – 11:00–12:00 CEST



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11:00 am | Opening: The PSS–Pass vision

Speakers: Ana Teresa Correia, ATB

11:05 am | Defining the DPSSP: The Methodological Framework

Speakers: Luca Carminati, University of Bergamo

11:10 am | The Home Journey: Customised Maintenance

Speakers: Erika Menosso, Electrolux & Marta Calderaro, Engineering Group

11:20 am | The Fashion Journey: The Transparency Bridge

Speakers: Delia Ibañez, Desigual & Marina Isasa Sarraalde, Tecnalia

11:30 am | The Industrial Journey: Market stability

Speakers: Ronald Möhring, OAS & Giovanni Di Orio, UNPARALLEL

11:40 am | Cross–stakeholder Q&A and Closing Remarks

Speakers: George Alexandris, The Circular Economy Foundation & Carolina Vilaça, F6S



Opening: The PSS-Pass vision

Transforming products into sustainable services via the DPSSP



Ana Correia

Dipl-Ing at ATB-Bremen

About the project



- 36-month EU funded project
- Product Service System Passport
- 11 Partners
- 3 Pilots



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& TECHNOLOGY ALLIANCE



AKTIENGESELLSCHAFT



What is PSS-Pass main objective?

Advancing **sustainable manufacturing** by integrating products and services into **Product Service Systems (PSS)**. It employs digital tools to create comprehensive 'passports' that track a product's lifecycle, **detailing its origins, components, and environmental impact.**

- **DPP** is coming in place as a binding instrument to contribute to a circular economy
- Industrial companies aim to **extend their products with services** within the concept of **Product Service System (PSS)**
- The extension of the DPP towards a **Digital Product Service System Passport (DPSSP)**



Enabling the transition from product-centric value chains to **service-centric ecosystems**, where Digital Product Passports evolve into DPSSP.

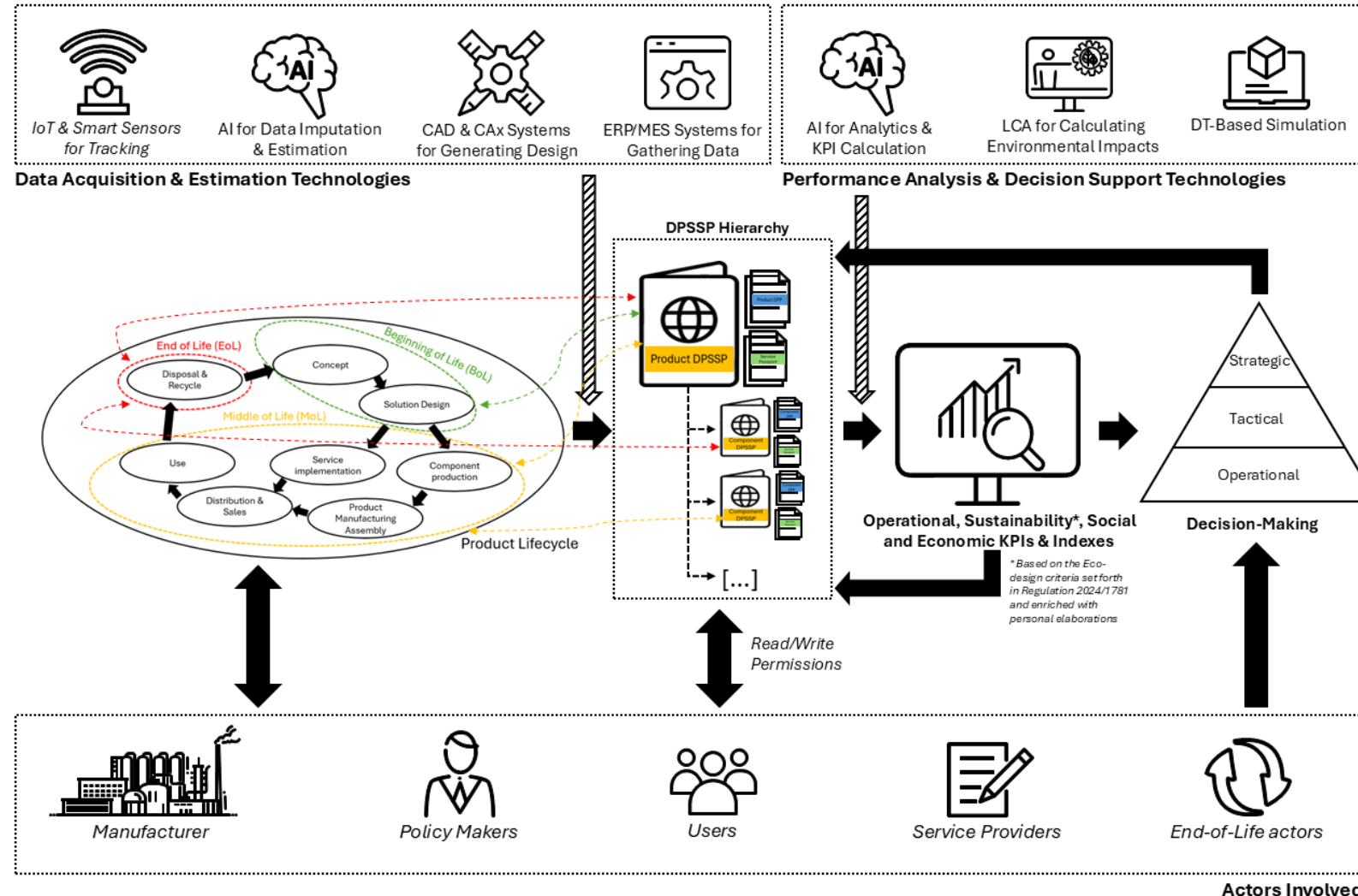
How can a DPP be effectively extended to a Digital Product Service System Passport (DPSSP), and how will this improve the circularity of the manufacturing industry?

Developing a Digital Product Service System Passport (DPSSP) enables a **digital record for tracking and optimising the circularity of products and services.**

