



Digital Product Passport Training of Trainers- Day 1

By
Dr. Fahim Chowdhury

ToT Day-1 Session-1: Introduction to DPP

- Digital Product Passport (DPP) and regulatory framework
- Pre-awareness assessment

Textile and Clothing Exports from Pakistan to EU

The textile and clothing trade between the European Union (EU) and Pakistan is a vital part of their bilateral economic relationship.

From 2019 to 2023 Pakistan solidified its position as a significant supplier of textiles and garments to the EU market




Pakistan's Textile and Clothing Exports to the EU27: A Multi-Billion Dollar Industry

In 2023, Pakistan exported textiles and clothing worth \$6.23 billion to the EU27.

The largest categories driving these exports included: home textile (\$2.06 billion) , Knitted Garments (\$1.66 billion), Woven Garments (\$1.63 billion)

These categories collectively highlight Pakistan's diverse and robust textile industry.

EU Market and Environmental Impact in Textile Industry

-  The global textile market size was valued at **US\$ 995 Billion** in 2022
-  Projected to reach **US\$ 1,440 Billion** by 2032, growing at a **Compound Annual Growth Rate (CAGR) of 3.77%**
-  Apparel import of EU in 2022 was **191.4 billion**



EU Push for Circular Economy

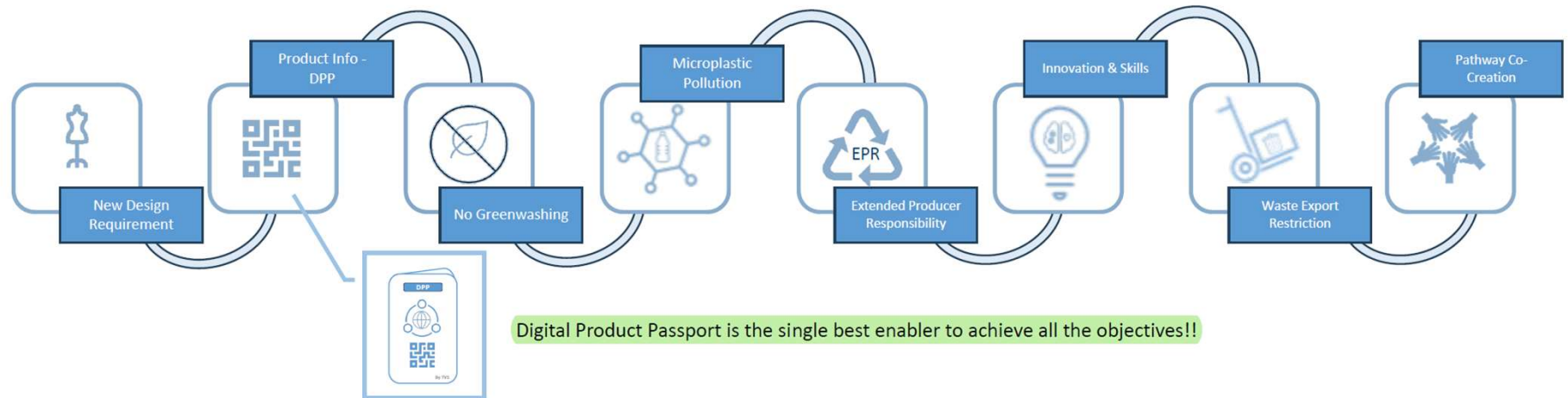
European consumption of textiles has the fourth highest impact on the environment and climate change, after food, housing and mobility. It is the third sector for higher use of water and land use, and fifth for the use of primary raw materials and greenhouse gas emissions.

The negative impacts on resources, water, energy consumption, and the climate continue to grow. The need to address the production and consumption of textiles is now more urgent than ever before.

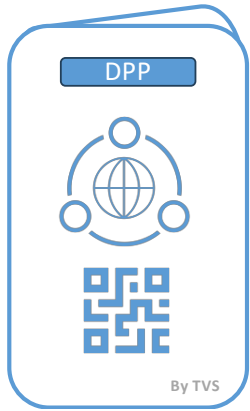
The EU Strategy for Sustainable and Circular Textiles presents a new approach, to mitigate the environmental issues in a harmonised manner. The Strategy implements commitments made under the European Green Deal, the new Circular Economy Action Plan and the Industrial Strategy, aims to create a greener, more competitive and more modern sector, more resistant to global shocks.



EU's actions to mitigate the environmental impact of the textile industry, promoting sustainability throughout the product lifecycle.



Digital Product Passport



What?

A framework/tool that tracks information across a product's lifecycle in the area of sustainability, circularity and legal compliance.

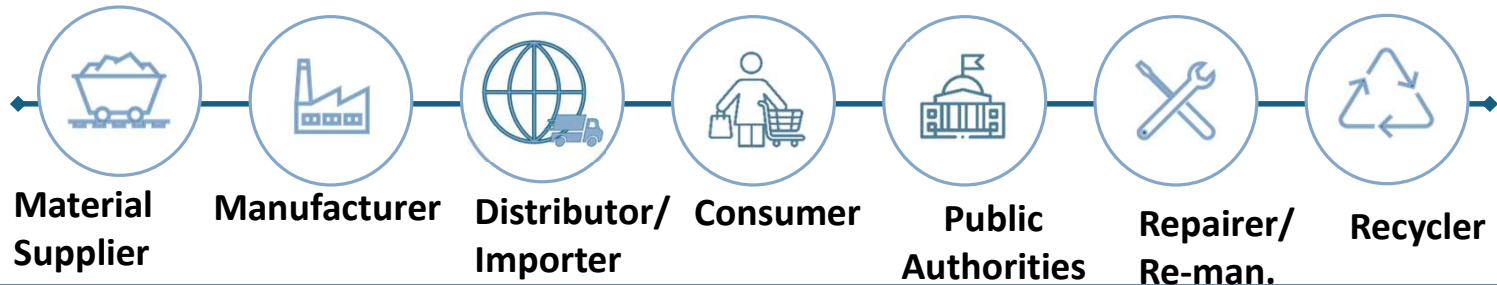
Why?

Promotes Circular Economy and Sustainability through effective management of waste flows and end-of-life treatment.
DPP solves the longstanding issue of transparency and traceability in the production industry

When?

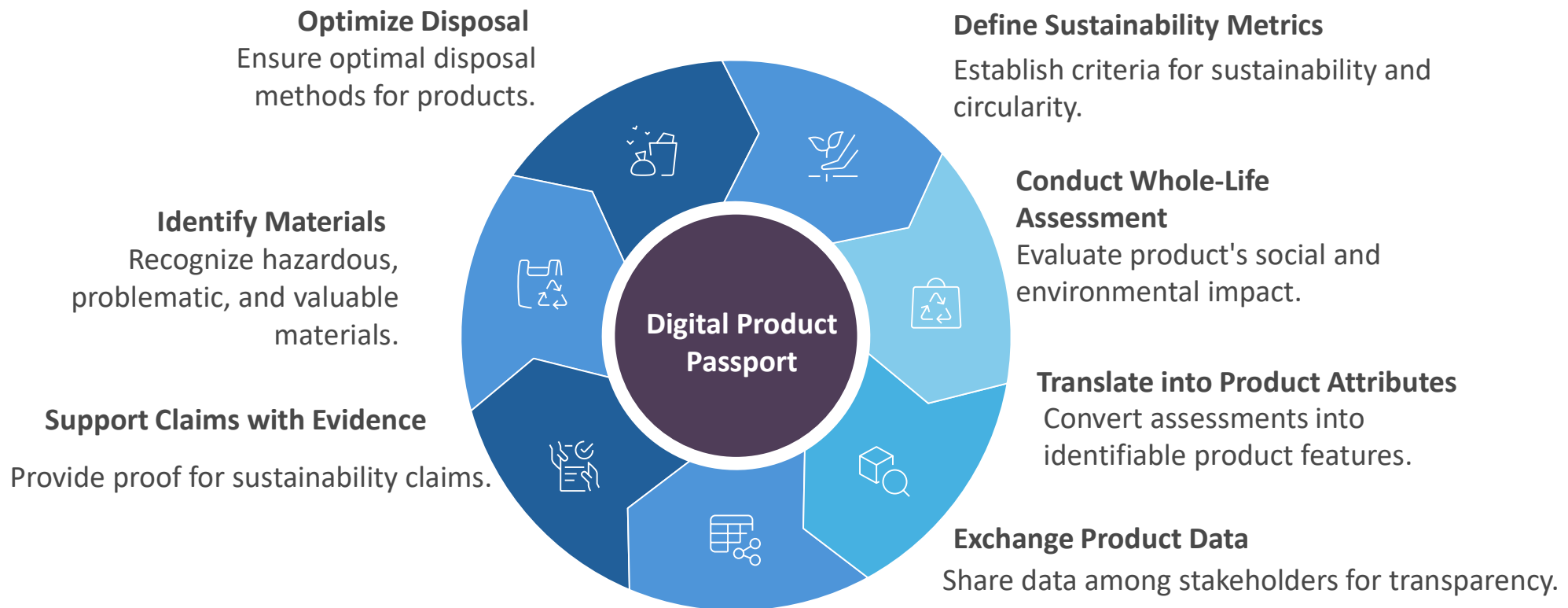
The initiative sets a clear timeline for adoption, with batteries expected to be the first industry to implement DPPs by 2026/7 (battery regulation EU 2023/1542), and other sectors to follow (ESPR EU2024/1781) , demonstrating the EU's commitment to enforcing sustainability practices.

Who?



DPP Promoting Sustainability

“A DPPE bears witness to sustainable business practice and product design values, encourages changes in consumer and disposer behaviour, and enables greater collective efforts towards a circular economy”



Aims and Objectives of a Textile Sector DPP



Informing consumers

- Provide information about a particular product to consumers



Informing companies

- Enhances interoperability and data sharing within brands.
- Enables access to useful information across supply chain, customer service, investment.



Managing resource flows

- Companies must trace supply origins to manage resources and assess risks.
- Raw material traceability enables audits and supports compliance.



Promoting circularity






- Facilitates repair, recycling, and reuse through detailed product information.
- Supports tracking of use-phase data like maintenance, rentals, and resales.



Sustainability indicator management

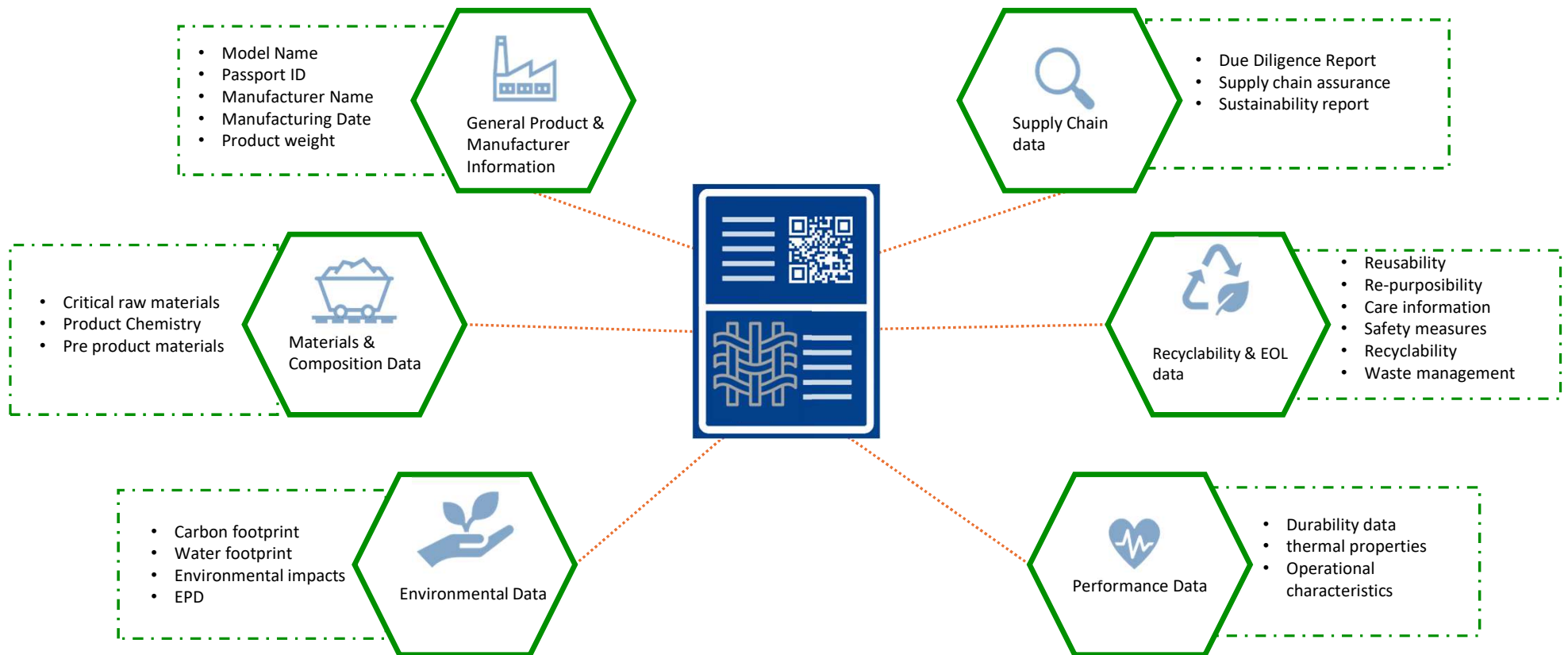
- Tracking products post-purchase supports full life cycle analysis.
- Frequent resales may inspire shifts toward resale or rental service models.

Aims and Objectives of a Textile Sector DPP

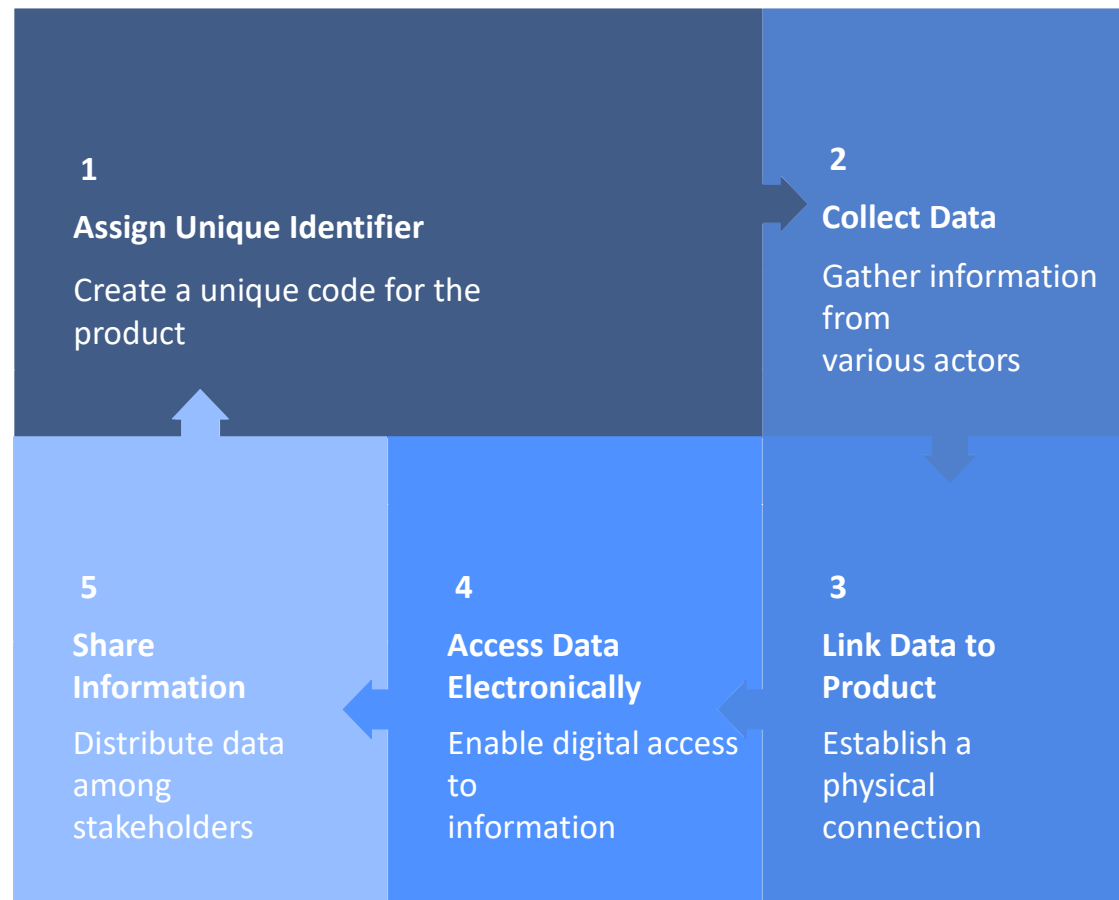
-  Market surveillance
 - Products made outside the EU must be declared to customs with clear identification.
 - Non-compliance results in penalties from authorities.
-  Track and trace after sales
 - Captures post-sale events via new data sources.
 - Enhances understanding of customer behavior and usage.
-  Compliance with regulations
 - Mirror image of market surveillance by brands, which must comply with regulation
-  Product end-of-life management
 - provide marketers with recycling rates and product lifetime data via scanning at sorting centers.
-  Product authentication
 - Unique product IDs enable brand verification and reduce fraud.
 - Authentication preserves product value in resale.

DPP – Data Requirements (more details in session-2)

The ESPR Regulation mandates comprehensive content requirements for the digital product passport, including general product and manufacturer information, compliance and certifications, carbon footprint, supply chain due diligence, product materials and composition, circularity and resource efficiency, and performance and durability.



Digital Product Passport Cycle



EU Regulations : DPP



DPP is seen as the first regulatory mover at scale.



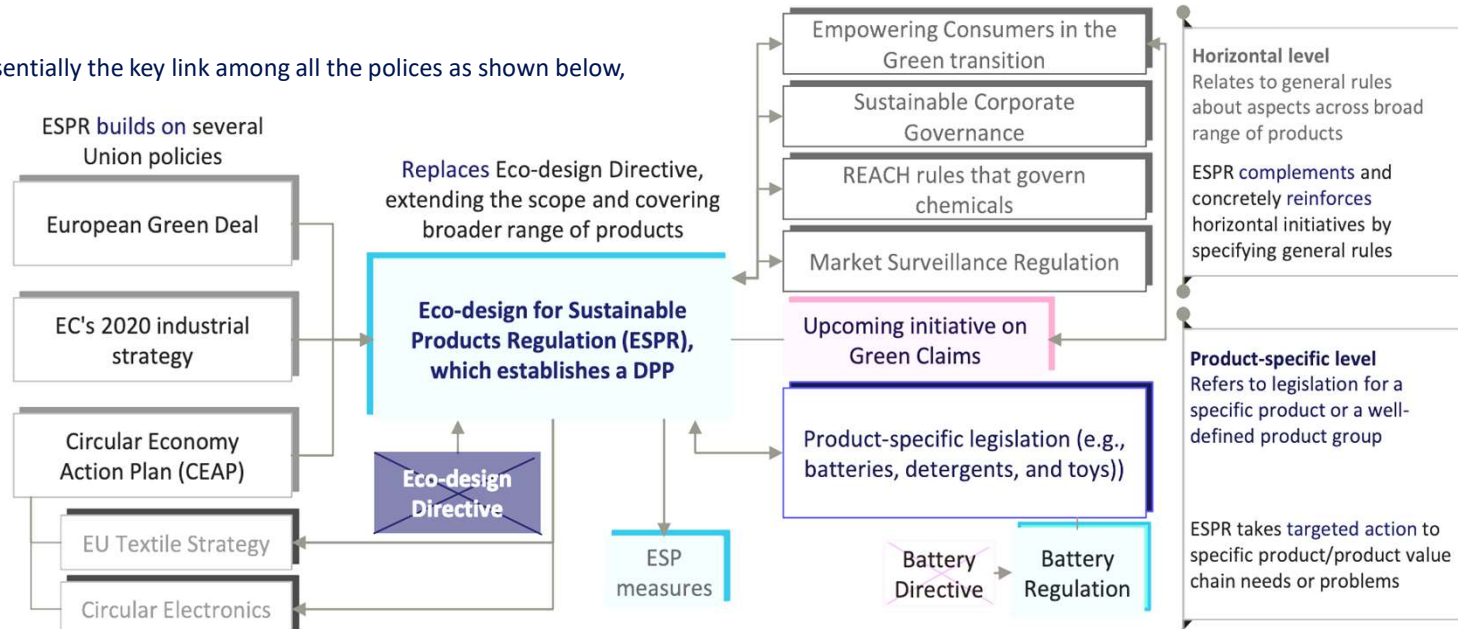
EC is the first legislator to mandate DPP across various industries with a clear timeline – Start with **Battery industry** in 2027 followed by other sectors i.e. Textiles, Furniture, Plastic etc.



DPP regulation will have major impacts on the global supply chain.



DPP is essentially the key link among all the policies as shown below,



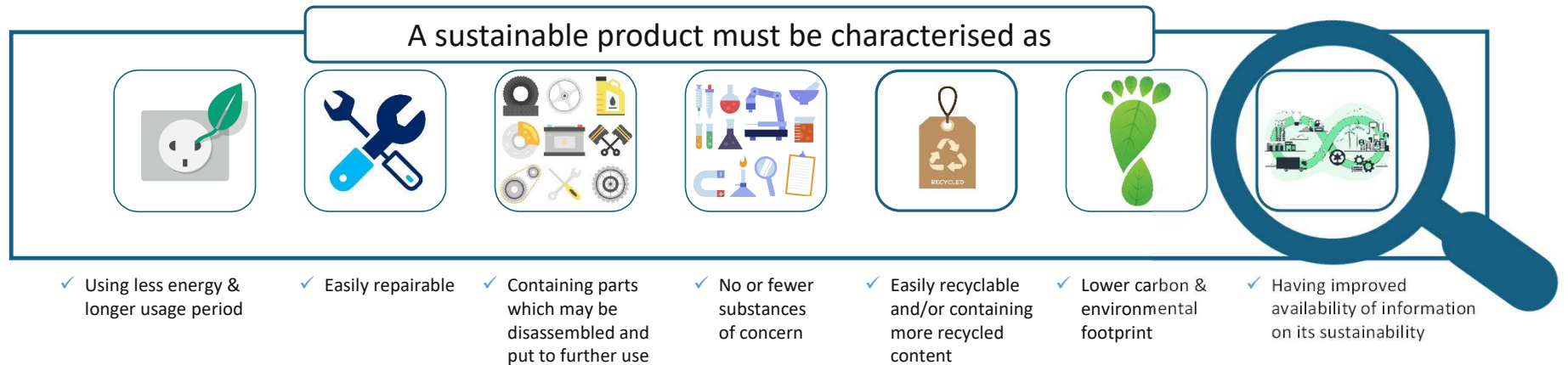
Source: European Commission, European Union, ESPR proposal, BCG analysis

And More...