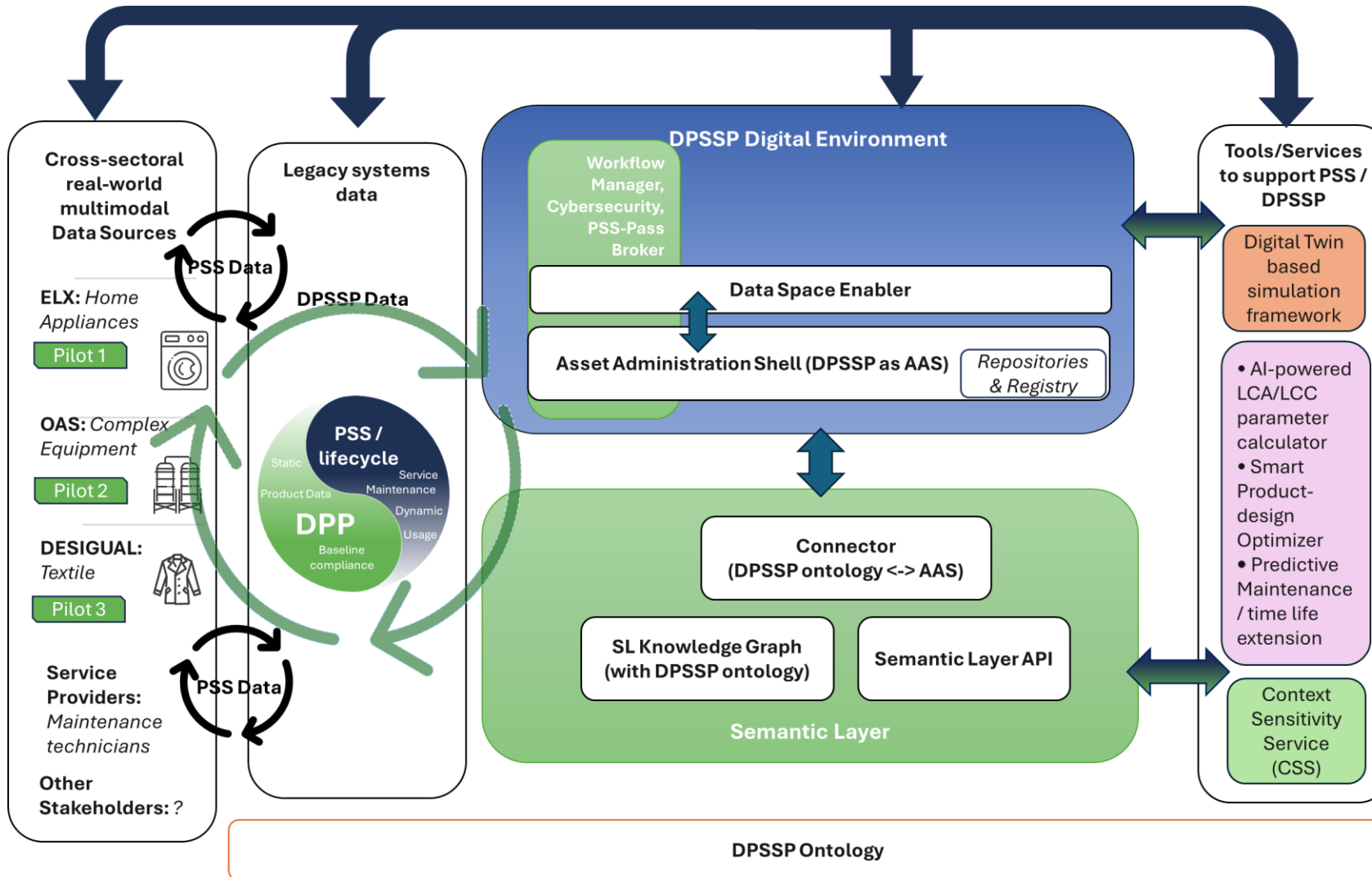
By leveraging Machine Learning, Digital Twin simulation, and Semantic interoperability mechanisms we aim to improve **decision-making**, increase **transparency**, support **eco-conscious choices**, and advance a **circular economy**.



How we have solved the challenge: PSS-Pass Conceptual Framework



How we have solved the challenge: PSS-Pass conceptual architecture



PSS-Pass is pilot driven



Home Appliances (Electrolux)

Turn products into services like triggering repairs before the customer even notices a problem.

- Extended warranty
- New software functionality
- Tailored Refurbishment



Textile (Desigual)

Sustainability made simple via traceability and raw supply chain aggregated data.

- Sustainable design
- Informed Consumer
- Beyond EOL



Complex Equipment (OAS)

Monitor a 30-year lifecycle, ensuring equipment never fails unexpectedly.

- Predictive Maintenance
- Product Carbon Footprint
- Equipment Reconfiguration



Thank you!



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Defining the DPSSP: The Methodological Framework

How the DPSSP framework creates value for both the factory and the consumer



Luca Carminati

University of Bergamo

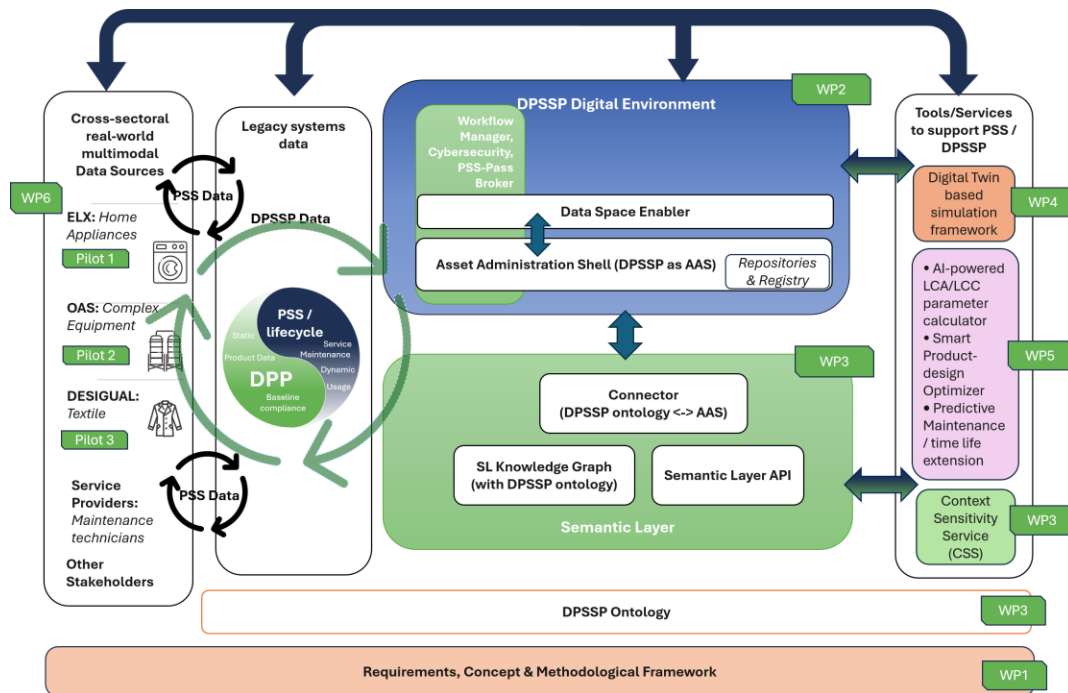


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From PSS-Pass Concept to PSS-Pass Methodological Framework

PSS-Pass concept made by ATB



The **methodological framework** outlines the pathway for translating the **DPSSP concept** into practice.

Phase Group A1: PSS Scenario Definition & Stakeholder Ecosystem

Phase Group A2: DPSSP Hierarchy Structure Definition

Phase Group A3: Data, Indicators, Actors & Technologies

Phase Group A4: Data Content and Semantics

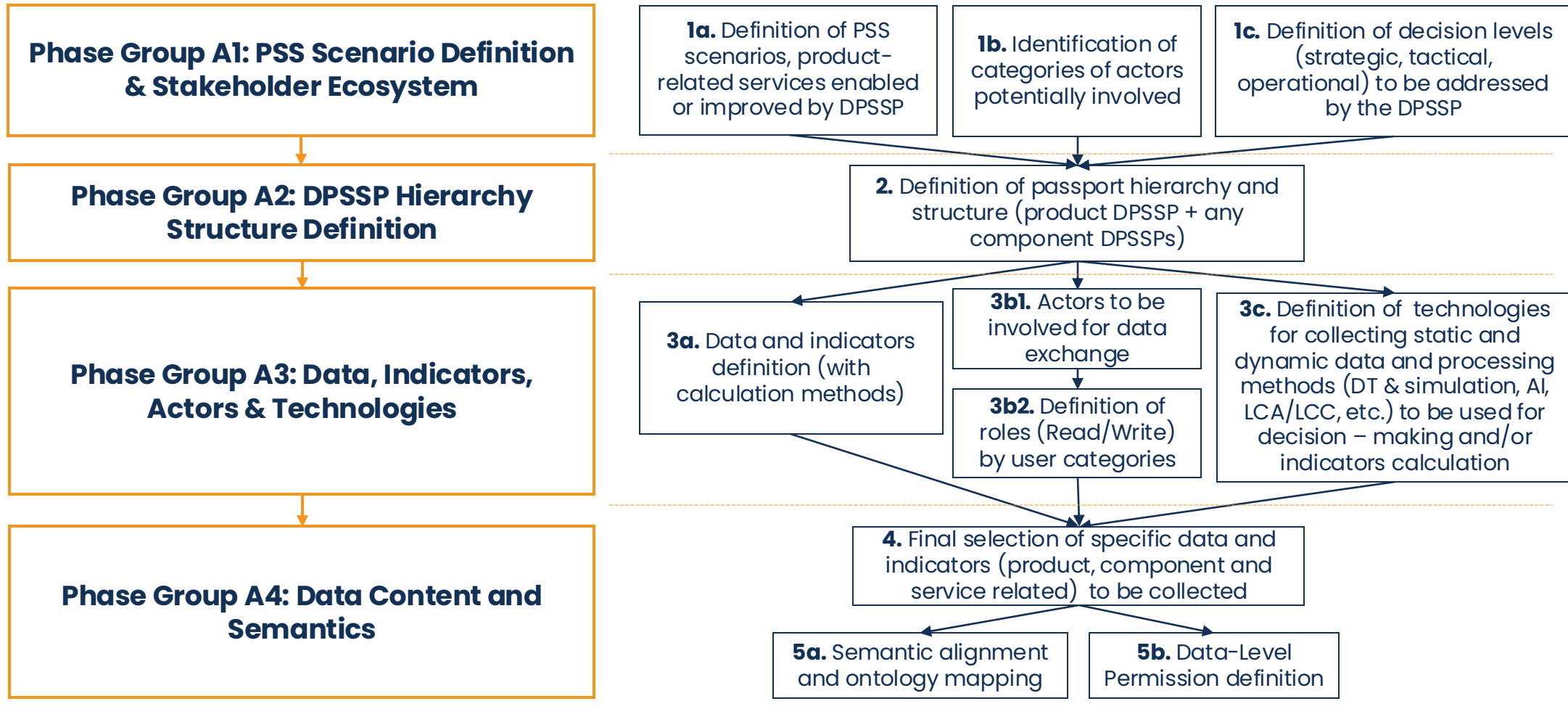
A. DPSSP DESIGN

B. DPSSP UTILIZATION

Phase Group B1: Integration, Execution and Decision Support

PSS-Pass Methodological Framework

For ex., for the **DPSSP DESIGN**



Main advantages of the PSS–Pass Methodological Framework:

- Focus on providing a **clear step-by-step procedure** for introducing and exploiting the **business value of the DPSSP** by companies
- Supporting tools:
 - **list of Product–Service Systems** → to support companies in innovating their business portfolio with product-related services
 - **Digital Product Service System Evaluation Assessment matrix** → to define the hierarchical structure of the DPSSP
 - list of **indicators and data re-elaborated from ESPR** → to define the DPSSP data that are necessary (avoiding too many data)
- Clear role of PSS–Pass technological components
- Applicable in **different contexts**



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The Home Journey: Customised Maintenance

The PSS-Pass Home
Appliances Pilot



Erika Menosso

Electrolux



Marta Calderaro

Engineering Group



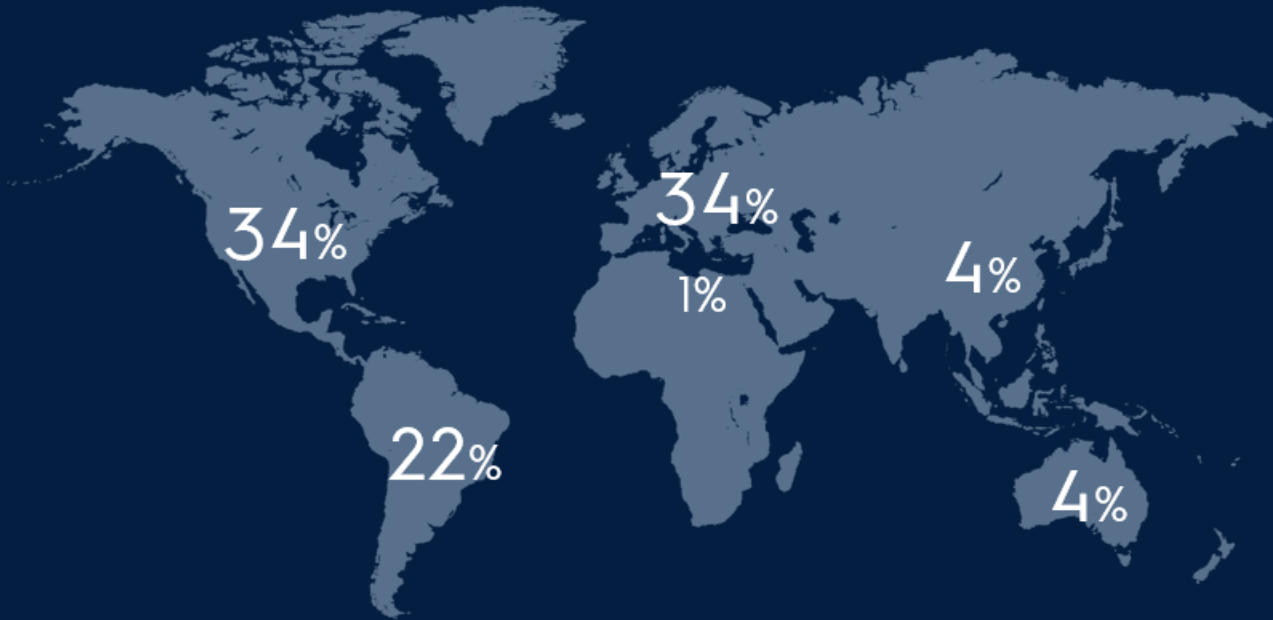
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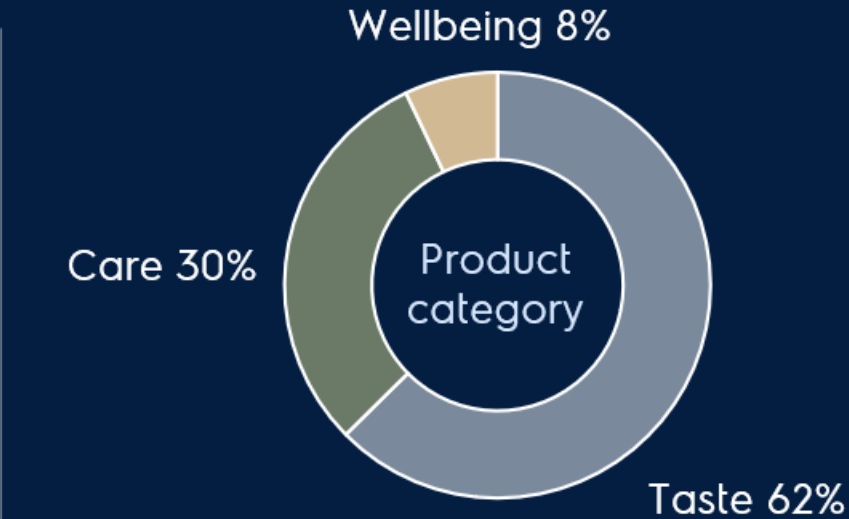