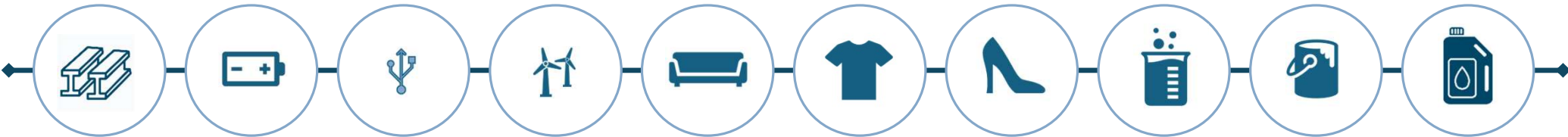
| Law | IN FORCE | OBJECTIVE | Impacted Entities | Timeline |
|---|----------|--|--|---|
| Taxonomy (EU 2020/852) | yes | Criteria for economic activities to be environmentally sustainable for financing sustainable investment | Large and listed companies under the scope of the CSRD | 2022/2023/2024 depending on delegated act |
| CSRD: Corporate Sustainability Reporting Directive 2022/2464 | yes | Disclose information on sustainability (including E+S+G) using common standards (ESRS) | Certain large and listed companies (different categories and application dates) | 2024 (2025) gradual phase-in until 2029 |
| CSDDD: Corporate Sustainability Due Diligence Directive 2024/1760 | yes | Identify and address adverse human rights and environmental impacts for own operations, subsidiaries and business partners | Certain large and listed companies (different categories and application dates) | 2027 Gradual phase-in until 2029 |
| Green Claims Directive- Proposal COM(2023) 166 | no | Protecting consumers from 'greenwashing': substantiation, communication and verification of voluntary green claims regulated | Traders, incl., SMEs (special provisions for microenterprises) | Ca. 2027 |

ESPR- EU 2024/1781

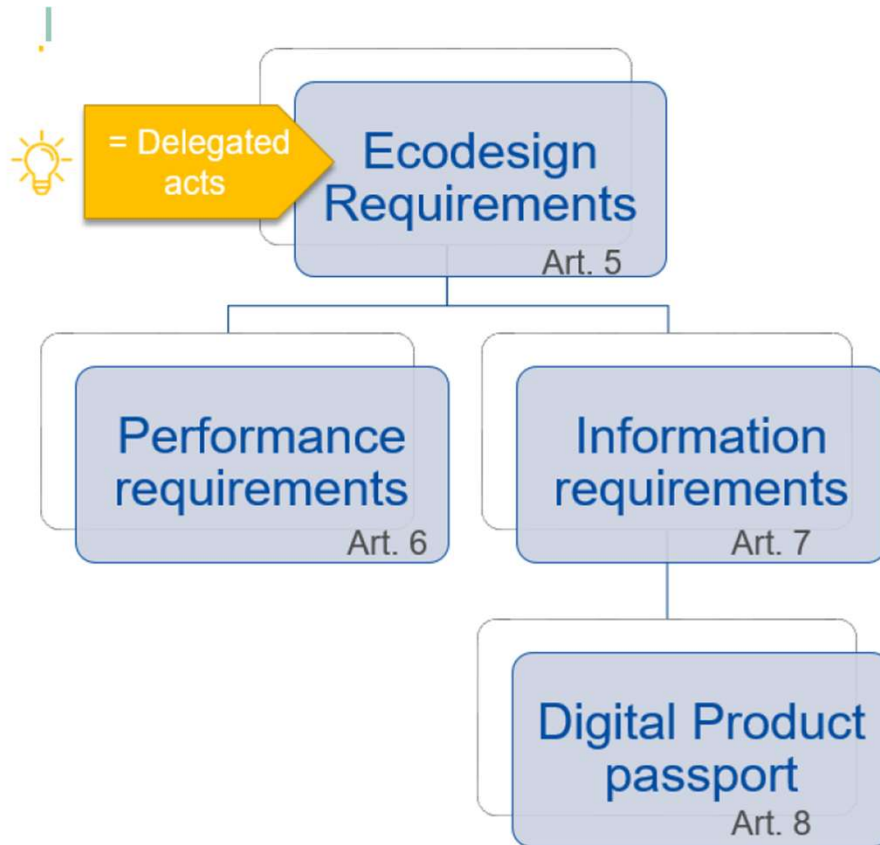
- ✓ Part of the package of rules following the 2020 Circular Economy Action Plan, comprising the European Greenddeal.
- ✓ It came into effect on 18 July 2024.
- ✓ Aimed towards an environmentally sustainable and circular economy.



Example product groups covered by ESPR



ESPR: Key Eco-design Product Aspects



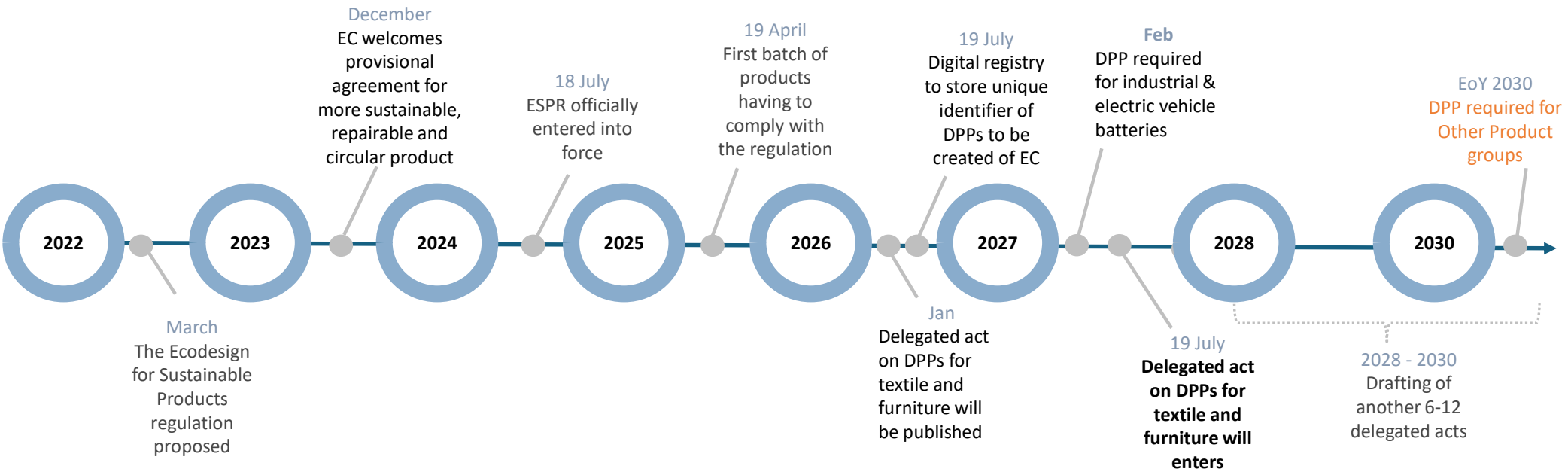
- **durability, reliability; reusability; upgradability;**
- **reparability;** possibility of **maintenance** and **refurbishment;**
- presence of **substances of concern;**
- **energy use** or **energy efficiency;**
- **resource use** or **resource efficiency;**
- **recycled content;**
- possibility of **remanufacturing** and **recycling;**
- possibility of **recovery** of materials;
- **environmental impacts**, including carbon and environmental footprint;
- expected generation of **waste** materials.

Products Covered by ESPR

The product groups in the first priority batch that need to comply with ESPR are:

- a. Iron and steel
- b. Aluminum
- c. **Textiles (garments and footwear particularly)**
- d. Furniture
- e. Tyres
- f. Detergents
- g. Paints
- h. Lubricants
- i. Chemicals
- j. Energy related products with eco-design requirements
- k. Information and communication technology products & other electronics

Timeline: ESPR



Source: European Commission, European Union, ESPR proposal, BCG analysis

Pre-training Assessment

Go to www.menti.com
Enter the code **4861 3902**



Or use QR code



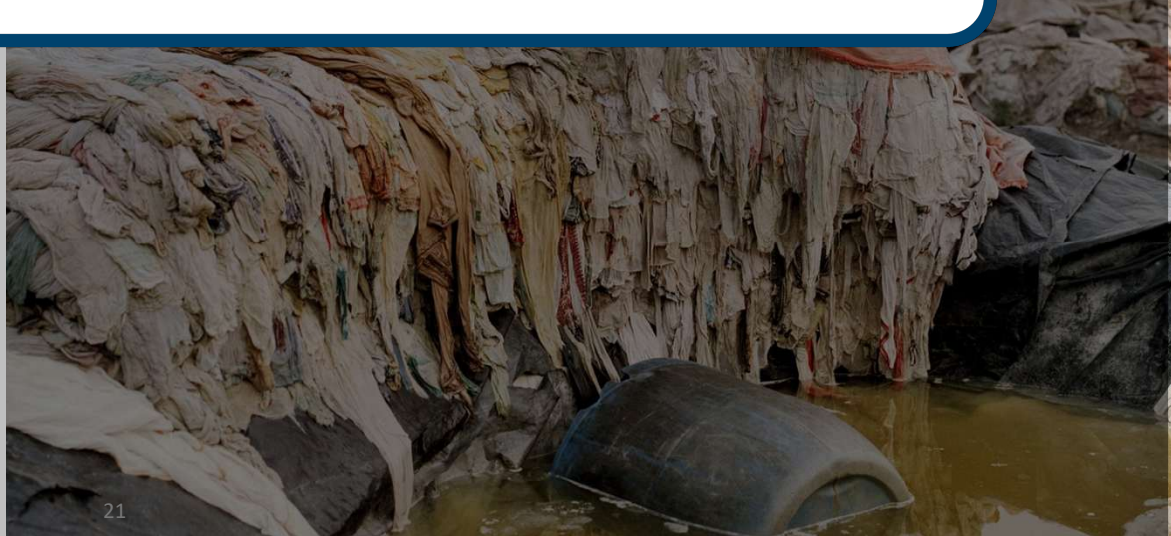
NETWORKING & TEA-BREAK

ToT Day-1 Session-2: : DPP Attributes

- DPP as a key enabler to tackle textile industry challenges
- Inter-active session: DPP attributes in Textile sectors




Sustainability: Because There Is No Planet B.



Sustainability Challenges

Do you know producing one single cotton T-shirt typically requires about **2,500 to 3,000 liters** of water?

This **2,700 liters of water**, which equals:

 *The drinking water needed by one adult for 1,080 days (or nearly 3 years), assuming an average daily intake of 2.5 liters.*

So, It takes nearly 3 years' worth of drinking water for one adult to produce just one cotton T-shirt.

The production of **one cotton T-shirt** typically emits about:

 **2.1 to 2.6 kg of CO₂-equivalent (CO₂e)**

Driving a typical car for **10 km** = ~2.3 kg CO₂

So, one T-shirt ≈ a short car trip's worth of emissions

Sustainability Challenges



Citarum River, Indonesia



Noyyal River, India



Ravi River, Pakistan



Msimbazi River, Tanzania

Textile Industries Challenges

- **Ecological Challenge**

- The industry is known to be wasteful and polluting using non-renewable resources, intense water and land uses.
- With the emergence of fast fashion, the production of clothing is now twice the amount it was prior to the year 2000
- the production of unrecyclable, low-quality apparel in fast fashion has a negative impact on natural resources,

- **Economic Challenge**

- Industry projections with 'business as usual' were in decline due to raw material shortages, and increased energy and water prices, as well labor costs
- In 2023 many French fashion retailers like Camaïeu, Go Sport, Pimkie, Kooka went bankrupt or are currently undergoing judicial reorganization.

- **Social challenge**

- Recent industry dramas (Rana Plaza, Uighur cotton forced production etc.) have highlighted the worst practices of textile production.
- The UN Guiding Principles on Business and Human Rights to respect human rights, including paying a living wage, to workers in supply chains, are not the norms according to the Labor organization behind the label.

Need for Transparency in the Textile and Fashion Sector

Since 2020, some interesting trends and consumer behaviours have been observed:

'Chosen de-consumption' or lack of money: 60% of consumers spent less on fashion during COVID 19 crisis and half of them expect to continue doing so

Second-hand clothing will overtake the fast fashion market by 2028

Online purchases for clothing represent 57% in UK, 26.4% in France 22.7% in Spain, 21% in Italy

52% of millennials always research background information before buying textiles, 45% for GenZ and 41% for Baby boomers

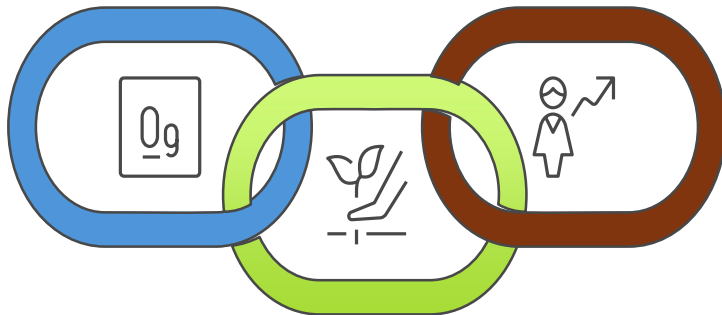
Transparency in the Textile Sector

Product Transparency

Focuses on the visibility of product details like origin and certification.

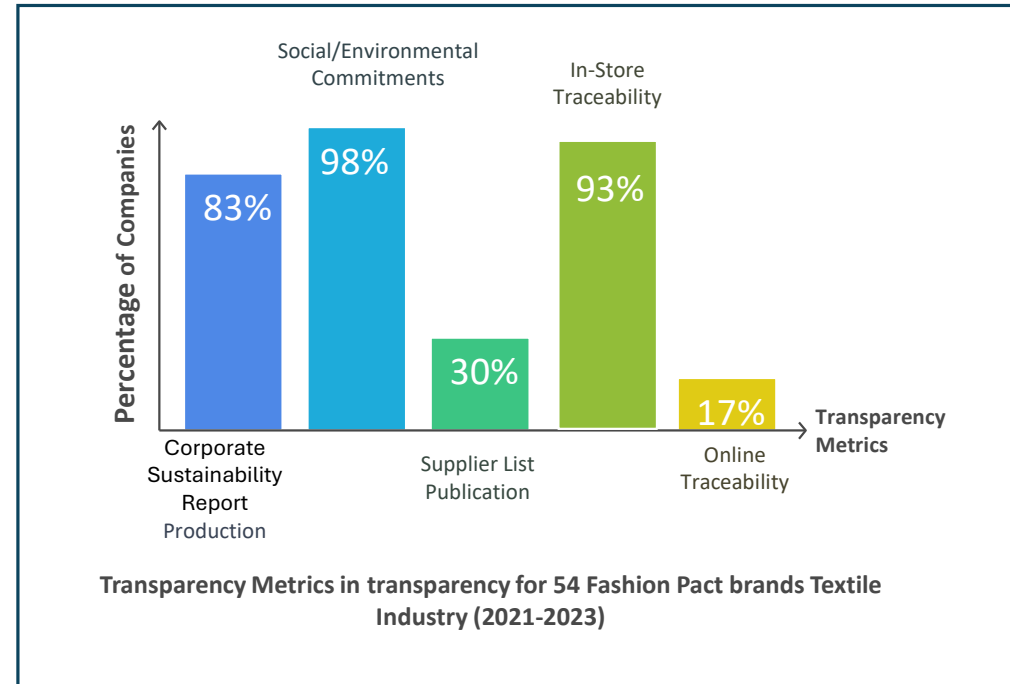
Fashion Transparency Index

Utilizes an external index to assess brand transparency.



Brand Transparency

Emphasizes the brand's commitment to sustainability and ethical practices



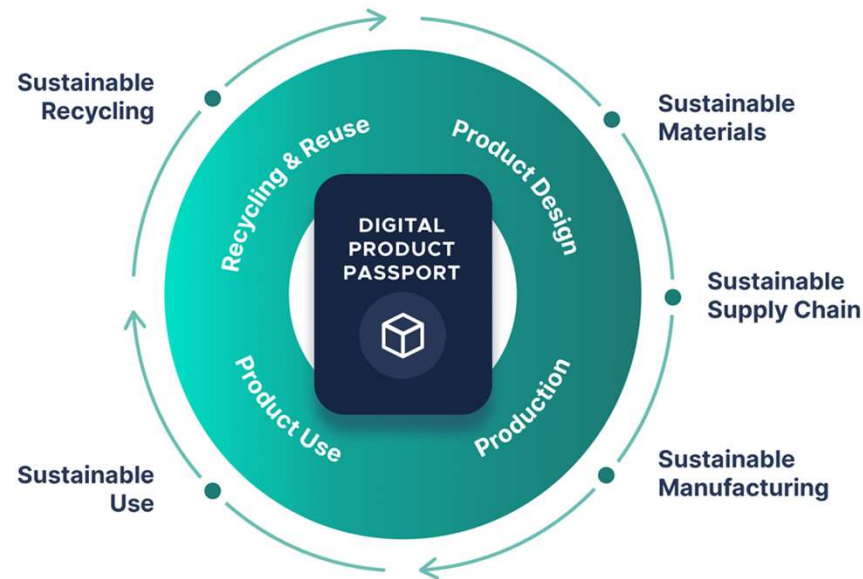
Transparency and Link to DPP



Current brand practices show room for improvement in transparency. The Digital Product Passport (DPP) can enhance transparency and support sustainable practices like repair, reuse, and recycling.



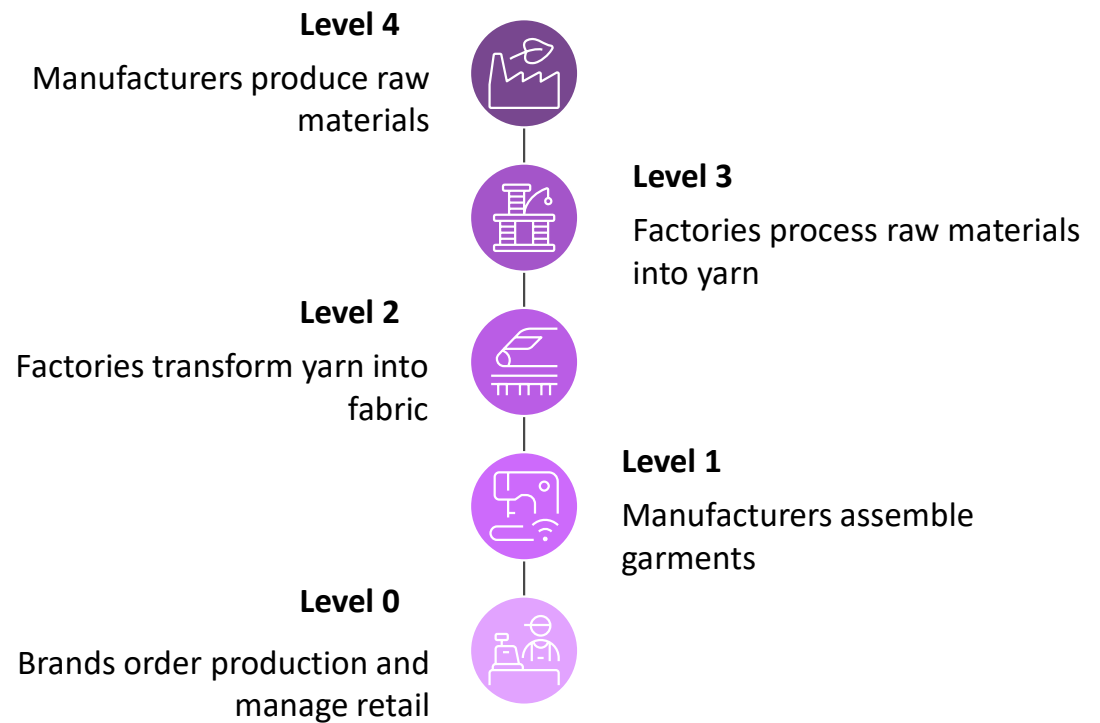
A key challenge is shifting from general **brand-level transparency** to **product-specific transparency**. Achieving this requires addressing the **complexity of the textile supply chain**.



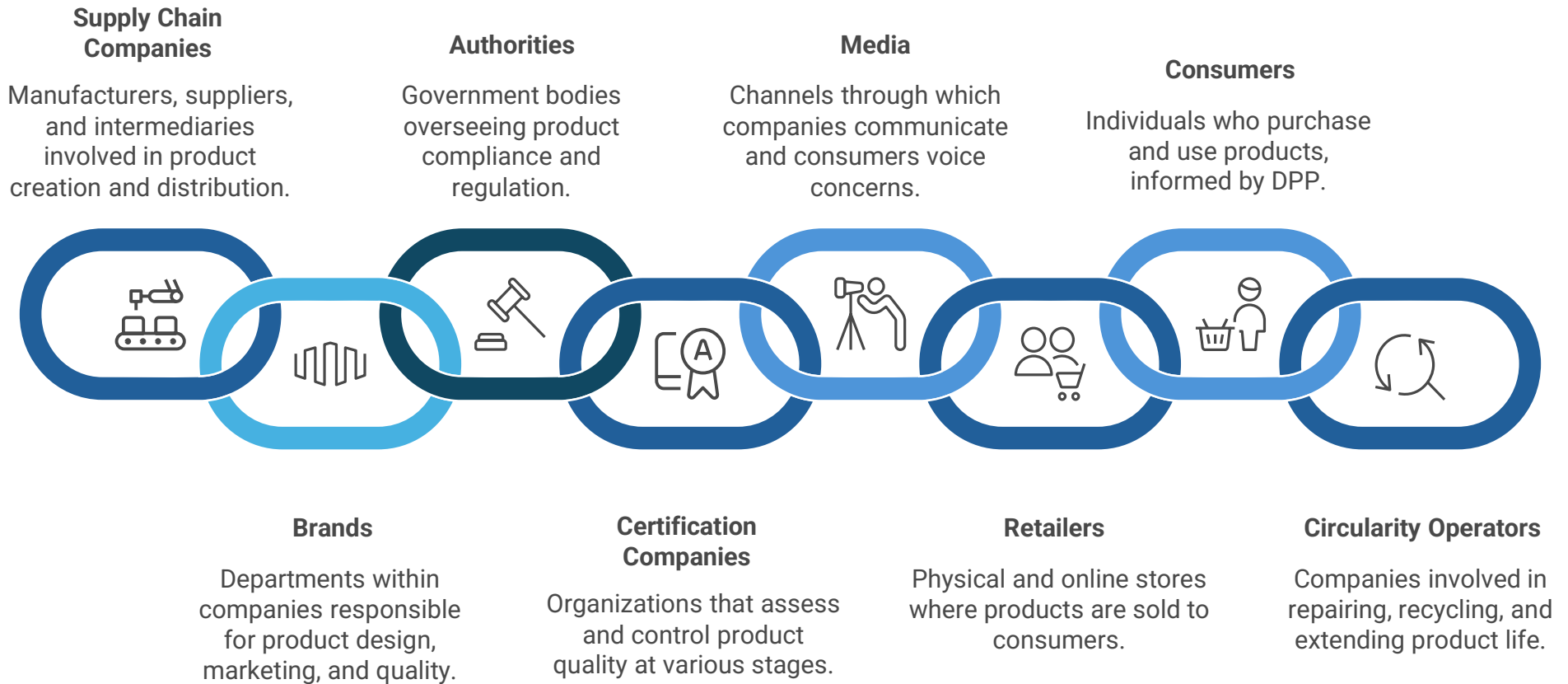
Complexity in Traceability in the Textile Product Supply Chain

The textile garment supply chain is a very complex multi-actor, buyer-driven production chain.