Electrolux Group

Sales by region 2025



Product category classification 2025



Key Indicators 2025

131 bn
Revenue SEK (2025)

120
markets reached

39,000
employees

Main Brands 2025

 **Electrolux** **AEG** **FRIGIDAIRE**

Electrolux Product Examples



Electrolux Business and Technology Challenges in relation to PSS-Pass

Business Challenge 1

- Definition of a new user experience for white goods (Products) and related Accessories, Consumables, and Services (**PACS**) based on two strategic drivers: **Digitalization and Sustainability**

Business Challenge 2

- From manufacturing-centric supply chain to extended partnership portfolio able to support entire **PACS ecosystem**

Business Challenge 3

- **Circular economy** business models activation and barriers identification

Technology Challenge 1

- **Integration** of DPP and PSS (DPSSP) preserving business targets of each value chain actor (**data governance**)

Technology Challenge 2

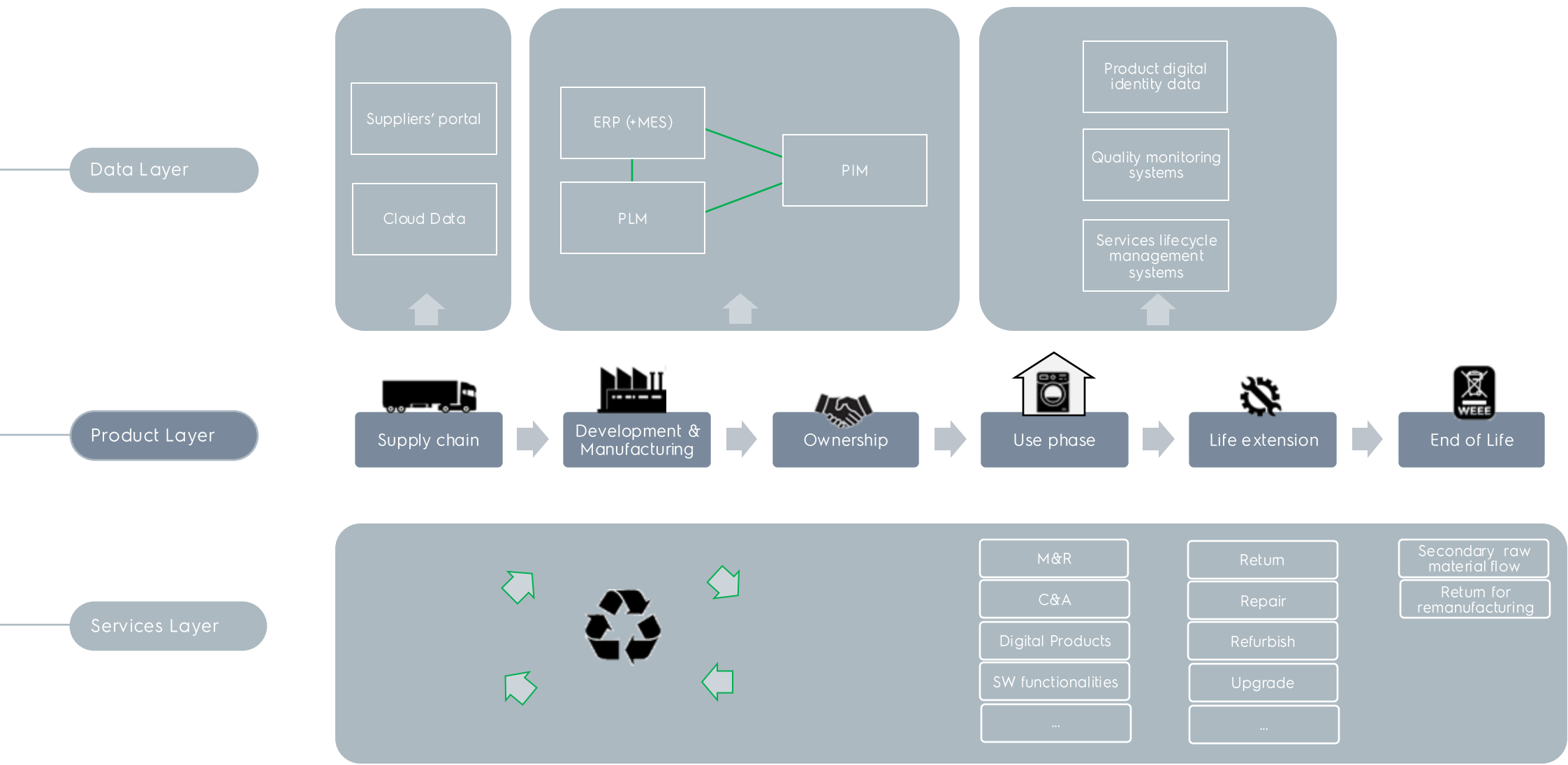
- A lifecycle-oriented solutions granting (**data interoperability**) across the entire (extended) value chain and a sustainable **data granularity level**

Technology Challenge 3

- **Assessment** of circular business models such as maintenance and repair, refurbishment programs, and services aimed at extending product lifetimes

From Product journey to PACS ecosystem

Simplified overview



Scenarios and User Stories

Scenario 1

► **Extended warranty**

- Providing maintenance services and repairs for warranty extension (customized experience)

User Story DTF1 Impact Estimation

- **I want to...** estimate the impact of new and existing PSSs based on different usage scenarios and business models **so that...** I can optimize the product design and business model to MINIMIZE ENVIRONMENTAL IMPACT

Scenario 2

► **New software functionality**

- Extending the lifespan of the product via Software functionality download

User Story DTF3 Maintenance evaluation

- **I want to...** test the impacts of different MAINTENANCE ACTIVITIES (remote, on site, self) and approaches (i.e. predictive) **so that...** I can set business targets and estimate cash-flow and costs savings

Scenario 3

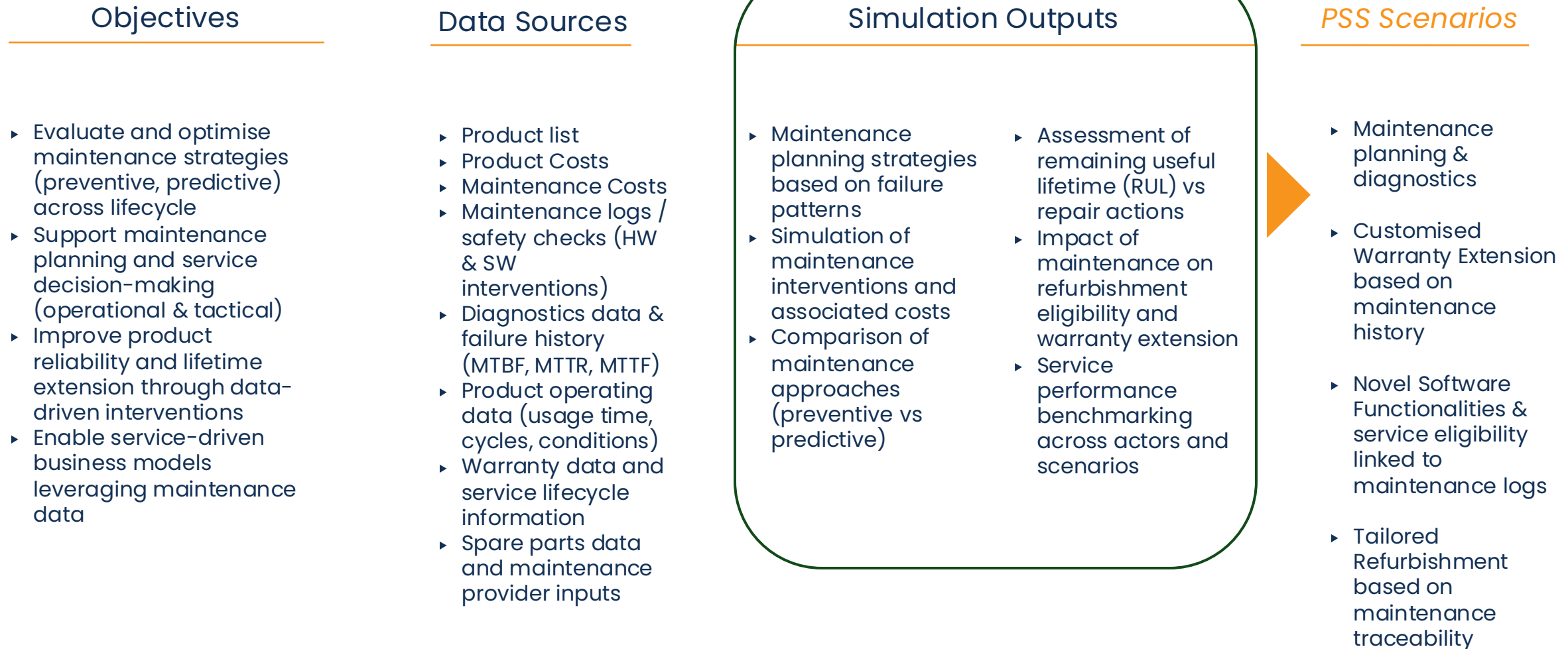
► **Tailored Refurbishment**

- Providing of a reduced refurbishment service to only product that are under Electrolux authorised maintenance programs

User Stories	ID	Actors	LC	Dec. proc.	Pilot
PSS Impact Estimation	DTF 1	PSS Manufacturer	ALL	Strategical	 
DTF1 exploits lifecycle data to simulate PSS changes e.g. costs, risks, returns of warranty, software, refurbishment (ELX), and reconfiguration strategies (OAS).					
PSS Usage Modeling	DTF 2	Customer	MoL	Operational	
DTF2 focuses on transforming real operational data into product- / system-level insights, to support optimisation and impact assessment (OAS).					
Maintenance approaches evaluation	DTF 3	Service provider, PSS manufacturer	MoL	Operational & Tactical	 
DTF3 leverages diagnostics, predictive maintenance, and failure-driven analysis to support maintenance planning (ELX, OAS), refurbishment (ELX) or reconfiguration actions (OAS).					

Maintenance Approaches Evaluation

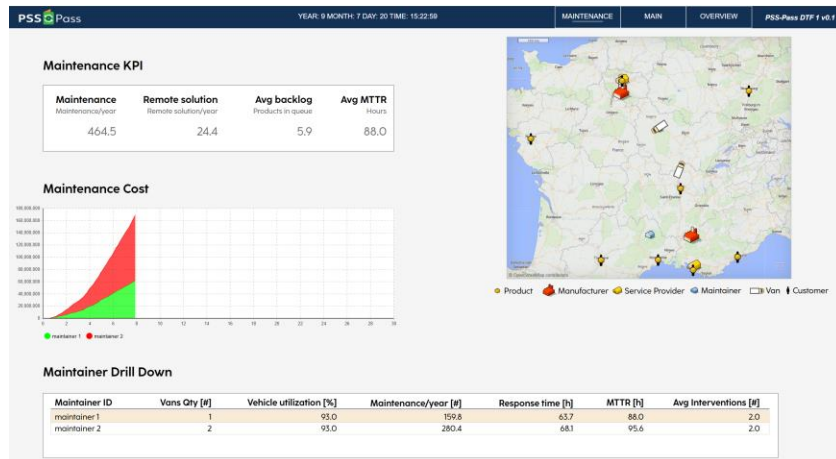
DTF3 Model tailored to Electrolux PSSs



A scalable & replicable solution

A DT-based simulation framework already demonstrated in two different sectors

ELX DTF3 Model



Domain-agnostic simulation methods & tools developed to be representative of the dynamic behaviour of PSS lifecycle and impacts

Modular, interoperable architecture enabling seamless scaling from single assets to full value chains

Standardised models & data (AAS-based) ensuring consistency, comparability, and cross-sector adoption

Reusable libraries & multi-agent simulation allowing fast replication across use cases and industries

DPSSP as a single source of truth guaranteeing traceable, transferable, and lifecycle-consistent insights



Thank you!



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The Fashion Journey: The Transparency Bridge

The PSS-Pass Textile
Industry Pilot



Delia Ibañez

Desigual



Marina Isasa Sarralde

Tecnalia



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Desigual

We were born in

1984.

In Barcelona

6.

Product categories:

Woman, Man, Kids, Sport, Accessories, Shoes

+215.

Stores.

10.

distribution channels

Retail Season, Retail Outlet, Franchises, D-Shops, Flash Sales, Desigual.com, E-Tailers, Department Stores, Wholesale, Travel Retail

3.

Logistics centers

one in Barcelona, Viladecans; one in EEUUU, in New Jersey; and one in Hong-Kong

Present in

107.

Countries

Around

2,300.

employees.

Goals for 2025

This plan is continuing to move forward with medium-term goals:



100% more sustainable cotton

All our cotton now comes from sustainable origins: organic, recycled, Better Cotton



Artificial cellulose fibres

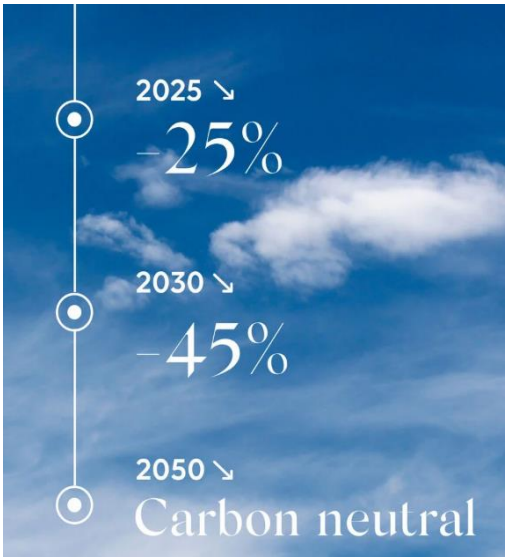
100% derived from renewable wood through responsible production (Viscose, Modal, Lyocell, Acetate...)