From Raw Materials to Retail: A Textile Production Journey

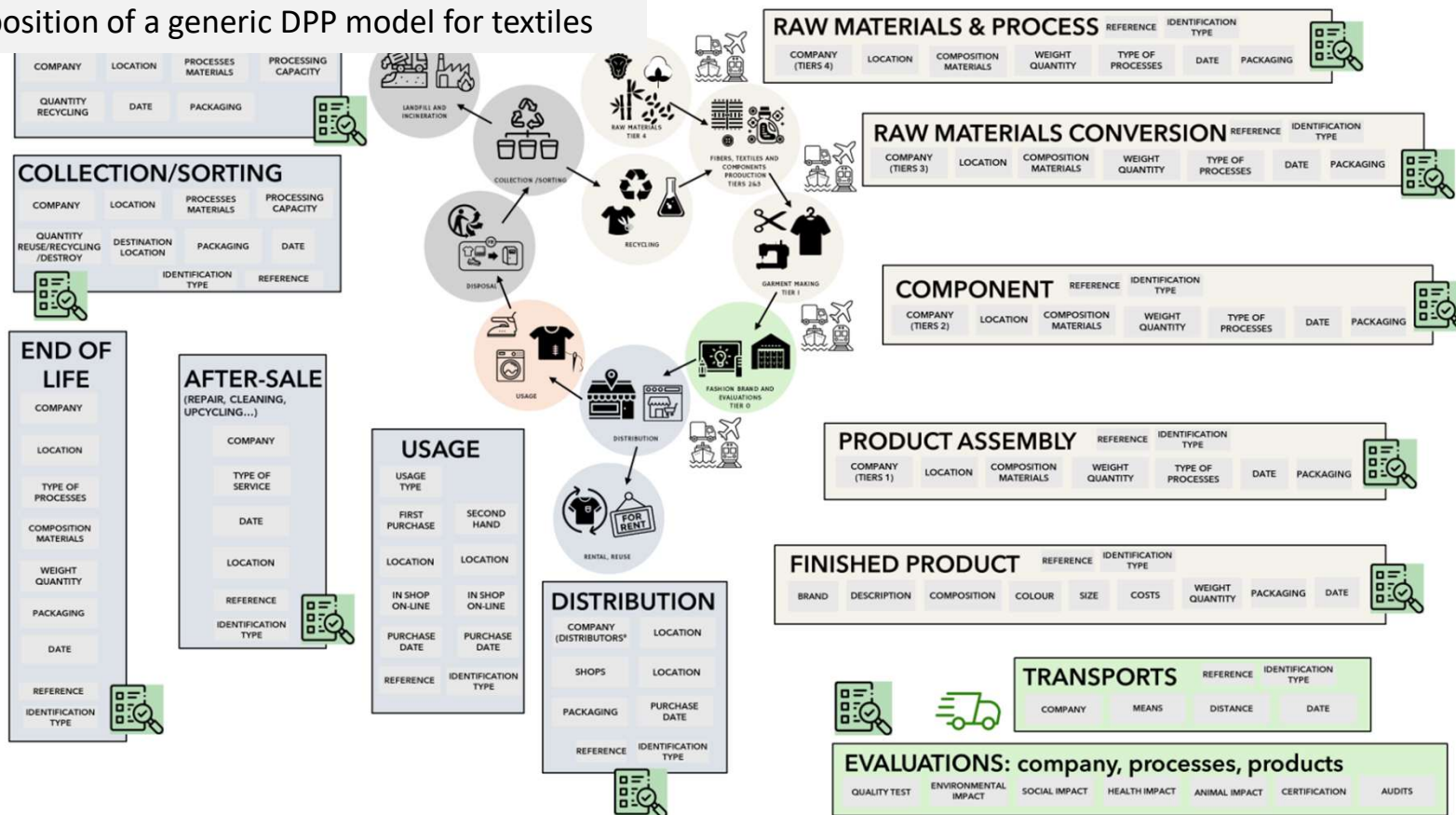


Full Textile Value Chain



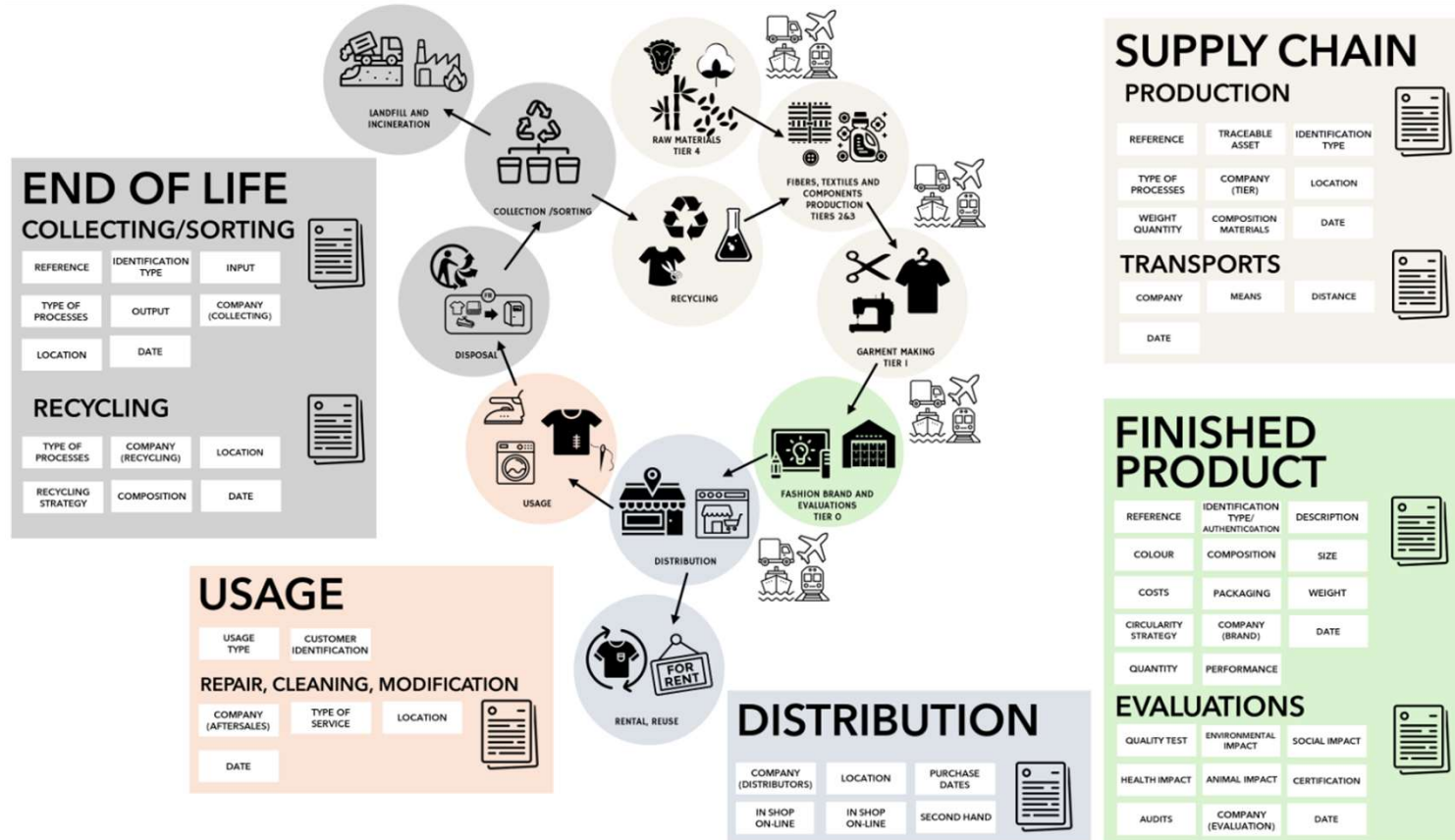
Proposition of a DPP Model and Consultation

Proposition of a generic DPP model for textiles



Proposition of a DPP Model and Consultation

Proposed model of DPP for textile (simplified version-the supply chain section was condensed to reduce redundancy)



DPP Deployment: Phases and Policy Options

Proposed Phases for EU-Level DPP Deployment in the Textile Sector

Main Objectives of DPP Deployment

- Traceability & Transparency** in the textile value chain
- Consumer Awareness** to promote responsible purchasing & durability
- Stakeholder Information Exchange** to boost reuse & closed-loop recycling
- Impact Assessment** to drive sustainability across the sector
- Protection of EU Interests** – citizens, businesses, and competitiveness

Phased Deployment Timeline

| Phase | Title | Target Year | Scope |
|-------|--------------------------|-------------|---|
| 1 | Minimal & Simplified DPP | 2027 | Core data only, basic traceability, early compliance with legal drivers |
| 2 | Advanced DPP | 2030 | Expanded data sets, stakeholder exchange features, partial circularity |
| 3 | Full Circular DPP | 2033 | Full lifecycle data integration, supports high reuse/recycling and policy alignment |

DPP Deployment: Phases and Policy Options

Phase 1 – Minimal and Simplified DPP (Target: 2027)

Purpose:

Launch a foundational DPP across Europe with a focus on essential sustainability and traceability information.

Mandatory Information:

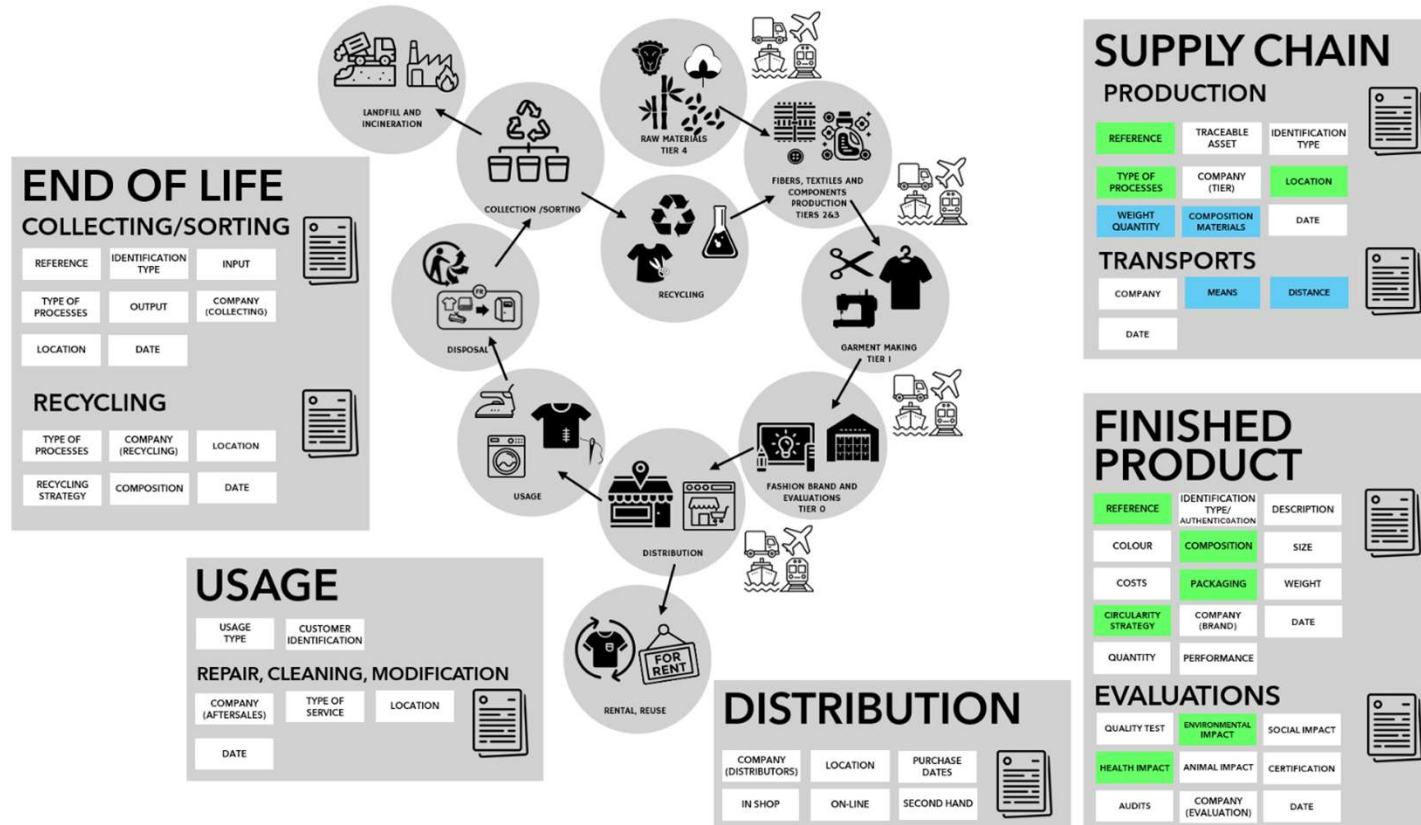
- Product Composition**
- Recyclability** of the product
- Traceability** of production processes
- Packaging Information**
- Environmental Impact**

Supplementary Information:

- Material Footprint**
- Transport Impact**

DPP Deployment: Phases and Policy Options

Simplified DPP Model for phase 1



DPP Deployment: Phases and Policy Options

Phase 2: Deployment of Advanced DPP (2030)

Expansion:

Advanced DPP scaled to more stakeholders across the full product life cycle.

Data Collection:

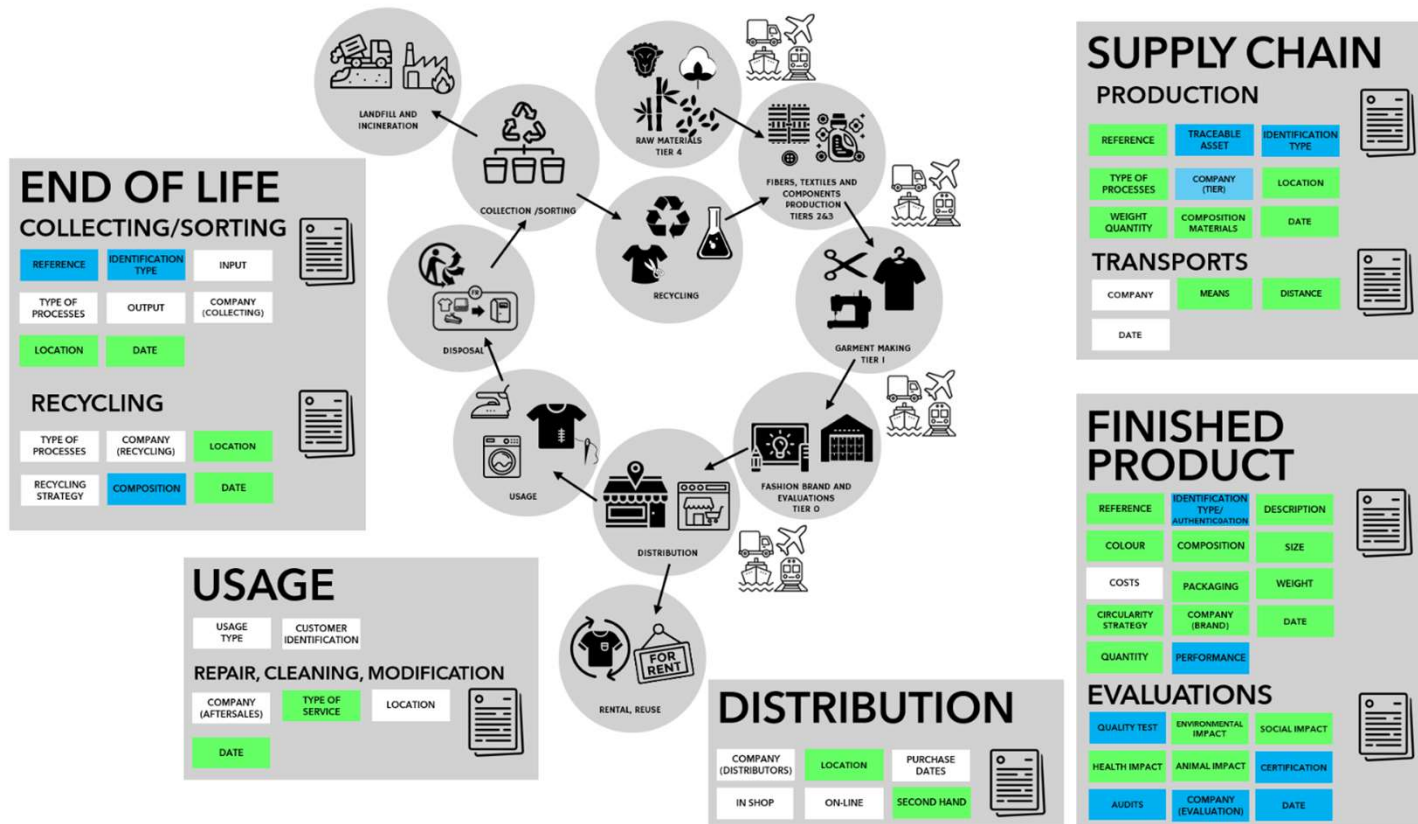
- **Supply Chain:** Mandatory (green) + optional (blue) data collected, with confidentiality safeguards.
- **Finished Products:** Transparency for consumers; key details (e.g., weight, composition) aid recyclers.
- **After-Sales & Second-Hand:** Tracking to support durability and circularity.

Key Recommendations:

- System Interoperability:** Integrate PIM, PLM, ERP, LCA tools, and third-party platforms via APIs and common standards.
- Tracking Harmonization:** Standardize QR/barcodes for seamless data flow from raw material to recycling.
- EU-Wide Adoption:** Mandatory DPP for all textiles, including imports, aligned with EU regulations.

DPP Deployment: Phases and Policy Options

Advanced DPP Model for phase 2



DPP Deployment: Phases and Policy Options

Phase 3: Full Circular DPP Deployment (2033)

Objective:

Fully operational DPP to drive circularity in the textile sector.

Key Features:

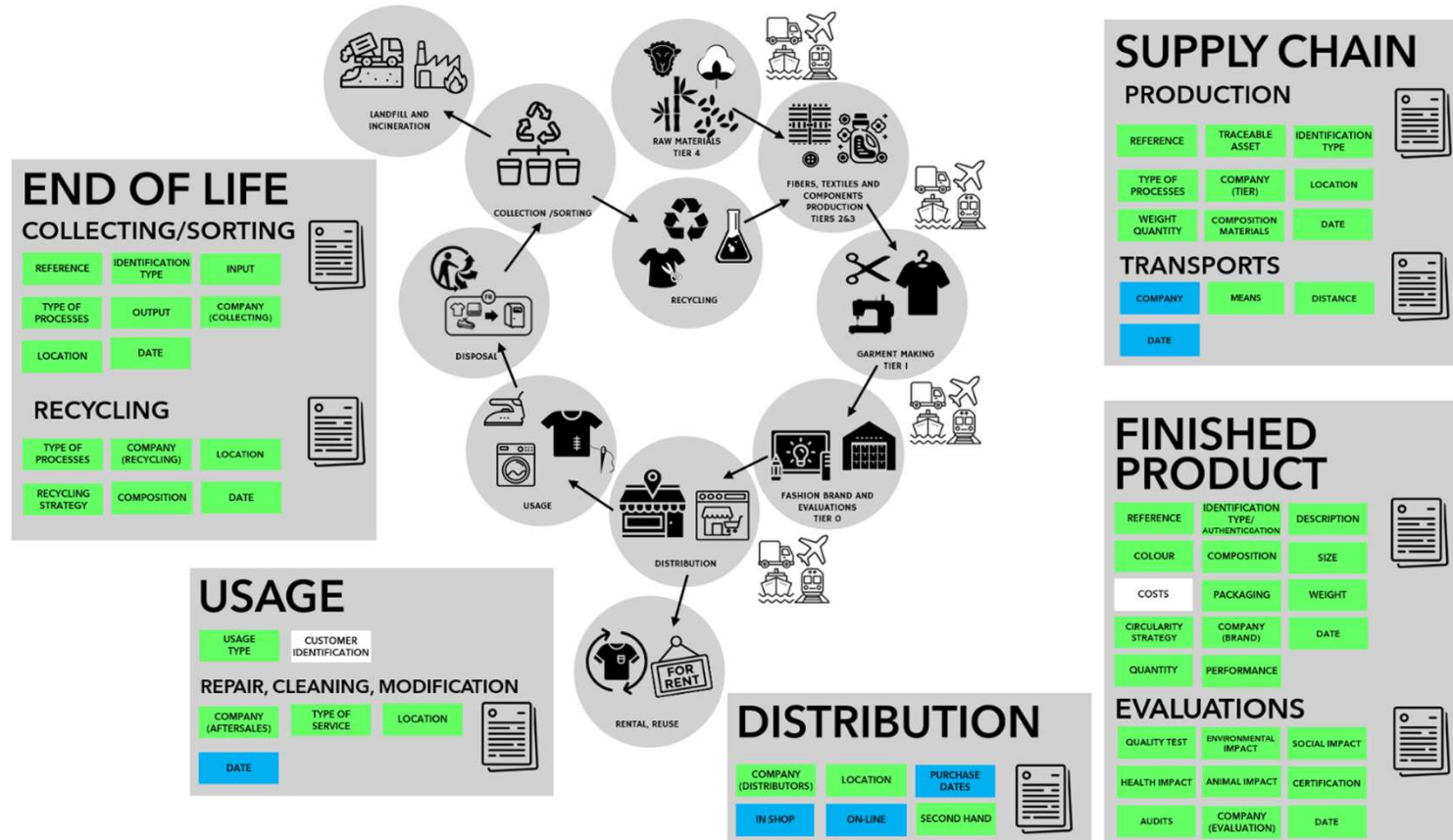
- **Supply Chain:** Fully integrated with restricted access to protect confidentiality.
- **Impact Automation:** Brands use DPP data to auto-calculate impacts and obtain eco-labels.
- **Lifecycle Tracking:** Distribution, usage, and aftersales monitored to enhance durability and deposit return.
- **Advanced Recycling:** DPP supports efficient sorting by detailing product design/manufacturing.
- **Closed-Loop Recycling:** High recycling rates via data exchange between recyclers and suppliers, reducing raw material use.