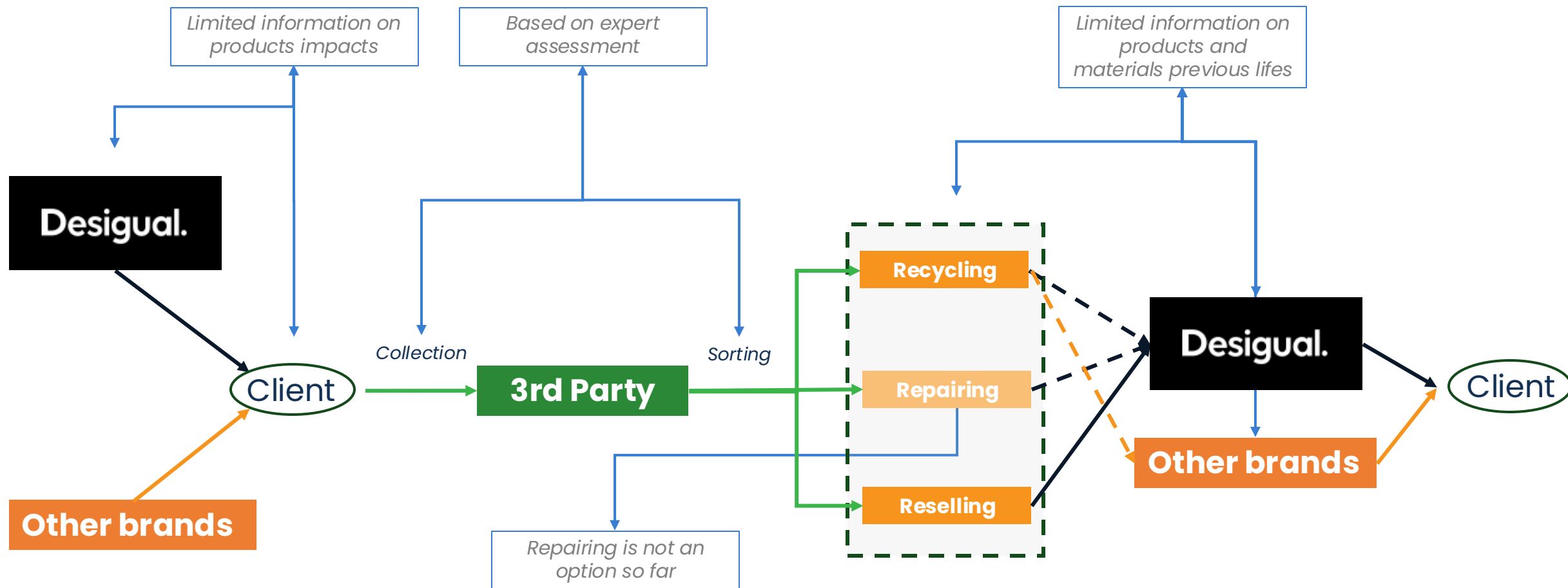
Increased recycled fibres

Boost the percentage of recycled polyester, cotton, wool, or polyamide

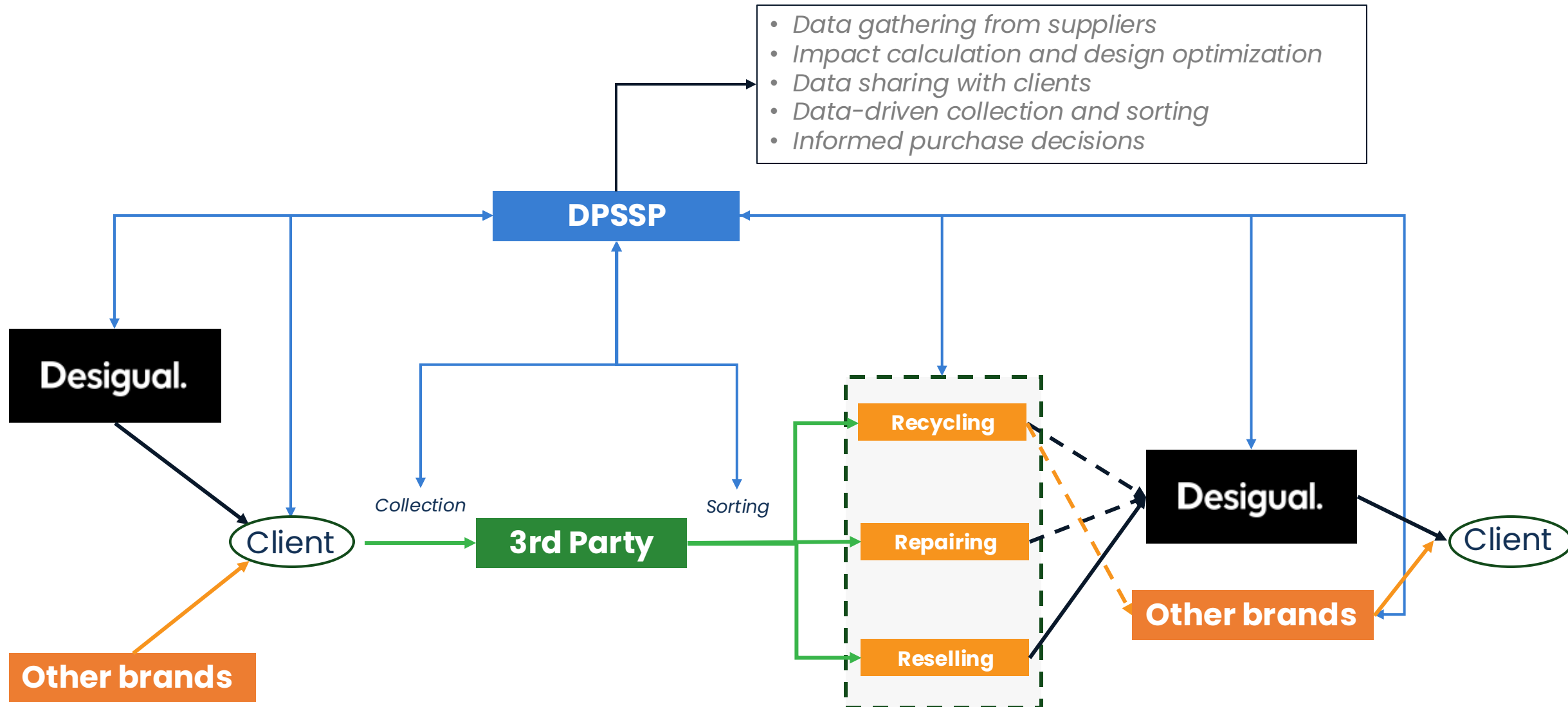
PSS  Pass



Desigual Take Back Program



Desigual Take Back Program



AI-based impact calculation and design optimization

Product	Material 1	% Material 1	Origin Mat.1	Dying	...
A	Cotton	50%	China	No	...
B	Nylon	75%	Myanmar	Yes	...
...	...	...	...	...	...

Option	Material 1	% Material 1	Origin Mat.1	Dying	...
T-Shirt 1	Cotton	50%	China	No	...
T-Shirt 2	Nylon	75%	Myanmar	Yes	...
...	...	...	...	...	...