Key Recommendations:

- ❑ **Scalability Focus:** Build on prior phases (surveys, workshops, FAQs) to ensure adaptable, effective rollout.
- ❑ **Global Integration:** Extend DPP to all stakeholders, including imports, and use AI to analyze data and shape future EU regulations.

DPP Deployment: Phases and Policy Options

Full circular DPP Model for phase 3



Interactive Session: DPP Data Requirement

Go to www.menti.com
Enter the code 1119 3786

Or use QR code



Or use QR code



LUNCH BREAK

ToT-Day 1 Session-3: DPP for sustainability

DPP for sustainability

The Global Shift: Why Now?

- **Climate Change & Resource Scarcity:**
 - Urgent need to reduce environmental footprint, as highlighted by global climate targets.
- **Consumer Awareness & Ethical Sourcing:**
 - Consumers, especially in key export markets, are increasingly demanding transparency and ethical production.
- **Regulatory Pressure & Compliance:**
 - Introduction of stringent international legislation (e.g., EU Green Deal, Extended Producer Responsibility schemes, due diligence laws).
- **Brand Reputation & Risk Mitigation:**
 - Major global brands are under pressure to ensure sustainable and ethical supply chains to protect their image and avoid boycotts.
- **Competitive Advantage:**
 - Sustainability and circularity are no longer optional but are becoming prerequisites for market access and differentiation.



Defining Sustainability in Textiles

Sustainability in the context of textile means the manufacturing, marketing, and use of garments, footwear, and accessories, and their parts and components, considering the environmental, health, human rights, and socioeconomic impacts, and their continuous improvement through all stages of the product's life cycle.

- **Triple Bottom Line (People, Planet, Profit):**
 - **Environmental:**
 - Minimizing ecological impact (pollution, resource depletion, GHG emissions).
 - **Social:**
 - Ensuring fair labor practices, human rights, safety, and community well-being.
 - **Economic:**
 - Promoting long-term viability, profitability, and equitable value distribution across the supply chain.



Sustainability Parameters (Environmental)

- Water usage & pollution levels
- Energy consumption
- Resource use & CO2 emissions (including direct GHG and transport CO2)
- Air pollution
- Waste production and management
- Soil degradation, Deforestation, Biodiversity and ecosystem depletion
- Hazardous chemicals, Pesticide and fertilizer use

Sustainability Parameters (Social, Ethical)

- **Social Parameters:**

- Respect for human & labour rights (Child labour, Forced/compulsory labour)
- Working conditions (Wages, Working times, Contracts, Temporary employment, Recruitment practices, Lack of social security)
- Trade unions and collective bargaining rights
- Unsafe workplaces and work practices, Inadequate personal protective equipment (PPE)
- Discrimination (women and minorities), Sexual harassment, Exploitation of home workers

- **Ethics-related Information:**

- Bribery and corruption
- Land rights and community welfare
- Animal welfare.

Economic Implications: Risks and Lost Value

- **Resource Price Volatility:**
 - Dependence on finite resources makes businesses vulnerable to price shocks.
- **Waste as a Cost Center:**
 - Disposal fees, lost revenue from discarded materials, and inefficient resource use.
- **Reputational Damage & Brand Erosion:**
 - Negative media attention, consumer boycotts, and loss of trust due to unsustainable practices.
- **Regulatory Penalties & Market Access Barriers:**
 - Fines for non-compliance, exclusion from markets with strict sustainability requirements.
- **Missed Innovation Opportunities:**
 - Failure to invest in circular models means missing out on new markets and competitive advantages.
- **Supply Chain Disruptions:**
 - Climate change impacts and social unrest can disrupt material flows.

Pillars of Sustainable Textile Production

- **Sustainable Materials:**
 - From fiber sourcing to fabric composition.
- **Responsible Water Management:**
 - Conservation, treatment, and recycling.
- **Clean Energy Transition:**
 - Efficiency and renewables.
- **Safe Chemical Management:**
 - Eliminating harmful substances.
- **Waste Minimization & Circularity:**
 - Reducing waste and enabling reuse/recycling.
- **Ethical Labor Practices:**
 - Ensuring human rights and fair working conditions.

Sustainable Materials: Natural Fibers

Organic Cotton:

- Grown without synthetic pesticides, herbicides, or GMOs.
- Uses less water through rain-fed systems and improved soil health.
- Better for farmer health and local ecosystems.

Hemp & Linen (Flax):

- Require minimal water and pesticides.
- Grow quickly and enrich the soil.
- Highly durable and strong fibers.

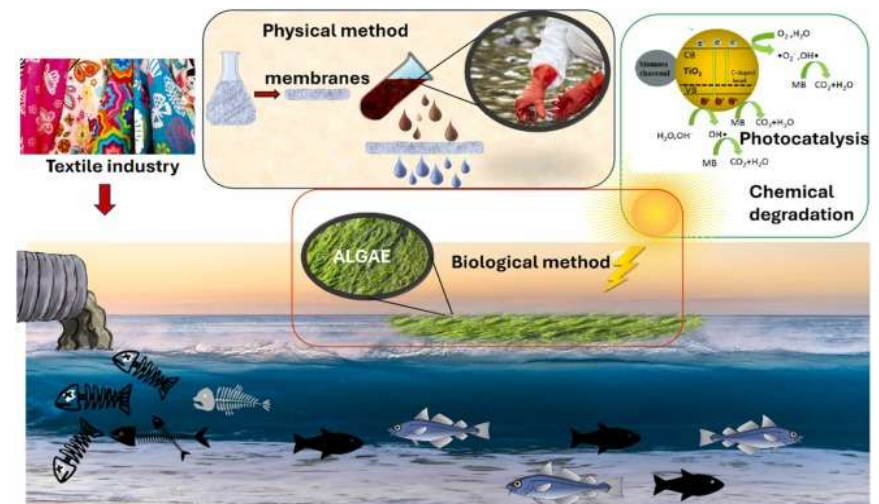
Recycled Natural Fibers:

- Utilizing pre-consumer (factory scraps) and post-consumer (used garments) cotton and wool.
- Reduces demand for virgin resources and diverts waste from landfills.



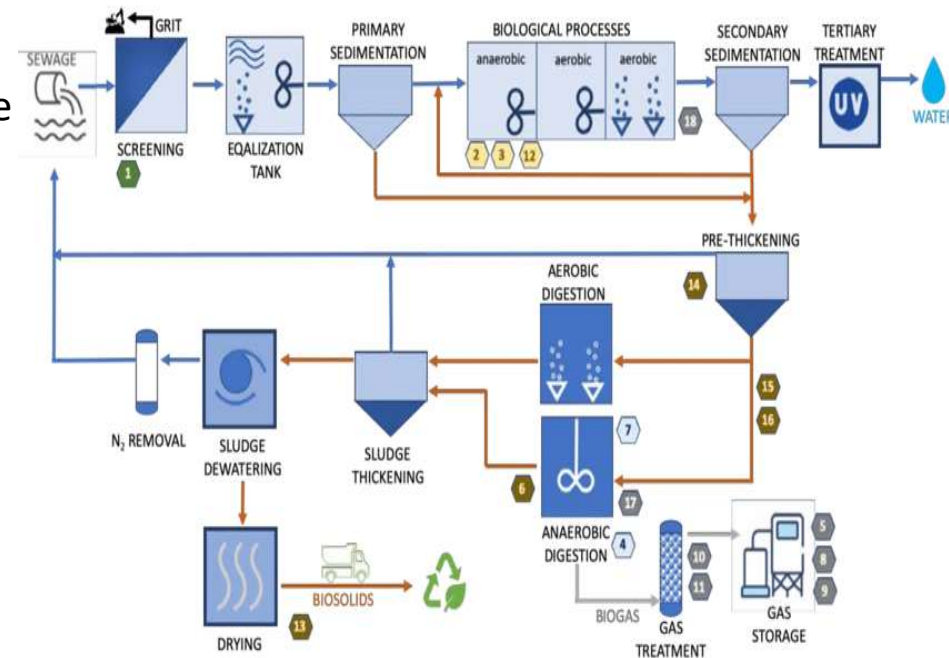
Water Management: Reducing Consumption

- **Process Optimization:**
- **Low-Liquor Ratio Dyeing:**
 - Using less water in dyeing baths.
- **Foam Dyeing/Digital Printing:**
 - Applying dyes with minimal water.
- **Cold Pad Batch Dyeing:**
 - Lower temperature processes reduce energy and water.
- **Water Recycling & Reuse:**
 - Implementing closed-loop systems for process water in dyeing and finishing.
 - Recycling cooling water and condensate.
 - Using treated wastewater for non-potable purposes (e.g., irrigation, cleaning).
- **Efficiency in Agriculture:**
 - Precision irrigation techniques for cotton farming.



Water Management: Wastewater Treatment & Quality

- **Effluent Treatment Plants (ETPs):**
 - **Primary Treatment:** Removing suspended solids.
 - **Secondary Treatment:** Biological treatment to remove organic matter.
 - **Tertiary Treatment:** Advanced filtration (e.g., reverse osmosis, activated carbon) for chemical removal and water reuse.
- **Zero Liquid Discharge (ZLD):**
 - Systems that recover and reuse all wastewater, eliminating discharge.
- **Monitoring & Compliance:**
 - Regular testing of discharged water to meet national and international standards.
- **Impact:**
 - Protects aquatic ecosystems, ensures community health, reduces regulatory risks.



Process diagram of ETP

Energy Efficiency: Optimizing Operations

- **Process Optimization:**

- Upgrading to energy-efficient machinery (e.g., motors, pumps, dyeing machines).
- Optimizing heating, ventilation, and air conditioning (HVAC) systems.
- Implementing energy management systems (ISO 50001).

- **Heat Recovery:**

- Capturing waste heat from dyeing, drying, and boiler systems for reuse.

- **Insulation:**

- Improving building insulation to reduce heating and cooling loads.

- **Lighting:**

- Switching to LED lighting throughout facilities.

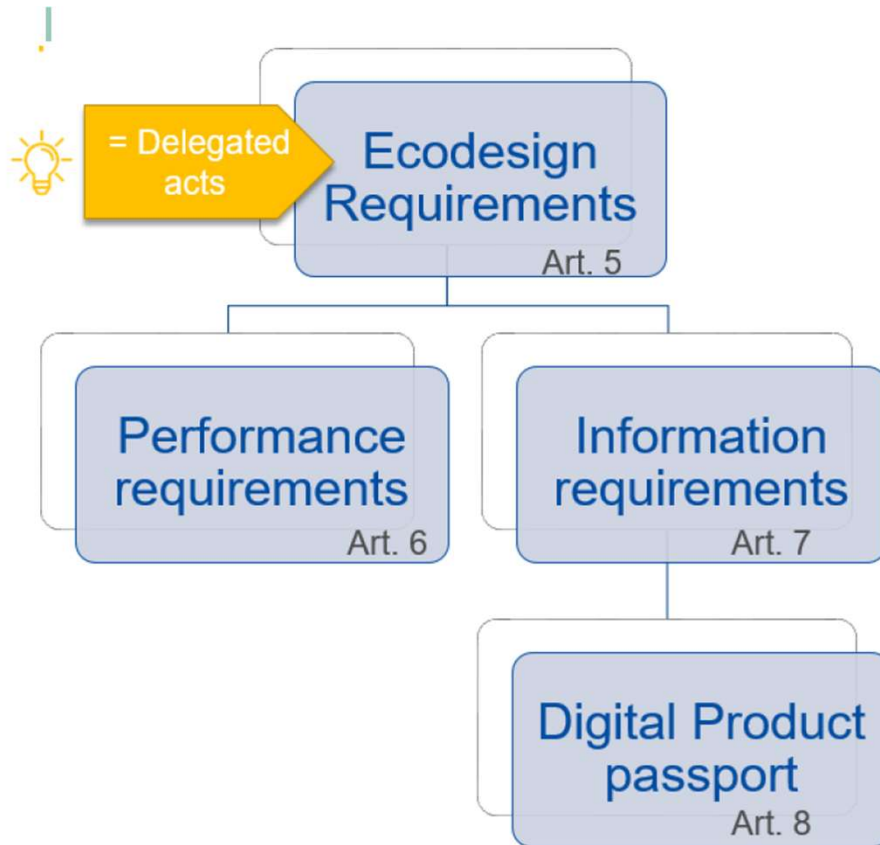
Energy Transition: Embracing Renewables

- **Solar Energy:**
 - Installing rooftop solar panels on factory buildings to generate clean electricity.
- **Biomass Energy:**
 - Utilizing agricultural waste (e.g., cotton stalks, rice husks) or textile waste as fuel for boilers.
- **Wind Energy:**
 - Exploring opportunities for wind power where geographical conditions are favorable.
- **Green Electricity Procurement:**
 - Purchasing renewable energy from the grid where available.
- **Benefits:**
 - Reduces reliance on fossil fuels, lowers carbon emissions, enhances energy security, reduces operational costs in the long run.

Ethical Labor Practices: Beyond Compliance

- **Fair Wages & Working Hours:**
 - Ensuring living wages and reasonable working hours, with proper overtime compensation.
- **Safe & Healthy Workplaces:**
 - Implementing robust health and safety protocols, providing adequate PPE, and ensuring emergency preparedness.
- **No Child or Forced Labor:**
 - Strict adherence to national and international laws against child labor and forced labor.
- **Freedom of Association:**
 - Respecting workers' rights to form and join trade unions and engage in collective bargaining.
- **Non-Discrimination & Anti-Harassment:**
 - Creating inclusive workplaces free from discrimination and harassment.
- **Transparency & Grievance Mechanisms:**
 - Establishing clear channels for workers to raise concerns without fear of retaliation.

ESPR: Key Eco-design Product Aspects



- **durability, reliability; reusability; upgradability;**
- **reparability;** possibility of **maintenance** and **refurbishment;**
- presence of **substances of concern;**
- **energy use** or **energy efficiency;**
- **resource use** or **resource efficiency;**
- **recycled content;**
- possibility of **remanufacturing** and **recycling;**
- possibility of **recovery** of materials;
- **environmental impacts**, including carbon and environmental footprint;
- expected generation of **waste** materials.

Sustainability information for DPP

- Environmental Sustainable Data:
 - Resource use & CO2 emissions
 - Water usage & pollution levels
 - Energy consumption
- Sustainability data applies to:
 - Products
 - Facilities/Organizations
 - Processes
- Beyond environment:
 - Due diligence report from supply chain actors related to practices related to human & labor rights, child labor, gender for actors in the supply chain

Sustainability Data

Product-related information

Origin:
Country and/or region and/or other origin criteria

Composition:

- Materials components
- Product components

Technical specifications:

- Materials specifications
- Product specifications

Product identification (IDs):

- Individual product/material
- Product/material batch

Product/material trade unit

Quality:
Characteristics
Inspections
Certificates/audit reports (product/materials)

Other management information:
Cost(s)
Sales data
Surplus or damaged materials/product

Process-related information

Process inputs and outputs:
Input volumes/weights
Output volumes/weights

Process events occurrence:

- Data
- Time

Process identification (IDs):

- Process (product) inputs
- Process (product) outputs
- Type of process
- Equipment (machine)
- Machine operator

Facility-related information

Operator details:
Supplier
Manufacturer
Subcontractor

Transport-related information

Operator details:
Transport or freight forwarding company
Owner/operator of the means of transport

Location:

- For picking up logistics units
- For delivering logistics units

Transportation (IDs):

- Logistics units
- Conveyance means (truck, railcar, ship, container if applicable)

Sustainability-related information

| Environment-related information | Due diligence for Human rights and labour-related information | Health and safety-related information |
|---|--|---|
| Hazardous chemicals Pesticide and fertilizer use Water use | Child labour Forced/compulsory labour Trade unions and collective bargaining rights | Unsafe workplaces and work practices Inadequate personal protective equipment (PPE) |
| Water pollution and wastewater management Air pollution Greenhouse Gas (GHG) emissions: <ul style="list-style-type: none"> - Direct GHG emissions - Transport CO2 emissions Energy consumption Soil degradation Deforestation Biodiversity and ecosystem depletion | Discrimination (women and minorities) Sexual harassment Exploitation of home workers Working conditions: <ul style="list-style-type: none"> - Wages - Working times - Contracts (with workers and/or subcontractors) Temporary employment Recruitment practices Lack of social security | Ethics-related information Bribery and corruption Land rights and community welfare Animal welfare |

Environmental Impact assessment of a product is crucial to capture Environmental related information for DPP

Life Cycle Assessment (LCA) in Textiles

- **What is LCA?**

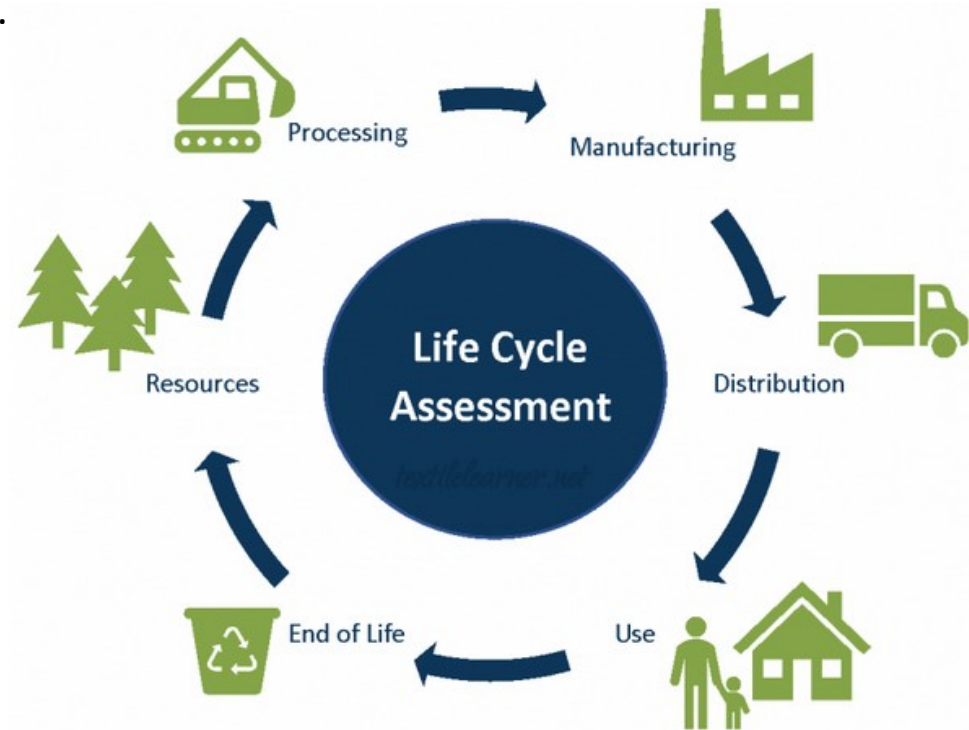
LCA stands for **Life Cycle Assessment** – it measures the **environmental impact** of a product from start to finish.

- **Stages of LCA in Textiles:**

1. **Raw Material Extraction** – cotton farming, polyester production
2. **Manufacturing** – spinning, dyeing, sewing
3. **Distribution** – packaging, transport
4. **Use Phase** – washing, ironing
5. **End of Life** – disposal, recycling, landfill

- **Why it matters:**

- Helps brands find where most pollution happens
- Supports decisions to improve sustainability
- Required by many international buyers



Product Environmental Footprint (PEF)

- **What is PEF?**

- PEF is a method developed by the **European Union** to measure the **environmental performance** of a product using **LCA-based data**.

- **Why it's important in textiles:**

- Brings standard rules for calculating environmental impact
- Makes it easier to compare products (e.g., T-shirt A vs T-shirt B)
- Helps meet **EU Green Deal** and **ESG** reporting requirements

- **PEF includes:**

- ✓ Carbon footprint
- ✓ Water use
- ✓ Air pollution
- ✓ Resource depletion

LCA vs PEF

- The PEF methodology is very similar to Life Cycle Assessment (LCA) and the common LCA calculation can be used for the PEF calculations.
- Just like LCA, PEF is science-based, clear, and quantifies all the environmental impacts over the entire life cycle of products. This includes products' emissions to water, air, and soil, resource use and depletion, the impact of land and water usage, etc.

However:

- PEF will be more stringent in its rules than a 'normal' LCA, due to it being a single method and the specificity of the PEF Category Rules as explained above.
- The PEF method and its database offer comparability, and are suitable for benchmarking products in the same product groups.

Before starting a PEF study

As a preliminary step, it is important to identify the right guidance document to follow. Check online if a PEFCR is available for the specific product you intend to assess:

a. If available, use the PEFCR

(https://ec.europa.eu/environment/eussd/smgp/ef_transition.htm).

b. If not available, use the PEF method Annex 1 to 2




















(https://ec.europa.eu/environment/publications/recommendation-use-environmental-footprint-methods_en).

This manual refers to the PEFCR for Apparel and Footwear (v 1.3), thereafter, referred to as 'the PEFCR'.