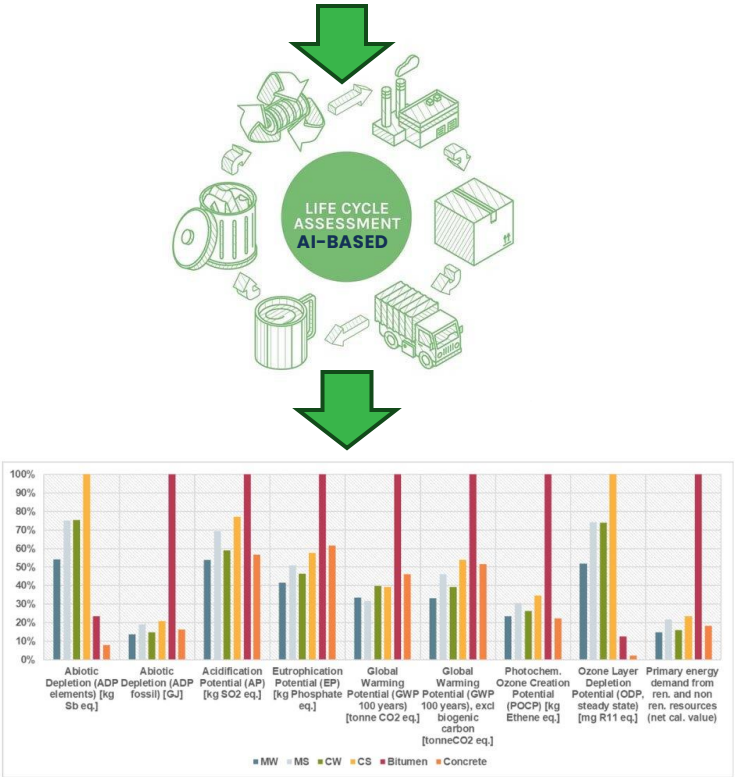


Figure 8: Cradle to grave environmental impacts for each roof design



Material 1	% Material 1	Origin Mat.1	Dying	...
Nylon		Myanmar	Yes	...
Polyester		India	No	...
....		Vietnam		...
				...

1. The DPSSP will contribute to increase transparency and trust among stakeholders.
2. It will boost the overall sustainability of Desigual garments.
3. It will also contribute to increment circularity and resource efficiency.
4. It will contribute to boost the perception of Desigual as a trustworthy and sustainability-committed brand.



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The Industrial Journey: Market Stability

The PSS-Pass Complex Equipment Pilot



Ronald Möhring

OAS AG



Giovanni Di Orio

UNPARALLEL



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The Problem



A Broken Product Lifecycle – Industrial value is lost when product history stops moving

In complex machinery, the product can live for decades, but resale, reuse and service decisions often lack trusted lifecycle evidence.

Factory Data Stays Inside

Product records are siloed, incomplete, or simply disappear after sale

End-User Lack Guidance

Operators and downstream owners need clear maintenance, repair and recovery instructions

Markets Lack Proof

Recycling and resale markets need authenticated histories and interoperable product data

Market stability problem when data stops moving: price uncertainty, fraud risk, and illiquid second-life markets.

EU Regulatory Landscape

The Ecodesign for Sustainable Products Regulation (ESPR 2024/1781) is already law. It makes DPPs mandatory across major product categories

Coverage is expanding rapidly: electronics, textiles, and industrial machinery are all in scope



Non-compliance risks loss of market access across the entire European Union



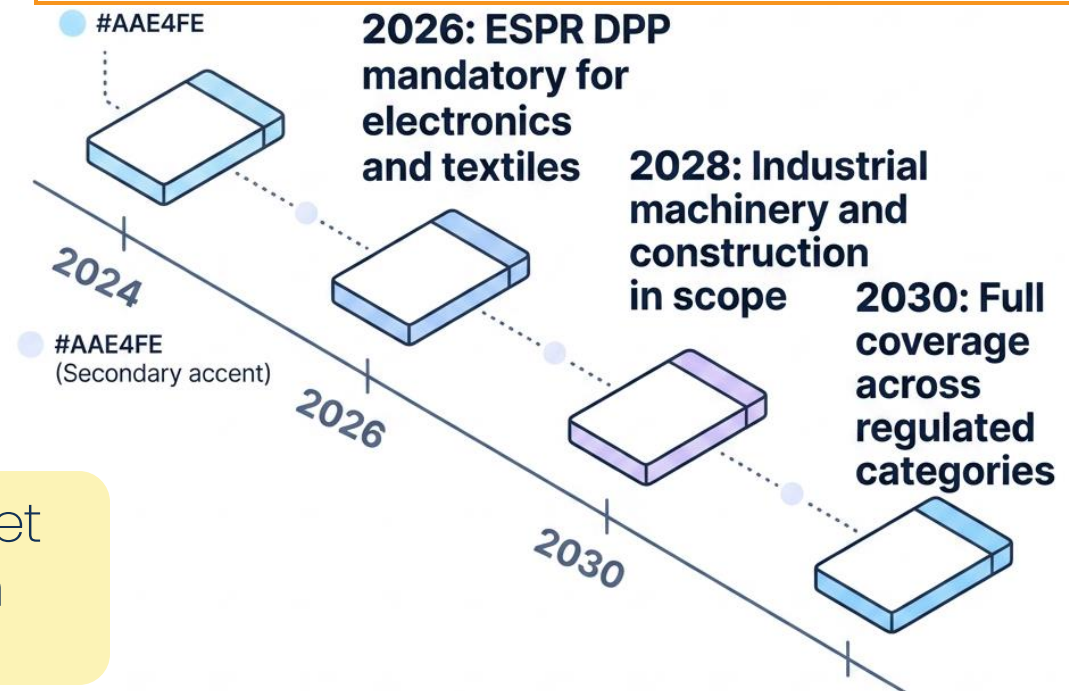
Complex equipment providers can shape trusted service, reuse and second-life ecosystems



Early movers gain competitive advantage in resale markets.

2024: EU Battery Regulation active

Battery Regulation already requires DPPs for EV and industrial batteries



DPPs Mandated but Insufficient

A **Digital Product Passport** (DPP) is a structured digital record – mandated by EU ESPR – tracking a product's origin, materials, certifications, and end-of-life instructions across its lifecycle. But today's DPPs have critical gaps:

Static Snapshots

Data captured at manufacture can miss repairs, upgrades, usage context and end-of-life events.