PEFCR (Product Environmental Category rules)

- Product specific rule
- Harmonization
- Methodology alignment
- Environmental impact categories
- Benchmarking
- Transparency

Product Environmental Category Rules (PEFCRs)

- | | |
|---|---|
|  Batteries and accumulators |  Leather |
|  Beer |  Pet food |
|  Dairy products |  Pasta |
|  Decorative paints |  Thermal insulation |
|  Feed for food-producing animals |  Wine |
|  IT equipment |  Packed water |
|  Metal sheets |  Photovoltaic electricity generation |
|  Hot and cold-water piping systems |  T-shirts |
|  Intermediate paper products |  Uninterrupted power supplies |
|  Liquid laundry detergents | |

Interactive Session: Sustainability data-points

Go to www.menti.com
Enter the code **8618 0008**

Or use QR code



Discussions

- Environmental impact assessment practices
- Strategies to reduce waste and pollution in textile industry
- How can we ensure ethical sourcing in textile industry?

ToT-Day 1 Session-4: DPP for Circularity

DPP for Circularity

The Current State: Linear vs. Circular

The Linear Model: A One-Way Street of Consumption

Process Flow:

1. **Take:** Extract virgin raw materials (cotton, oil for synthetics).
2. **Make:** Manufacture products using energy, water, and chemicals.
3. **Use:** Products are consumed for a limited time.
4. **Dispose:** Products are discarded as waste, often ending up in landfills or being incinerated.

Characteristics:

- Relies on finite resources and cheap energy.
- Generates massive amounts of waste at every stage.
- High externalized environmental and social costs.

Outcome:

- Leads to resource depletion, pollution, and significant value loss.



What is the Circular Economy?

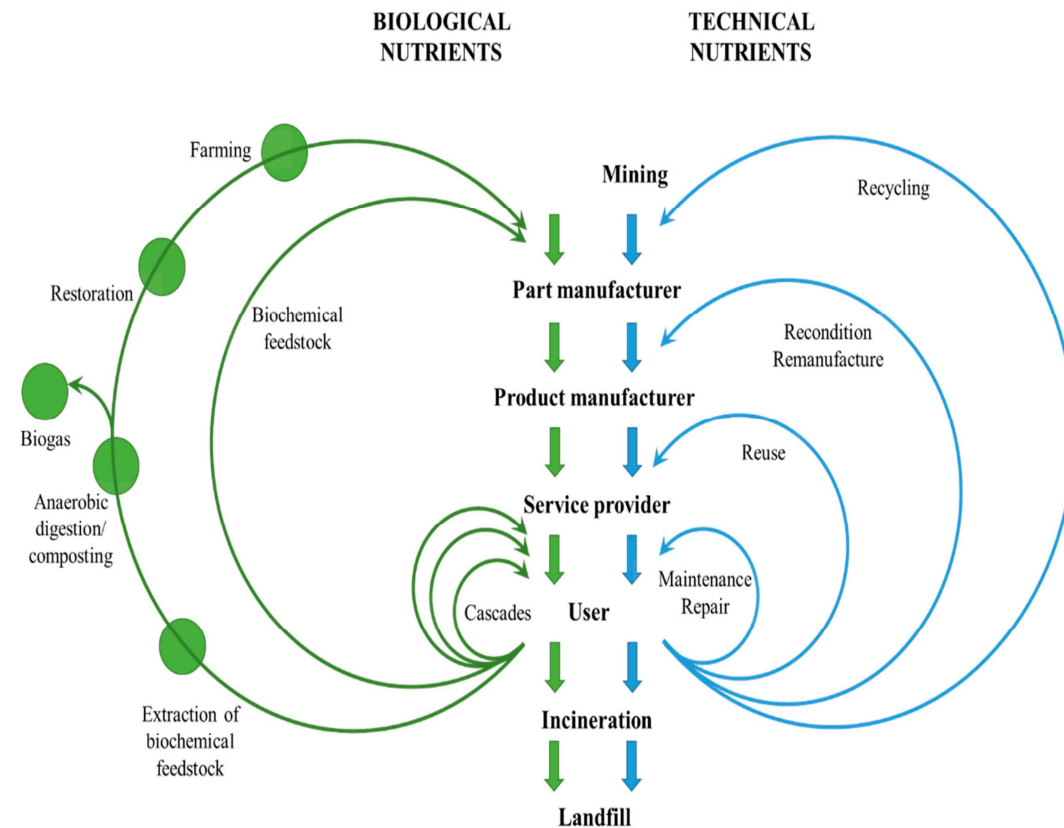
Core Concept:

A regenerative system where resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling.

Key Principles (Ellen MacArthur Foundation):

- 1. Design out waste and pollution:** Eliminate negative impacts from the outset.
- 2. Keep products and materials in use:** Maximize utility and value through extended use and multiple cycles.
- 3. Regenerate natural systems:** Return biological materials safely to the biosphere, and restore ecosystems.

Shift from Linear to Circular: A fundamental paradigm shift in how we produce and consume.



EU Strategy for sustainable and circular textile

Objectives

The Strategy aims to create a greener, more competitive sector that is more resistant to global shocks. The Commission's 2030 vision for textiles is that:

- all textile products placed on the EU market are **durable, repairable and recyclable**, to a great extent made of **recycled fibres, free of hazardous substances**, produced in respect of **social rights** and the **environment**
- **“fast fashion is out of fashion”** and consumers benefit longer from high quality affordable textiles
- profitable **re-use** and **repair** services are widely available
- the textiles sector is competitive, resilient and innovative with producers taking responsibility for their products along the value chain with sufficient capacities for recycling and minimal incineration and landfilling

EU actions

The Strategy lays out a forward-looking set of actions. The Commission will

- Set design requirements for textiles to make them last longer, easier to repair and recycle, as well as requirements on minimum recycled content
- Introduce clearer information and a **Digital Product Passport**
- Reverse overproduction and overconsumption, and discourage the destruction of unsold or returned textiles
- Address the unintentional release of microplastics from synthetic textiles
- Tackle **greenwashing** to empower consumers and raise awareness about sustainable fashion
- Introduce mandatory and harmonised **Extender Producer Responsibility** rules for textiles in all Member States and incentivise producers to design products that are more sustainable
- Restrict the export of textile waste and promote sustainable textiles globally
- Incentivise circular business models, including reuse and repair sectors
- Encourage companies and Member States to support the objectives of the Strategy

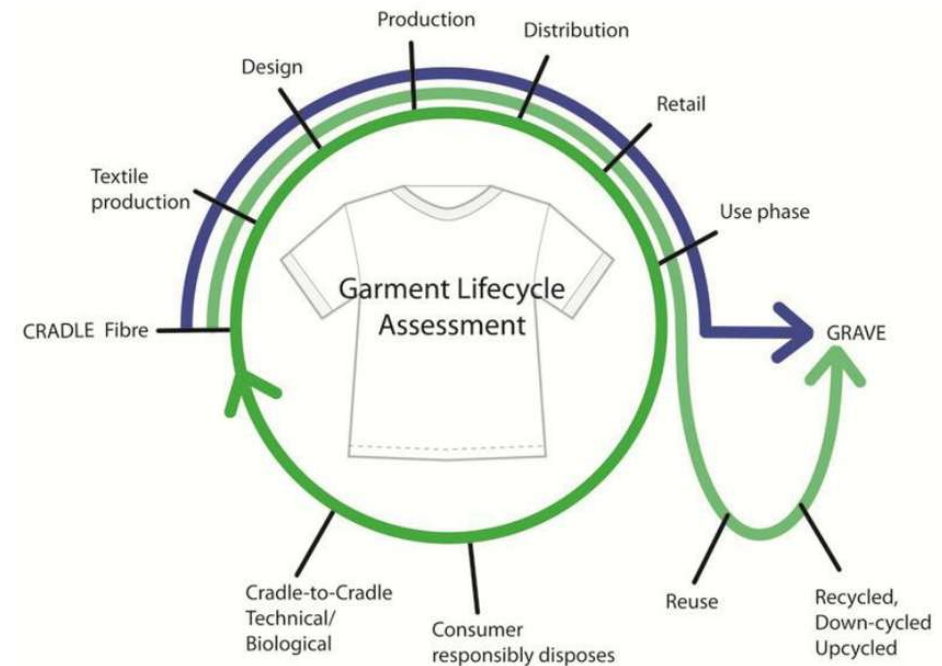
Why Circularity in Textiles?

- **Resource Security:**
 - Reduces reliance on volatile virgin raw material markets.
- **Economic Value Creation:**
 - New revenue streams from resale, repair, recycling, and innovative business models.
- **Waste Reduction & Cost Savings:**
 - Minimizes disposal costs and maximizes material value.
- **Innovation & Competitiveness:**
 - Drives product and process innovation, attracting new investment and talent.
- **Brand Loyalty & Consumer Trust:**
 - Appeals to conscious consumers and strengthens brand reputation.
- **Regulatory Preparedness:**
 - Positions businesses ahead of upcoming circular economy legislation (e.g., Extended Producer Responsibility).
- **Environmental Resilience:**
 - Reduces ecological footprint, contributing to climate goals.



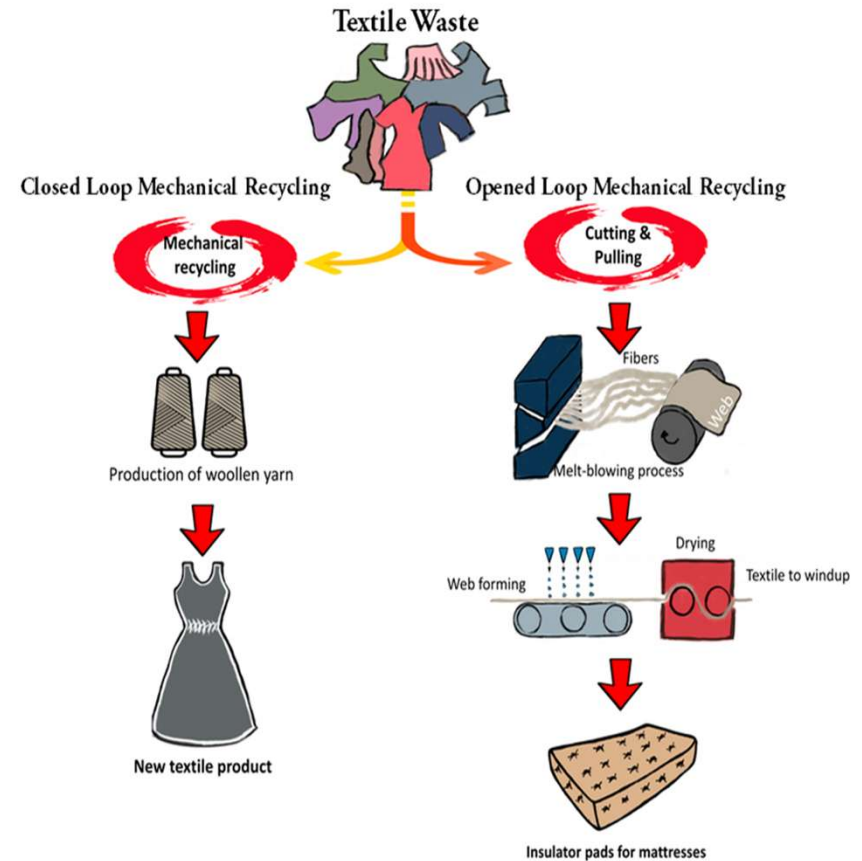
Circular Design Principles: Designing for Longevity

- **Durability:**
 - Using high-quality materials and construction techniques to ensure products withstand wear and tear.
- **Timeless Aesthetics:**
 - Designing classic styles that don't quickly go out of fashion and reducing impulse purchases.
- **Repairability:**
 - Incorporating features that allow for easy repair (e.g., accessible seams, replaceable zippers).
- **Modularity:**
 - Designing components that can be easily replaced, updated, or repurposed.
- **Versatility:**
 - Creating multi-functional garments that serve various purposes.



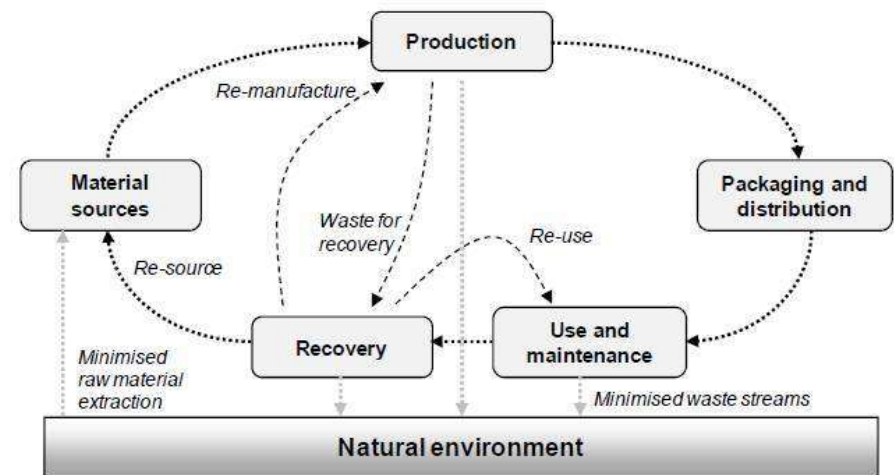
Circular Design Principles: Designing for Recyclability

- **Mono-Material Design:**
 - Using a single type of fiber (e.g., 100% cotton, 100% polyester) to simplify recycling.
- **Minimizing Blends:**
 - Avoiding complex fiber blends that are difficult to separate for recycling.
- **Detachable Components:**
 - Using easily removable buttons, zippers, labels, and embellishments.
- **Non-Toxic Dyes & Finishes:**
 - Ensuring materials are safe for recycling processes and don't contaminate recycled streams.
- **Digital Product Passports (DPP):**
 - Embedding information about material composition and recyclability for future processors.



Circular Production Processes: Resource Efficiency

- **Waste Minimization at Source:** Optimizing cutting patterns, reducing fabric offcuts, and minimizing defects.
- **Closed-Loop Systems in Manufacturing:**
 - **Water Recycling:** As discussed, the reusing process involves water.
 - **Chemical Recovery:** Capturing and reusing chemicals from dyeing and finishing.
 - **Energy Recovery:** Utilizing waste heat from machinery.
- **Lean Manufacturing Principles:** Identifying and eliminating waste in all forms (materials, time, energy).
- **Digitalization & Automation:** Using data analytics to optimize production parameters and reduce resource consumption.



Examples of Circular Business Models in Different Sectors

| Sector | Company/Example | Circular Practice |
|---------------|----------------------|---|
| Fashion | Patagonia | Repair & reuse program, recycled materials |
| Electronics | Fairphone | Modular phones – easy to repair & upgrade |
| Furniture | IKEA (Sweden) | Take-back & resale of used furniture |
| Food | Too Good To Go (App) | Sells surplus food from restaurants & stores |
| Automotive | Renault (France) | Vehicle parts remanufacturing & reuse |
| Textiles | The Renewal Workshop | Refurbishes and resells unsellable apparel |
| Plastic Waste | Terracycle | Recycles hard-to-recycle waste (e.g., pens, wrappers) |

Interactive Session: Circularity Data Survey

Go to www.menti.com
Enter the code 1170 4548

Or use QR code



Discussions

- How can brands design products to be more **durable, recyclable, or biodegradable**?
- What role does **second-hand fashion** or **rental clothing** play in promoting circularity?
- Should governments regulate textile waste and pollution more strictly?



NETWORKING & TEA-BREAK

Awareness Session-4: Feedback

- Case study
- Post-awareness assessment
- Questions and Answers, Wrap up and Closing



Q&A Session



Training for Trainers- Day 2

By
Dr. Fahim Chowdhury

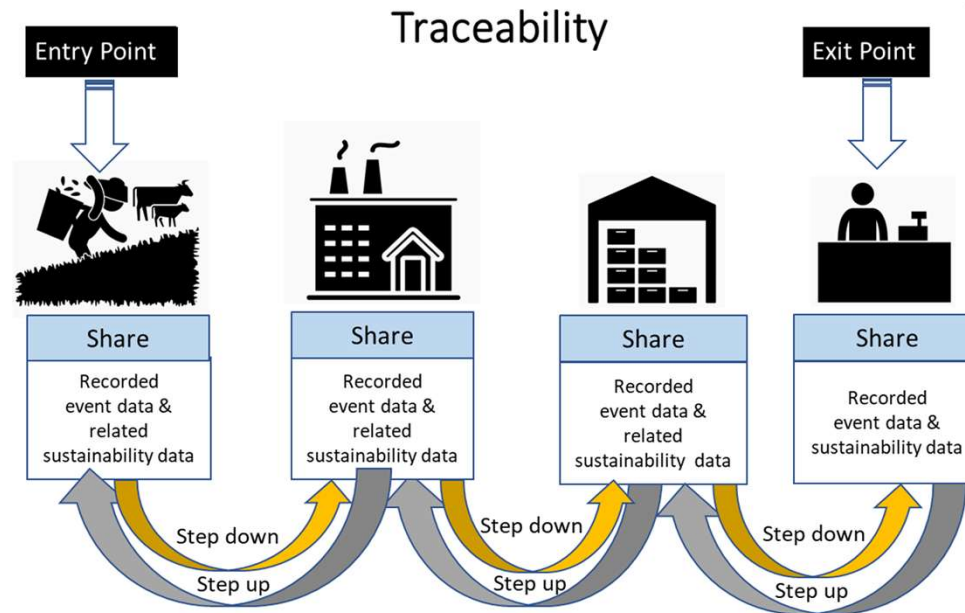
Day 2 Session-1: Supply Chain and traceability

- Complexity in textile supply chain
- Group Discussion

Ensuring Traceability in Textile Industry

Traceability - The "Journey" of a Product

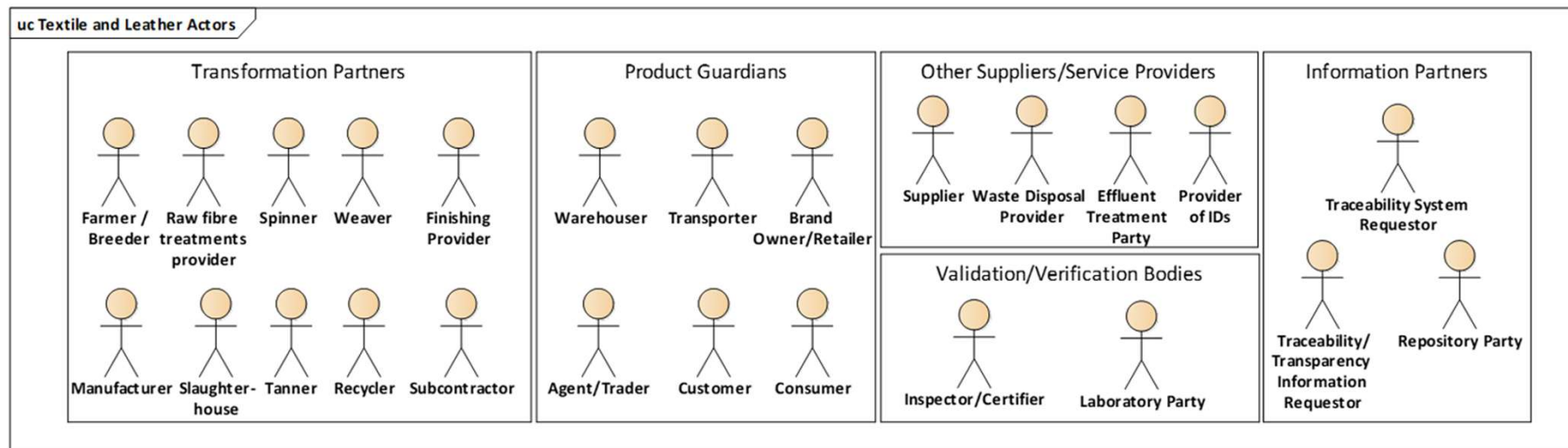
- Traceability is about knowing where a product or material has been and where it's going.



Traceability across organizations in the value chain

The Foundation of Traceability: The Five Ws

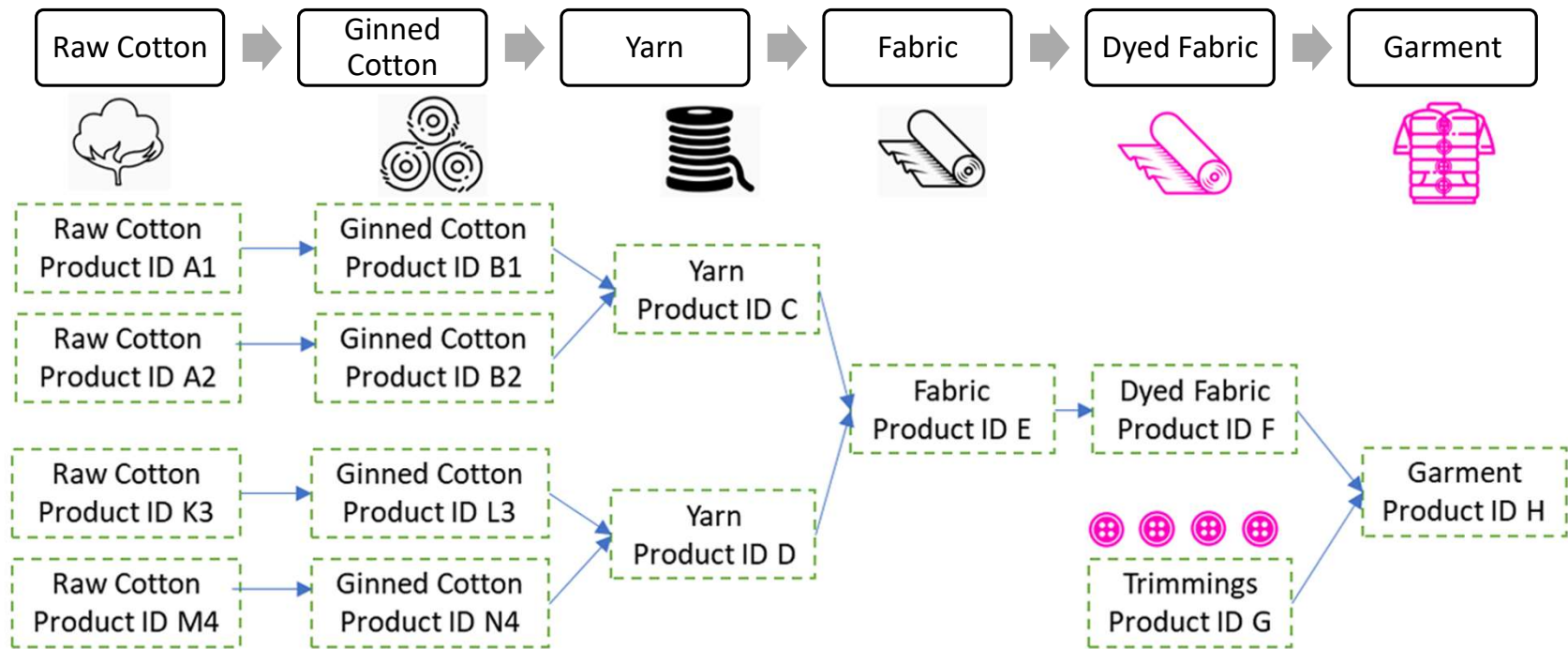
- Effective traceability relies on recording data about
1. **Who:** Which party or organization handled the asset?