Service Data Blindspot

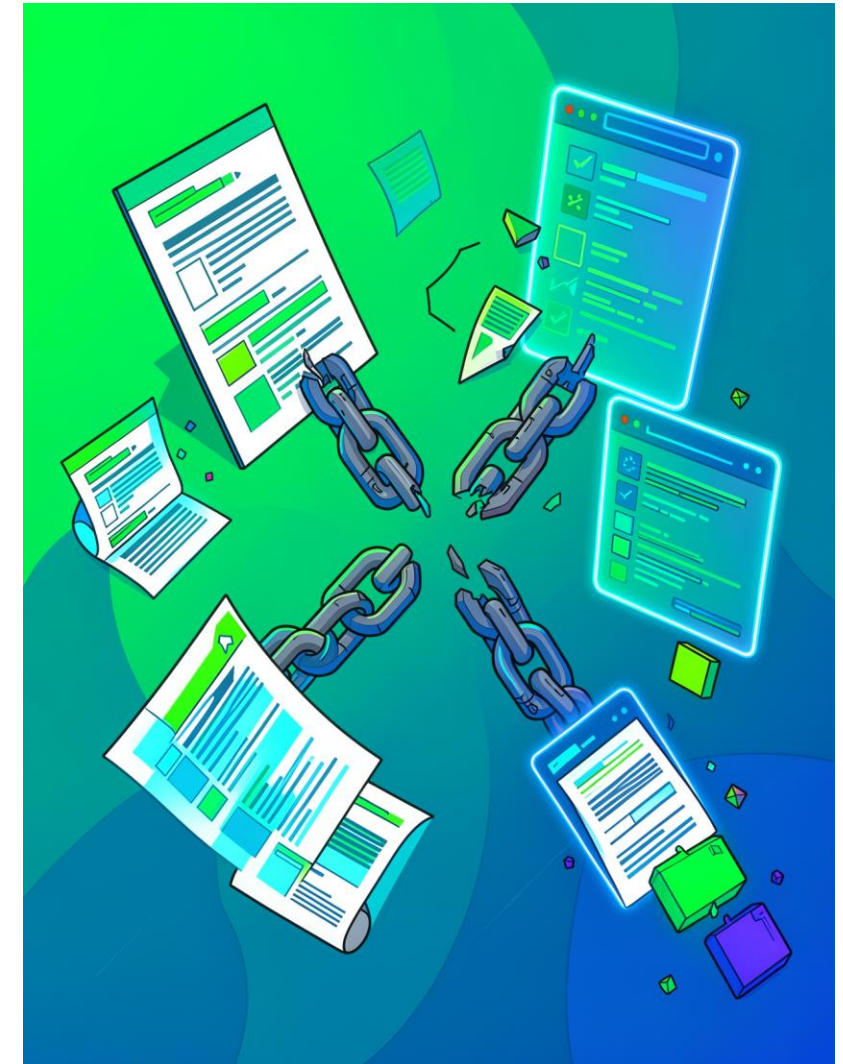
Maintenance records, repair histories, and performance metrics – the most valuable resale data – are excluded entirely

Fragmented Architecture / Broken chain

Although the DPP defines the information to be shared, lifecycle data remains distributed across manufacturers, operators, and service providers

Sovereignty Concerns

Industry will not share sensitive factory data to protect factory IP unless access, purpose and policy remain under control



From static product record to shared machinery lifecycle evidence

Transitioning from “**As-designed**” static data to “**As-maintained**” lifecycle-aware intelligence that serves every market stakeholder

Today's DPP



- Product data only – static snapshot at manufacture
- Single-owner information model
- Limited service visibility
- No authenticated market histories

DPSSP



- Product + Service + Live lifecycle data
- Event-driven, continuously updated
- Multi-stakeholder, federated model
- Compliance + business value + circular decisions
- Authenticated market-ready asset histories



DPSSP captures service lifecycle integration, dynamic real-time data, and circular enablement

Introducing PSS-Pass – The Digital Bridge



The DPSSP Digital Environment within PSS-Pass is the implementation layer that makes DPSSP **real, protected, and actionable** – connecting factory data directly to end-users and second-life market

i The bridge creates a dual-journey: better lifecycle decisions for users, greater market stability for resale and reuse (second-life markets)

Manufacturer

Factory data captured, encrypted, and stored securely in the DPSSP environment



DPSSP Vault

Protected, standardized digital environment ensures data integrity and compliance



DPSSP Bridge

Authenticated product data delivered precisely to those who need it



End-User & Resale

Consumers and secondary markets receive verified, trusted product histories

The DPSSP Digital Environment – Architecture Overview

Built on the **Asset Administration Shell (AAS) standard (IEC63278)** – the standard backbone for industrial asset data. Cloud-native, containerized microservices supporting on-premise, cloud, hybrid, and third-party deployments



API Gateway & IAM

Single controlled entry point with authentication, role-based access, and cryptographic verification.



Repository & Package Archive

Live queryable store of current DPSSP state plus long-term AASX archive for full auditability.



Workflow Manager & Broker

Orchestrates multi-step processes; captures lifecycle events from IoT, PLCs, and ERP systems.



Resolver & DPSSP IDE

Maps product identifiers to DPSSP endpoints; design workspace for AAS passport validation.



The key concern of every manufacturer: "If I share data, I lose control." DPSSP solves this with five architectural guarantees.

1

Decentralized Sovereign Deployment

Each manufacturer operates its own environment – no central database owns your data.

2

Role-based Access Control (RBAC)

Only authorized actors – by identity and role – see what they are entitled to view.

3

Data Space Protocol (DSP) TRUE Connector

Machine-enforceable contracts govern every exchange before any data is transferred

4

Immutable Lifecycle Events Encrypted Channels

Full audit trail preserved. TLS/mTLS on all channels. Security events logged forensic traceability.

Standardized data for resale market



DPSSP structures factory data into interoperable submodels built on **IDTA-published AAS templates** – giving resale markets authenticated, trusted data they can act on.

OAS AAS Submodel Stack

Submodel	What it capture	Value for resale
Digital Nameplate	Unique ID, manufacturer, identifiers	Authenticity and product identity
Technical Data	Functional characteristics, specs	Verified capability for reuse and reconfiguration
Handover documentation	Use, repair and operational documentation	Reduces buyer and recycler uncertainty
Bill of Materials (BoM)	Component hierarchy, supplier references	Component-level repair and recovery decisions
Carbon footprint	Environmental metrics, full lifecycle	ESG and regulated circularity evidence
Predictive Maintenance	Maintenance, alarms, reconfiguration and usage events	Service evidence strengthens machinery second-life trust and operator end-user lifecycle decision process
Maintenance Instructions	Maintenance intervals, required technicians, tools, consumables, and detailed step-by-step instructions	
Service Request Notification	triggering corrective maintenance, inspections, and repairs. It categorizes maintenance tasks based on IEC standards	



A resale buyer sees not just what the machine is – but what it has lived through.
Authenticated and immutable

The Dual-Value Journey

The DPSSP acts as the digital bridge connecting manufacturers to machinery market (end-users, operators, etc) – delivering authenticated value at every stage of the product lifecycle.

For Industry	For Operators/Consumers
Authenticated histories reduce uncertainty in resale and second-life markets	Digital disassembly and recycling instructions at end-of-life
OEM data protected – Only market-relevant data shared	Exact material and component transparency supports repair and recovery choices
Fraud and counterfeit risk in second-life markets become easier to challenge	Optimized material recovery based on actual product state
Unlock data-as-a-service revenue for certified refurbishers	Verified product provenance builds trust in what to repair, reuse, resell or recycle

Proving Long-Term Value of Industrial Assets

Certified service records command higher resale prices – authenticated maintenance history removes buyer uncertainty and reduces price negotiation friction.

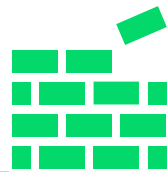
Documented second-life eligibility extends asset ROI – DPSSP evidence unlocks certified refurbishment programs and second-life market access.

Authenticated histories create market liquidity – when buyers trust the data, secondary markets move faster and at higher volume.

**CERTIFIED
DATA**



TRUST



Creates/
Increases

LIQUIDITY



MARKET

€4.5T

Circular Economy by 2030

Projected global value of the circular economy –
the market DPSSP and PSS-Pass unlocks



Why Act Now

1

Mandates Are Approaching

EU DPP requirements begin in 2026. Early movers define the standards others will follow

2

Markets Are Growing Fast

The Circular Economy is projected to reach 4,5T by 2030. Authenticated data is the entry ticket.

3

Competitors will be Locked Out

Without verified product data, access to the EU regulated market will be denied.

4

Modular & Scalable

Starts with one product line – no massive overhaul required.





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Cross-stakeholder Q&A and Closing Remarks



George Alexandris

The Circular Economy
Foundation



Carolina Vilaça

F6S



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