Business partners in the textile and leather sector

The Foundation of Traceability: The Five Ws (2)

2. What: What is the specific material or product?



Traceable assets and IDs

The Foundation of Traceability: The Five Ws (3)

3. **When:** When did the event occur?
(Date and Time)



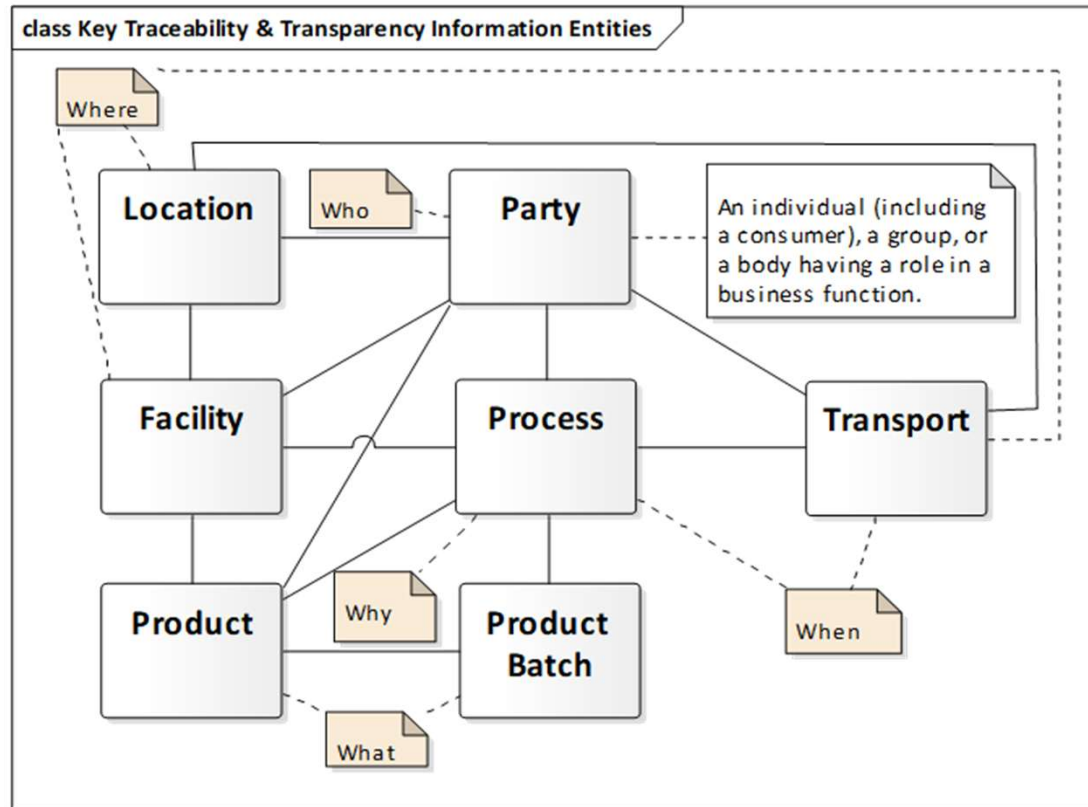
4. **Where:** Where did the event take place?
(Location, Facility)



5. **Why:** Why did this event happen?
(Process, action taken)



Key Traceability Information Entities Canonical Data Model

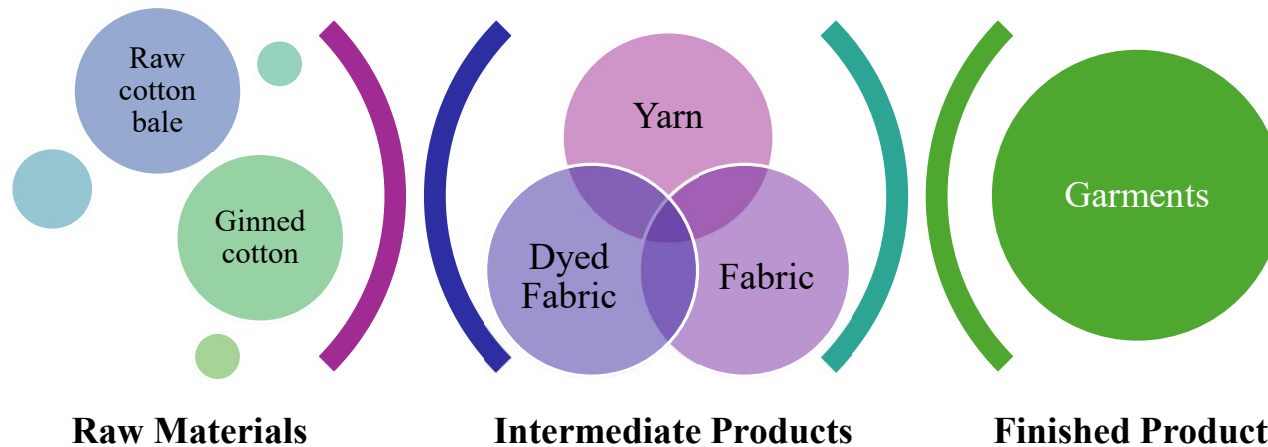


Traceable Assets: From Fiber to Fashion

- **Definition:**

- Any item (for example, an object, a product, or other traded item, or a service) that needs to be tracked along a supply chain.

- **Examples in textiles**



Unique Identifiers: The Digital Fingerprint of Traceability

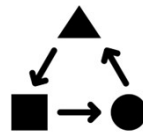
- **Importance:**



Accessible



Traceable



Interoperable



Reusable



Accurate

- Ensures clarity and avoids ambiguity in tracking.
- Globally unique identifiers (e.g., ISO/IEC 15459, GS1 standards) facilitate international trade and data exchange.

Beyond Tracking: Achieving Transparency and Accountability

- Definition of transparency: Information is made available to all elements of the value chain in a standardized way, which allows for common understanding, accessibility, clarity and comparison.
- Visibility is achieved through sharing data, with control over sensitive information.
- Allows stakeholders (consumers, regulators, brands) to verify sustainability claims.
- Builds trust and strengthens brand reputation.
- Enables responsible sourcing and supply chain management.

Compliance and Risk Reduction

- Increasing number of national and international regulations concerning product origin, materials, labour practices, and environmental impact.
- Traceability provides the data infrastructure to prove compliance.
- **Mitigates risks associated with:**
 - Illegal trade.
 - Forced labor or child labor.
 - Environmental violations
 - Water pollution, hazardous chemicals
 - Product recalls and quality issues.



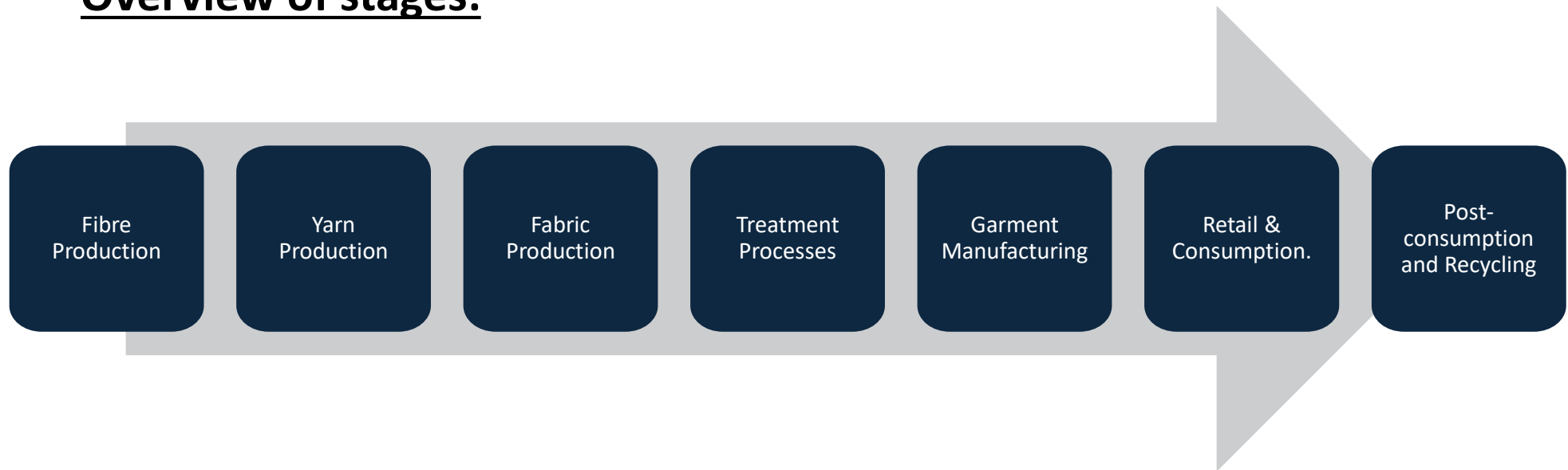
Business Benefits: Competitiveness and Efficiency

- **Enhanced Brand Value:**
 - Meeting the ethical sourcing demands of international buyers.
- **Market Access:**
 - Unlocking new markets that prioritize sustainable supply chains
- **Operational Efficiency:**
 - Improved inventory management, waste reduction, and process optimization
- **Cost Savings:**
 - optimizing processes, reducing waste, improving efficiency, and enabling better risk management throughout the supply chain
- **Innovation:**
 - Fosters innovation in sustainable materials and processes.
- **Investment Attraction:**
 - By reducing risks, improving efficiency, and enhancing brand reputation



The Textile Value Chain: From Fiber to End-of-Life

- Overview of stages:



- Many actors involved

- Farmers, Ginners, Weavers, Manufacturers, Brand Owners, Recyclers

Fibre Production: The Starting Point

- Sourcing Our Fibres: The Foundation of Traceability



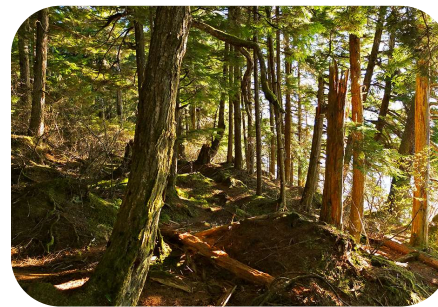
Natural Plant
Fibres

Growing, harvesting,
separating, cleaning



Natural Animal-
based Fibres

Raising animals,
shearing, cleaning,
scouring, washing



Human-made
Cellulose-based Fibre

Extraction from wood,
chemical transformation



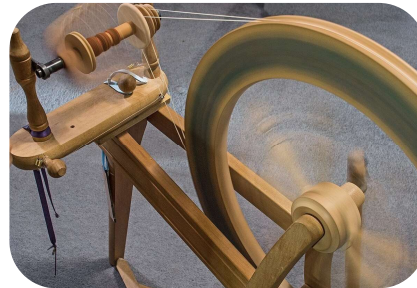
Human-made
Synthetic Fibre

Chemical transformation
from petrochemicals or
biomass

From Spinning to Recycling: Key Processes

- **Transformations:**

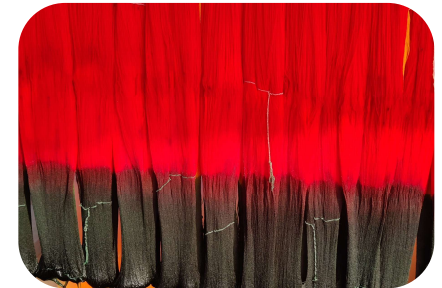
- Linking processes and Information



Spinning



Weaving/Knitting



Finishing (Dyeing, Printing, Washing)

- At each stage, "transformation processing points" require recording input/output IDs.



Garment Manufacturing



Consumption and Recycling

What Data Do We Need to Collect?

- The Data Backbone: What Information is Key?

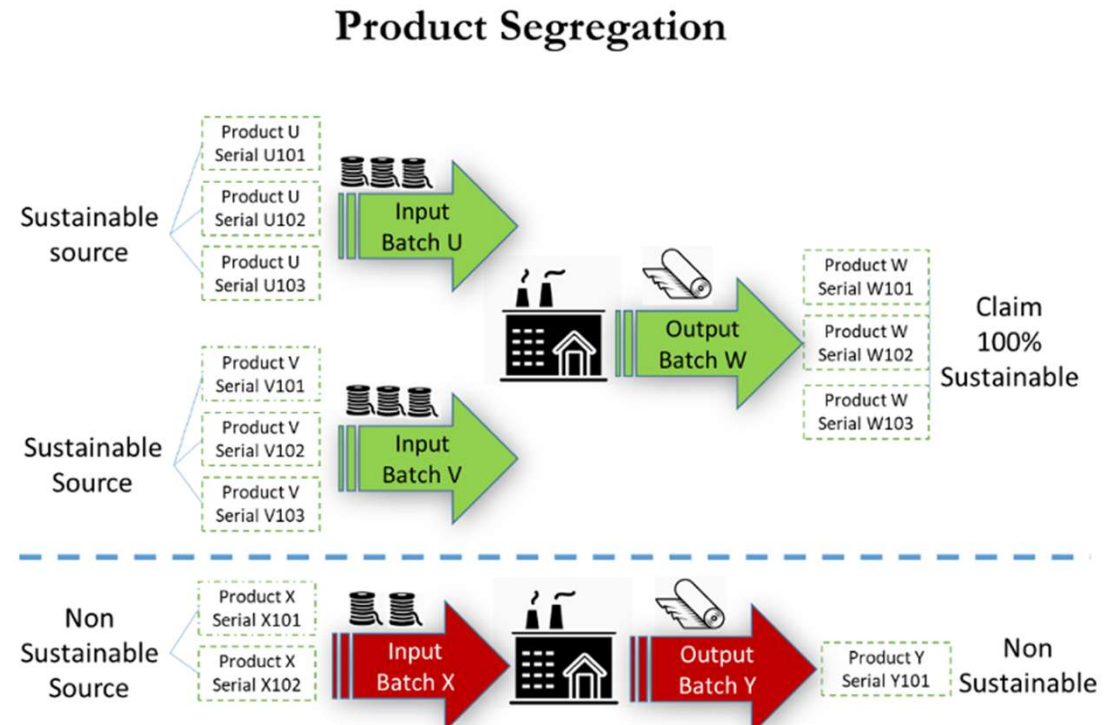
| | |
|--------------------------------|---|
| Event Information (The 5 Ws) | Core to establishing traceability |
| Sustainability Characteristics | Emissions, water use, labor conditions, certifications |
| Product Information | Colour, size, materials used, treatments applied, quality |
| Process Information | Inputs/outputs, resources used (energy, water), production cycle |
| Certificates | Product, process, and organization certificates linked to inspections |
| Inspection Results | Along with standards, methods, and corrective actions |

Complexity of the Global Supply Chain

- **Fragmented Nature:**
 - Many small and medium-sized enterprises (SMEs) globally, especially at the early stages of the supply chain
- **Multiple Tiers:**
 - Difficulty in identifying all actors and processes involved across numerous tiers.
- **Geographical Dispersion:**
 - Materials often cross multiple borders and continents.
- **Lack of Standardization:**
 - Different data formats, varying levels of digital maturity among partners

Product Segregation (Identity Preservation)

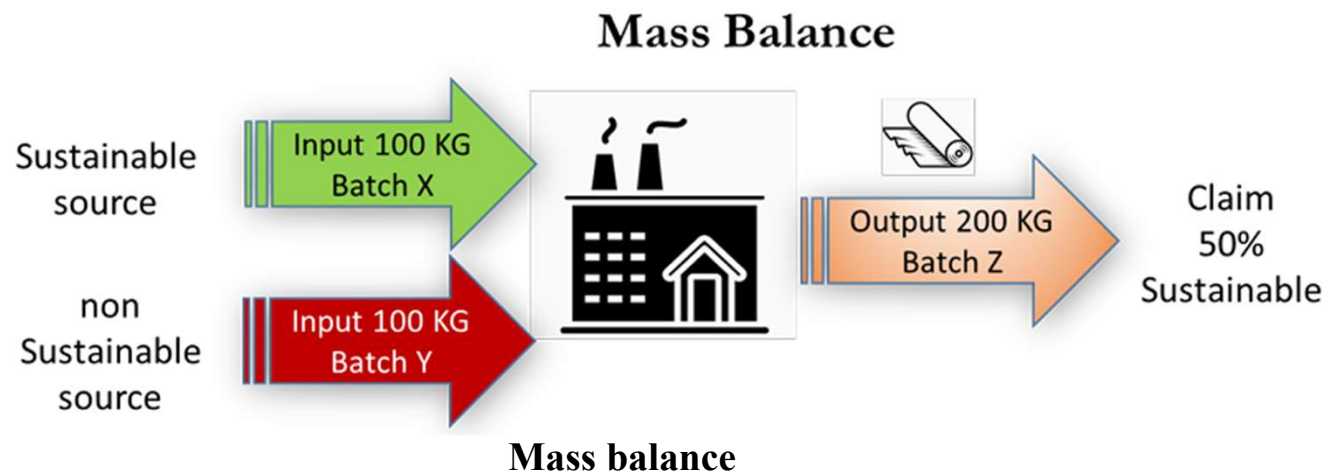
- Requires a well-defined process and administration.



Segregation of products and raw materials

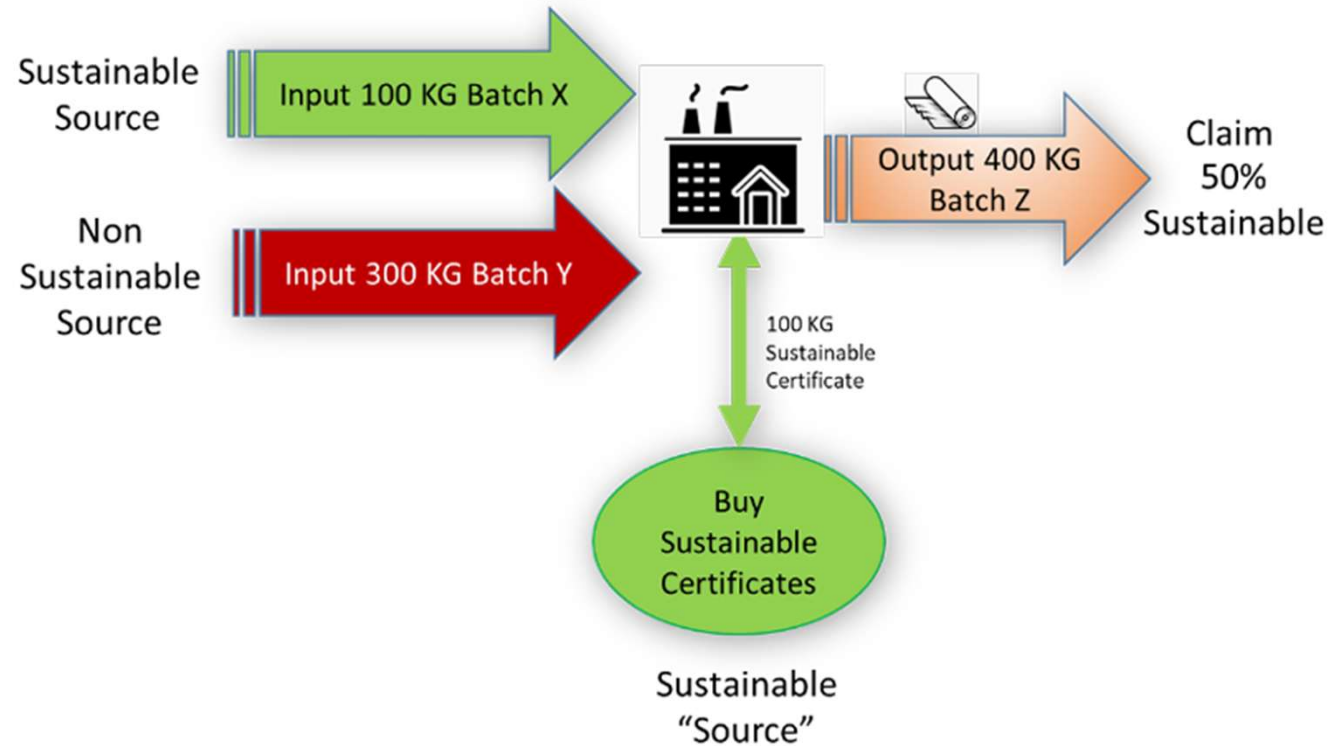
Mass Balance

- Sustainable and non-sustainable sources are mixed.
- An exact account is kept about their volume/weight ratios.
- **Purpose:** Guarantee that the amount of sustainable content claimed is equal to the amount of sustainable products or materials used.



Book and Claim (Assertion)

- Sustainable and non-sustainable sources are mixed without tracking their relative volumes, and the right to claim sustainable sourcing is traded in the form of sustainability certificates.



Book and claim (assertion)

Product Segregation method

Product Segregation Challenges:

- Maintaining strict separation of certified/sustainable materials from non-certified ones is often difficult or impractical, especially for bulk commodities like cotton.
- **Mass Balance Model Limitations:**
 - While allowing mixing, it requires a stringent accounting of volume and weight ratios to ensure sustainable content claims. Without robust systems, this can be challenging to verify
- **"Book and Claim" Model:**
 - Addresses mixing by trading sustainability certificates, but there's no physical link between the certified input and the final product, potentially raising consumer skepticism if not well-communicated.

Barriers

Overcoming Hurdles: Data, Trust, and Investment

- **Data Silos:**
 - Information often resides in disparate systems, preventing holistic views.
- **Trust and Confidentiality:**
 - Companies may be hesitant to share sensitive business data with competitors or even partners.
- **Cost of Implementation:**
 - Investing in new technologies and systems can be a barrier for smaller enterprises.
- **Lack of Digital Literacy:**
 - Some actors in the supply chain may lack the technical capabilities for digital data capture and exchange.
- **Data Integrity:**
 - Ensuring the accuracy and reliability of data across the entire chain.

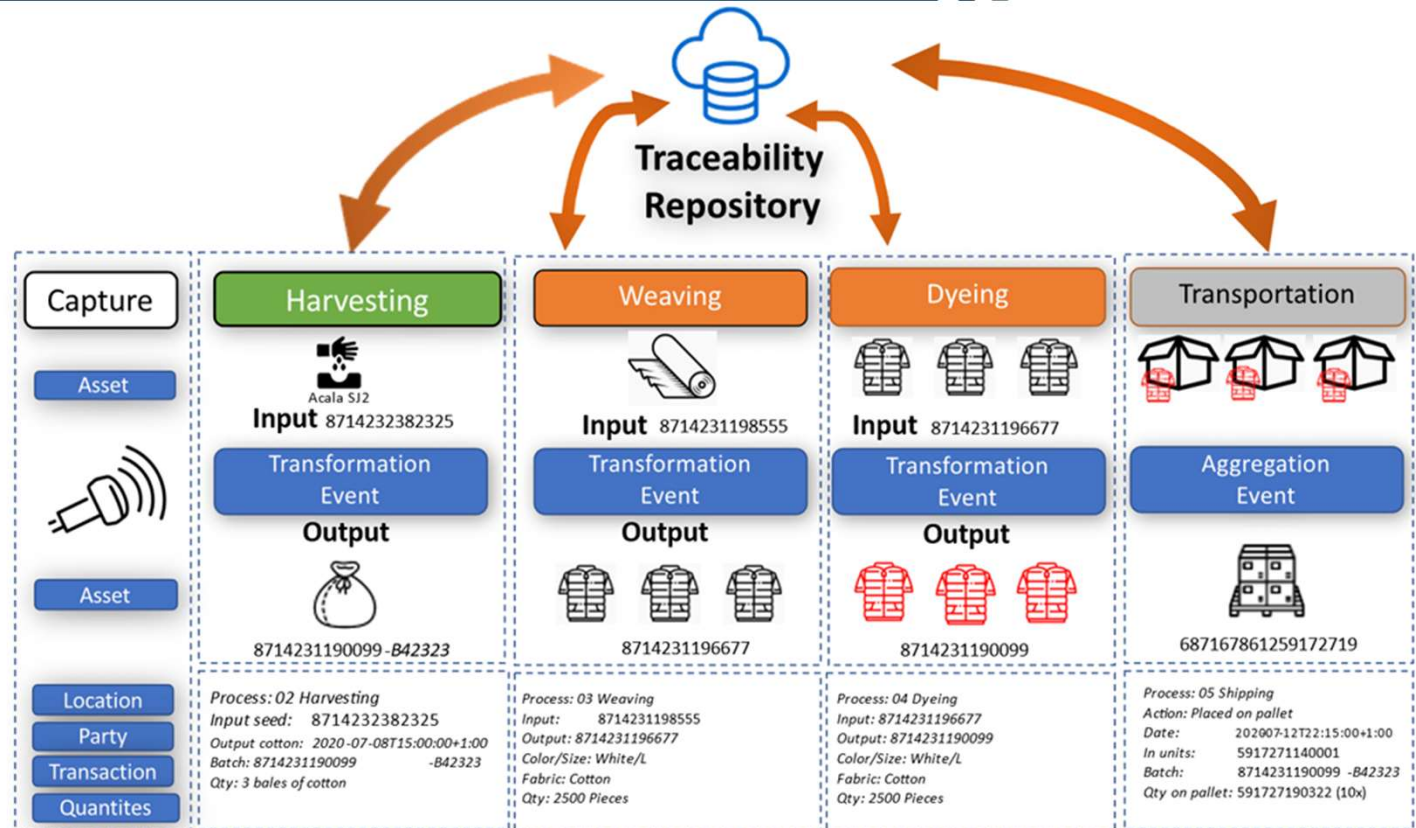
Digital Solutions:

- **Concept:**

- A standard (ISO/IEC 19987) for sharing event information in "shared traceability repository."

- **Functionality:**

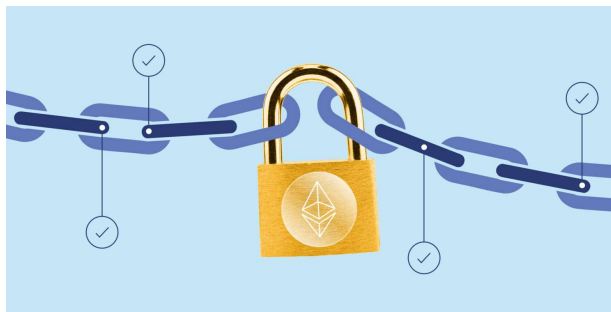
- Stores key event data (the 5Ws) for instant sharing, providing an overview "across organizations within the supply chain."



A repository for traceability, visibility and sharing

Digital Enabler: Blockchain Technology

- **Concept:**
 - A "distributed ledger that registers transactions in a highly trustworthy, time-ordered manner."
- **Benefits:**
 - Provides "proof that transactions have happened and that the data have not been altered."
- **Data Integrity:**
 - Cryptographic hashes provide "proof of data content (i.e. digital fingerprint)."



Solutions & Innovations

- **Technological Tools:**

- Blockchain-based traceability platforms
- QR code & RFID for physical product tagging
- AI for quality & sustainability pattern tracking

- **Standards & Certifications:**

- different aspects of sustainability and ethical production in the textile industry
- GOTS, OEKO-TEX, Fair Trade, BCI



Interactive Session: DPP data-points vote

Go to www.menti.com
Enter the code 2752 9805

Or use QR code



Discussions

- Experience on Traceability Solutions



NETWORKING & TEA-BREAK

Day 2 Session-2: Deep dive on DPP

- Technical Requirements
- Digital Platforms and Data Space
- Interactive Session

Key Legal Requirements as per Battery Regulation and ESPR

- A persistent, **unique** product identifier
- A machine-readable **data carrier** based on standards
- Use of **open standards**
- An open, interoperable **data exchange** network without vendor lock-in
- Interoperable and machine-readable **data formats**
- **Free of charge** and easy access, based on defined access rights
- **No secondary use** without consent (data usage control)
- Decentralized data storage, meaning information stored by the REOs or a certified independent **third-party product passport service provider** authorized to act on their behalf
- Archiving: **Availability of a back-up copy** through a certified independent third-party DPP service provider
- DPP information points may be either **static** or **dynamic** (updatable)
- DPP information points may be either **public** or have **restricted** access conditions.

DPP Systems- Technical Standard Stack

Domain data ecosystem

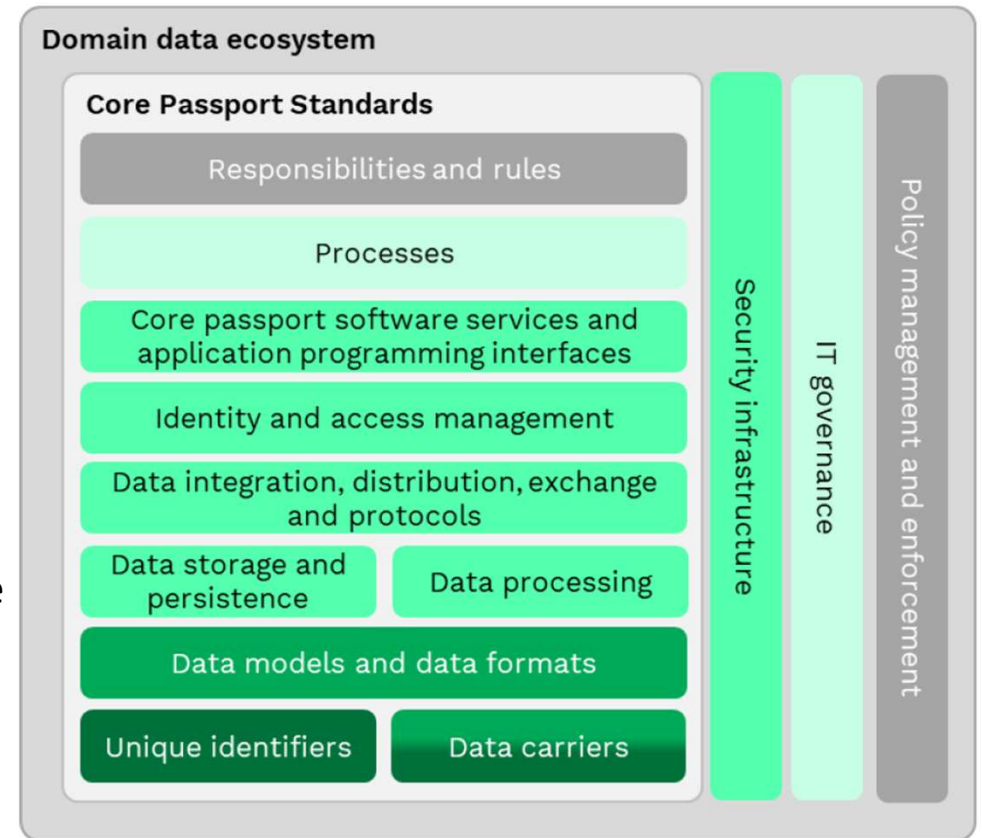
the totality of DPP relevant data, in this case textile, and their relationships to each other.

Responsibilities and rules

Various roles by the participants and business rules in completing tasks.

For example:

- (i) when a change in the economic operator responsible for a DPP. Such transitions must be executed seamlessly
- (ii) bankruptcy scenarios involving companies responsible for data within the battery passport system.



DPP Systems- Technical Standard Stack

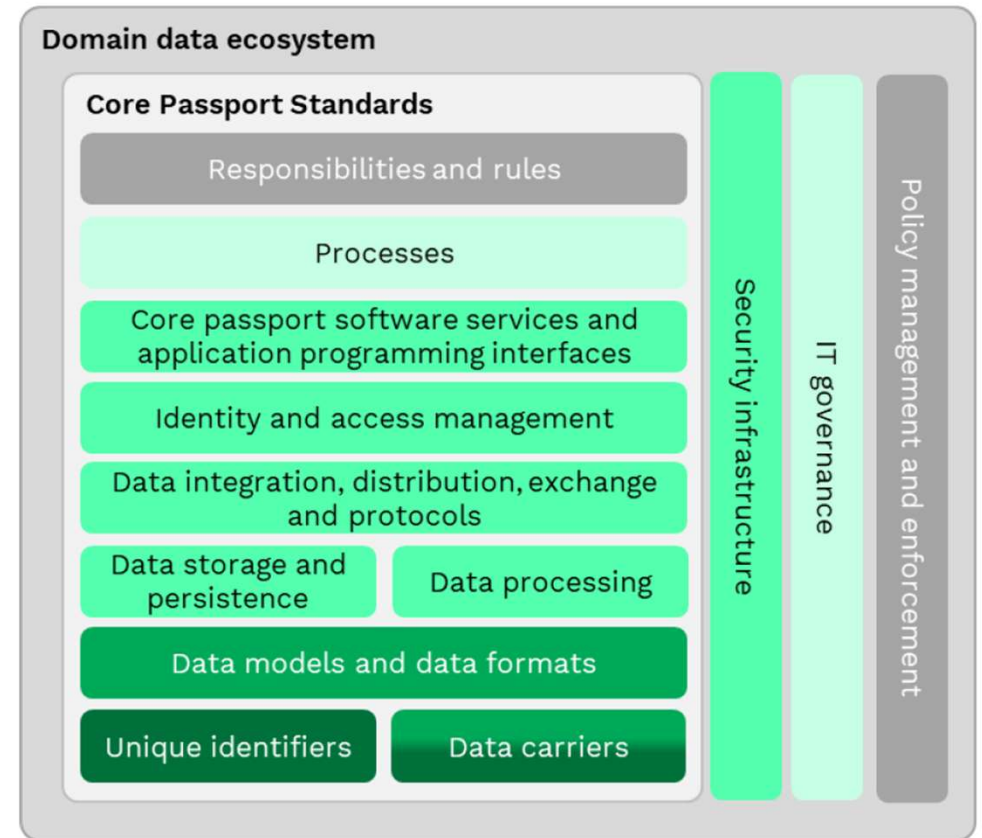
Process

A process is a “set of interrelated or interacting activities” that can be executed to realise one or more given objectives of an enterprise, a network or a part of an enterprise to achieve some desired end-result.

There exists typically:

Management process: resource management, business continuity management, performance management, risk, safety, security management, and the engineering change management

Data and information flow processes: These processes are touching with observation, classification, analysis, control, feedback, transformation and aggregation



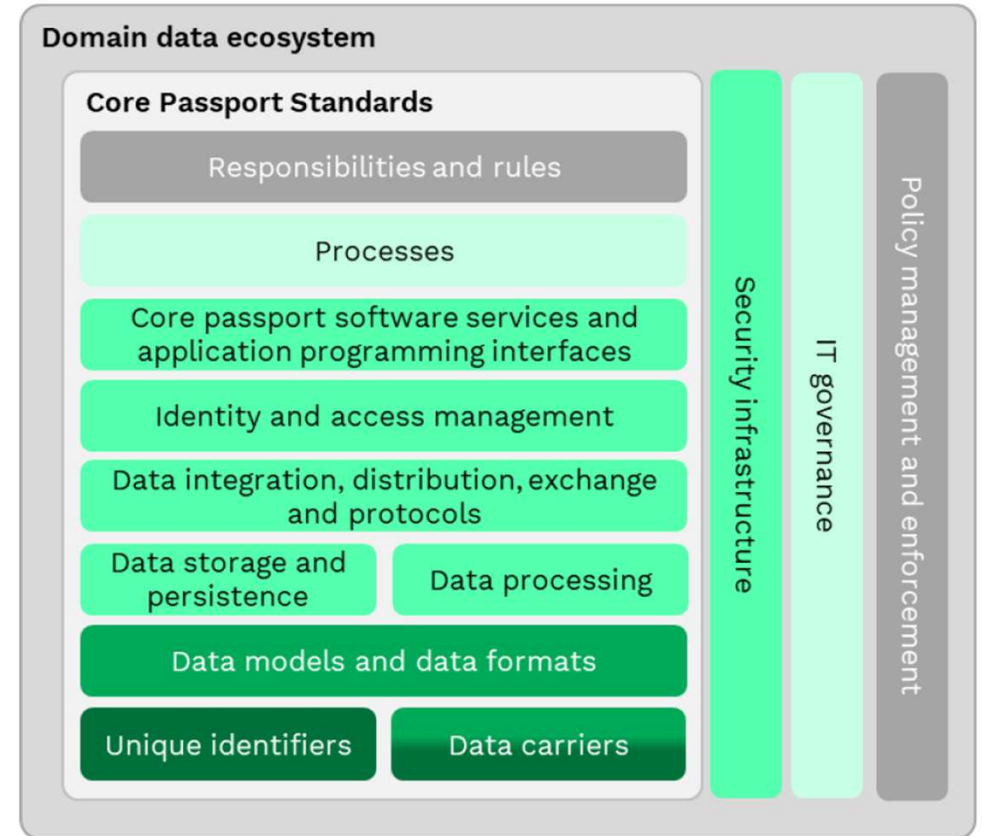
DPP Systems- Technical Standard Stack

Core passport software services and application programming interfaces: Key component

- Onboarding services
- Issuing services
- Update services
- Transfer services
- Archiving services
- Search, view and compare services

Standards: Web Services Description Language (WSDL), SOAP Messaging Framework, NGSi-LD (Next Generation Service

Interface-Linked Data), REST API , Catena-X ecosystem, W3C



DPP Systems- Technical Standard Stack

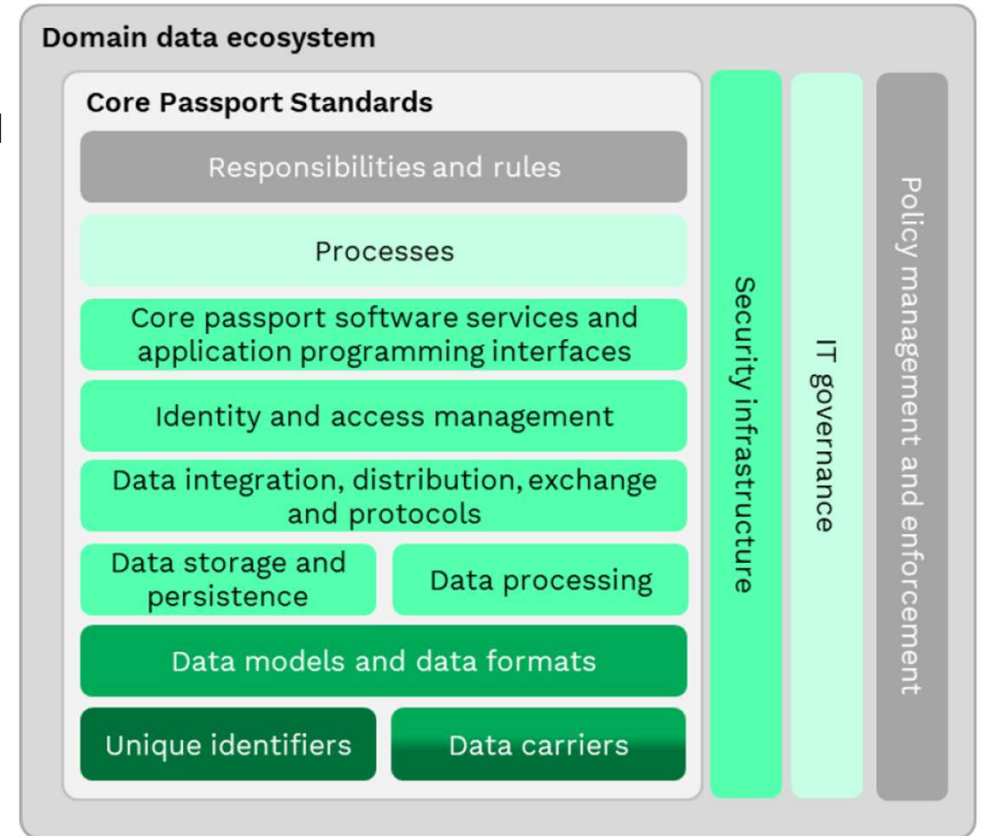
Identity and access management

The relevant actors and stakeholders in a decentralised digital passport ecosystem shall be identified and granted access to information in line with their respective access rights specified in upcoming delegated acts by the European Commission.

three major groups of actors:

- the public,
- Notified bodies, market surveillance authorities and the European Commission,
- any natural or legal person with a legitimate interest.

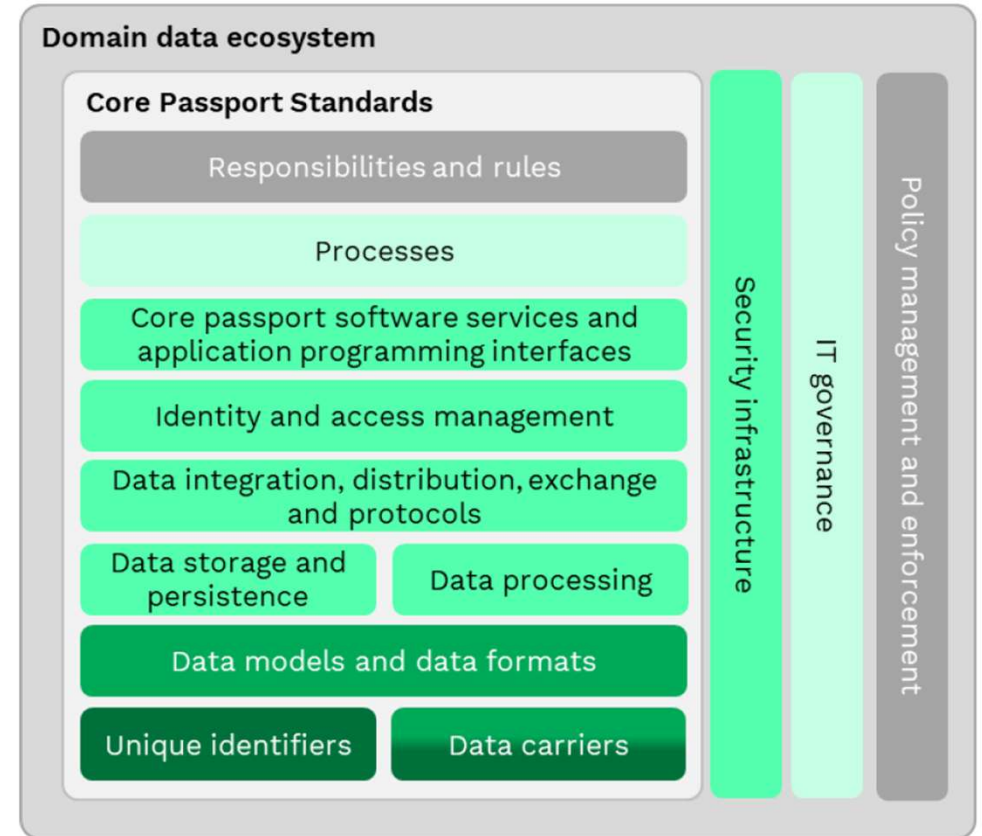
Standards: W3C DID Decentralised identifiers; W3C Verifiable credentials, eIDAS, Gaia-X trust framework



DPP Systems- Technical Standard Stack

Data integration, distribution, exchange and protocols refer to the different ways that systems use to collect and exchange data between different stakeholders and software components. There are e.g. APIs, file sharing platforms and Data Spaces.

ESPR states: “all data included in the digital product passport shall be based on open standards, developed with an interoperable format, and shall be, as appropriate, machine-readable, structured, searchable, and transferable through an open interoperable data exchange network without vendor lock-in,”
Standards: REST API, W3C JSON-LD, ETSI NGSI-LD API



DPP Systems- Technical Standard Stack

Data Storage and persistence

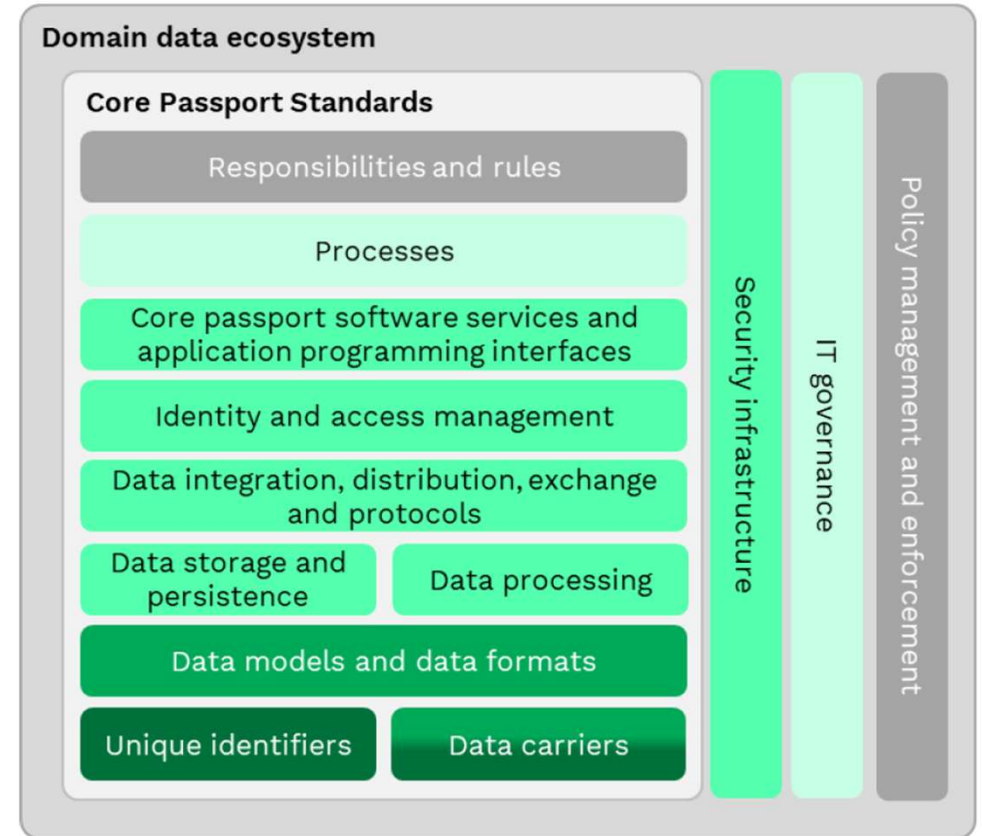
- the ability of data to survive beyond the current runtime or session after the application or system that created it has been shut down.
- each economic operator or a delegated DPP service provider is responsible for storing the DPPs
- To ensure reliable access to the DPP data, data storage is performed through high availability systems.

Examples: Graph database, NoSQL database

Data processing

Data processing can encompass a wide range of activities, including data entry, validation, verification, cleaning, aggregation, calculation, and visualisation.

The ultimate goal of data processing is to extract valuable insights, patterns, or knowledge from the data to support informed decision-making and improve business processes



DPP Systems- Technical Standard Stack

Data models and data formats

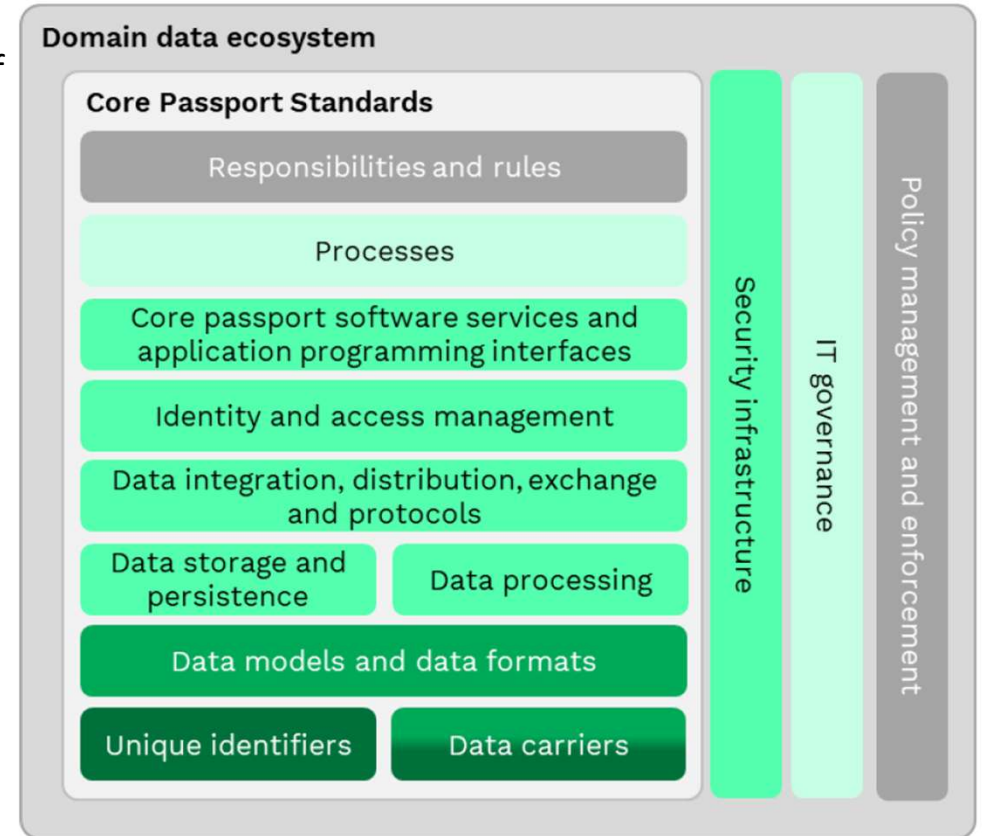
- A data model is a structured and organised representation of data that defines the relationships, attributes, constraints, and semantics of various elements within a system or domain.
- For interoperability purposes a common data model approach is necessary to ensure that data exchange can be performed in a reliable way.

Examples of data models and format: RDF, SHACL, JASON

Unique identifiers

Data processing can encompass a wide range of activities, including data entry, validation, verification, cleaning, aggregation, calculation, and visualisation.

The ultimate goal of data processing is to extract valuable insights, patterns, or knowledge from the data to support informed decision-making and improve business processes



DPP Systems- Technical Standard Stack

Unique identifiers

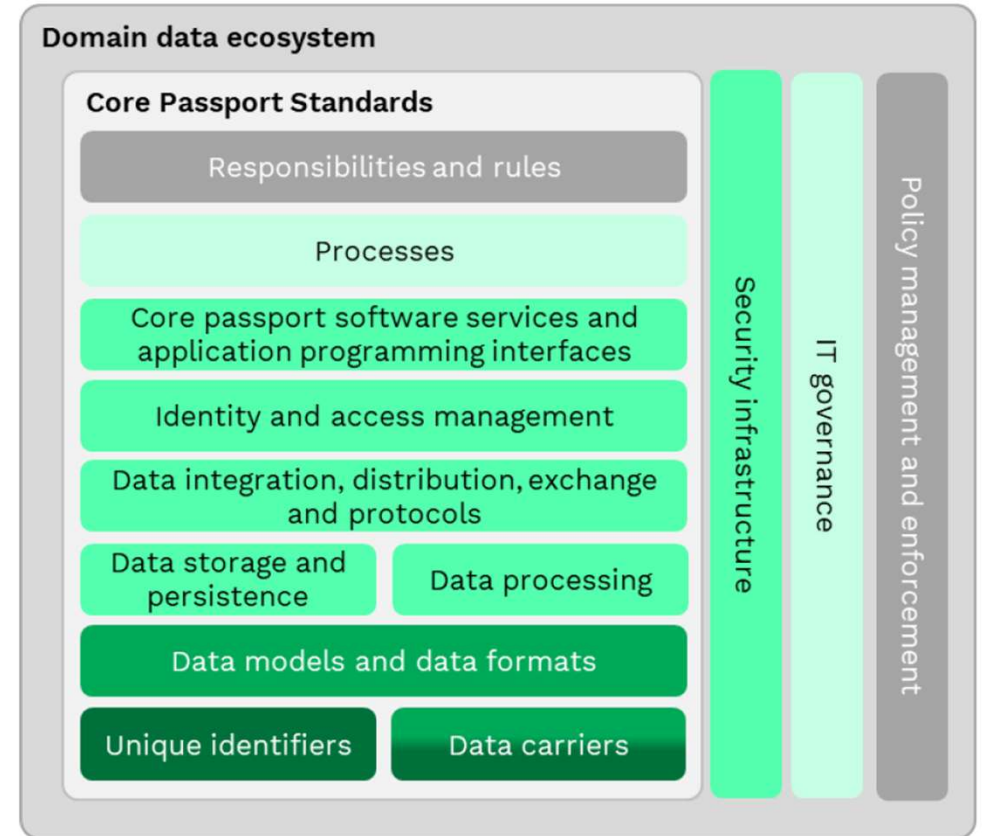
- DPP has its distinct and exclusive identifier.
- Organisations, individuals and facilities needs unique identifiers.

Standards: GS1, Uniform Resource Names (URNs),
Decentralised Identifiers (DIDs)

Data Carriers

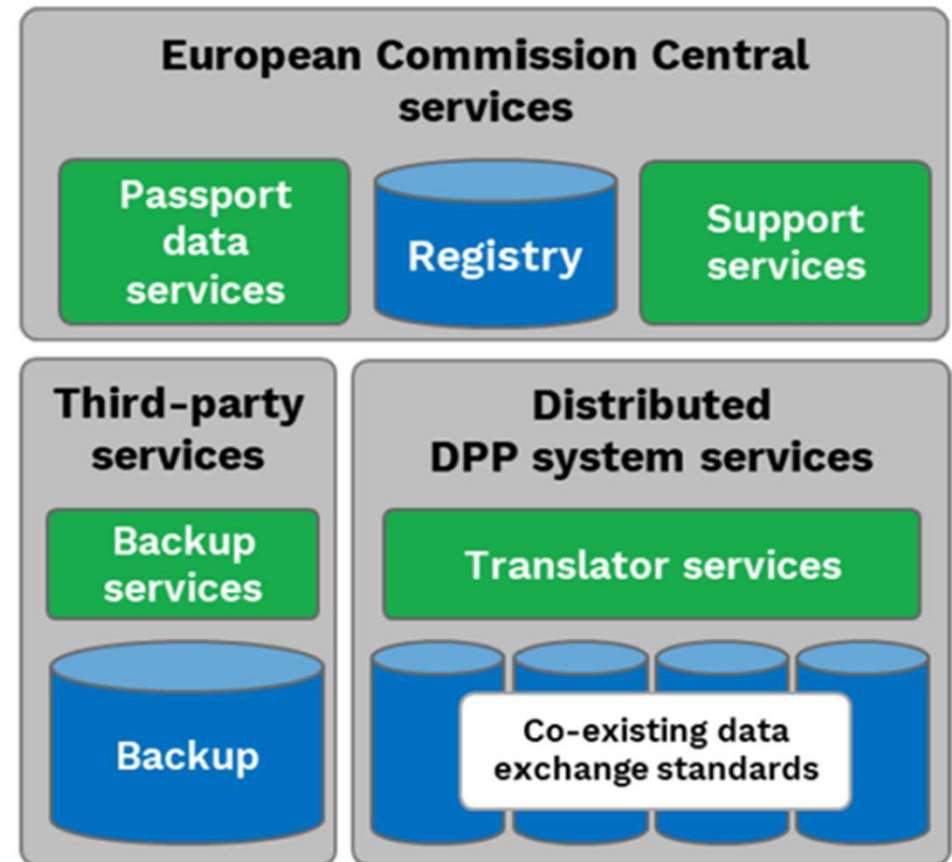
A data carrier, in the context of information technology and data management, is a medium or device used to store, transport, or transmit data.

Example: Data Matrix code, QR code, NFC Tag.



DPP System Architecture and Its Challenges

- Secure and reliable supply chain data acquisition and exchange
- Seamless and secure provision of access to different stakeholder groups with sector specific policies and rules
- Cross-domain interoperability
- Connectivity for dynamic data acquisition
- Application of data carriers



Data Space for DPP Solution

One Solution:

A data space is defined as a structured, decentralized **environment** designed to support secure and trusted data sharing and exchange within a larger data ecosystem based on common agreed principles.

Dataspace features:

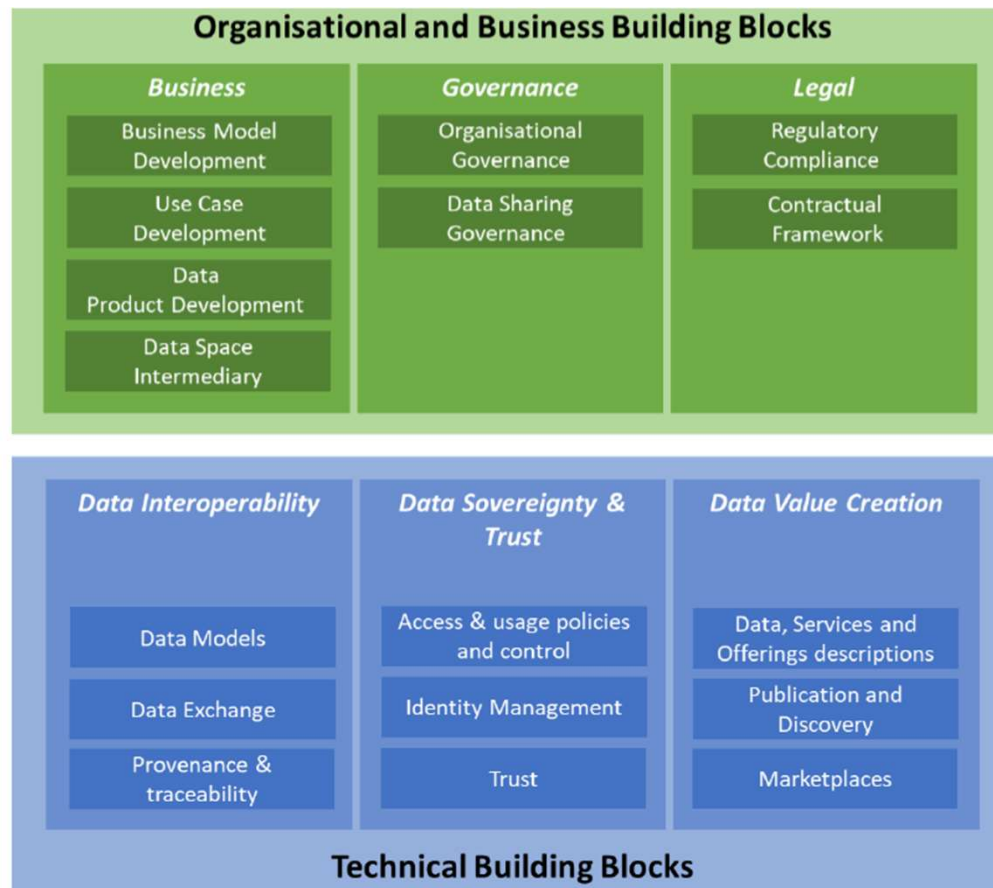
- **Trustworthy data sharing and exchange:** Trustworthy data sharing involves ensuring data integrity, privacy and security.
- **Common agreed principles:** data governance, data standards, security protocols, and other guidelines
- **Data ecosystem:** interconnected network of data sources, systems, and stakeholders within a specific domain or industry.
- **Data sovereignty:** the right of individuals, organizations, and governments to have control over their data, including decisions about its collection, storage, sharing, and use.
- **Data interoperability:** common rules and standards to connect several different endpoints.

European Strategy for Data

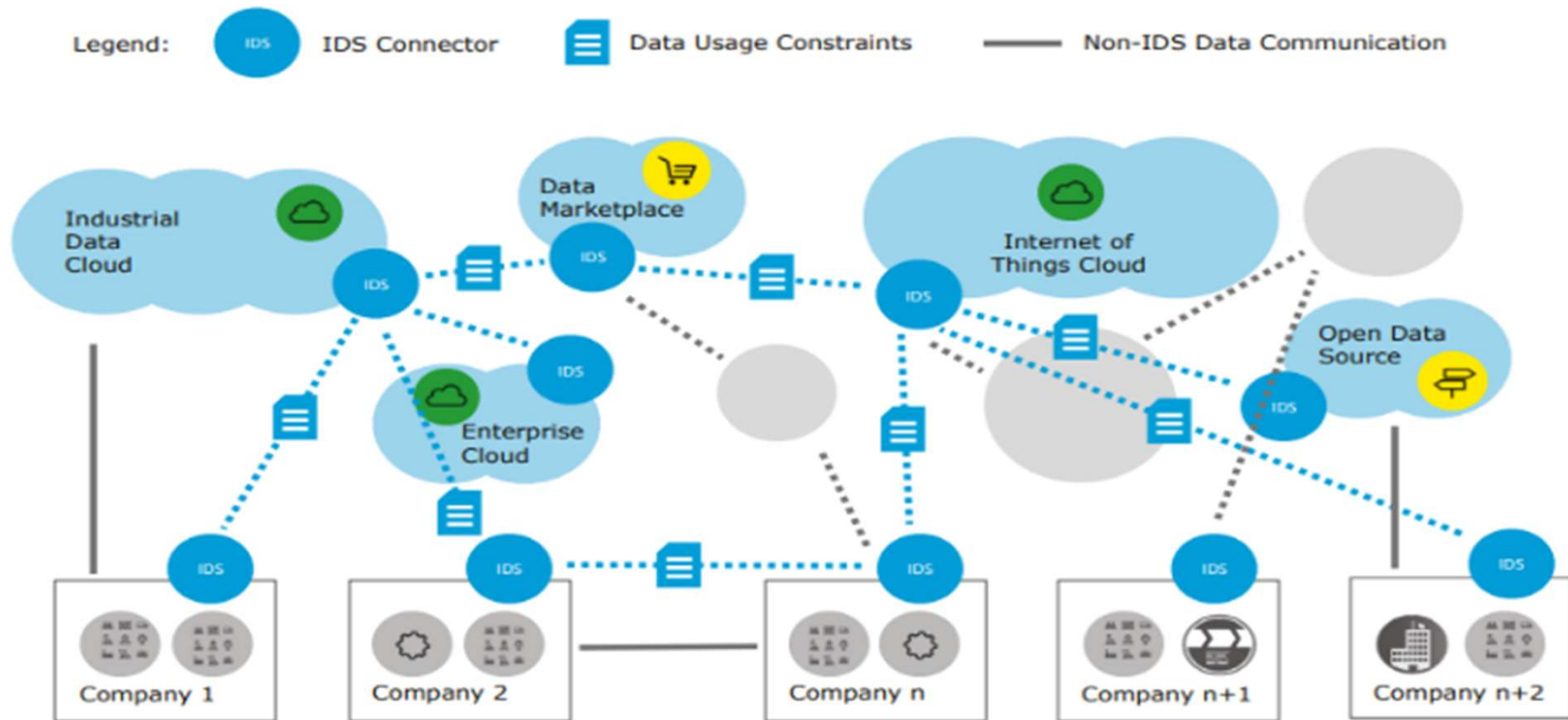
A common European data space, a single market for data



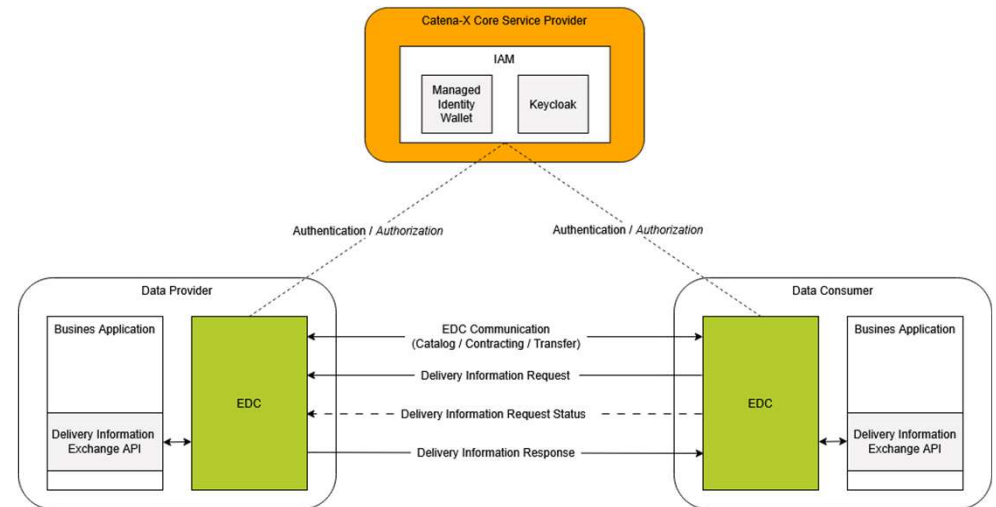
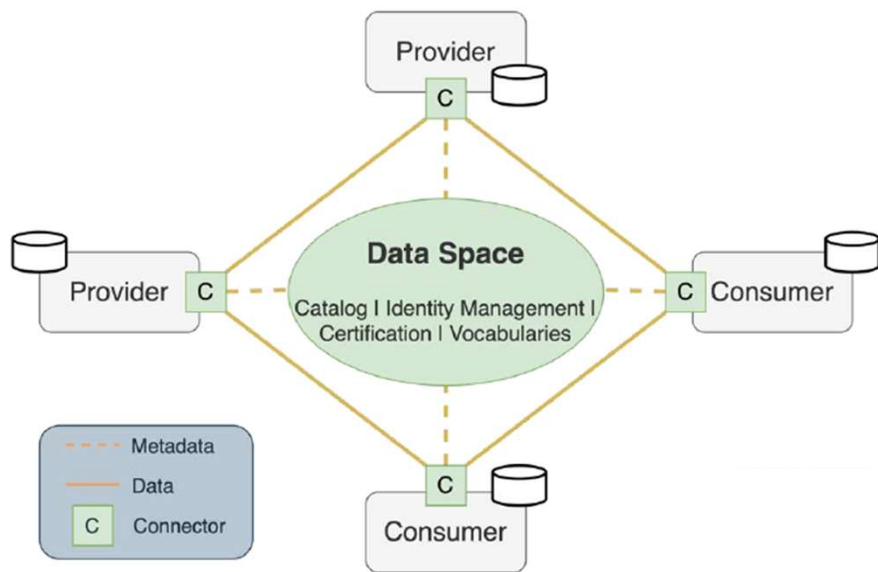
Building Blocks of Data Space



Example of Data Space

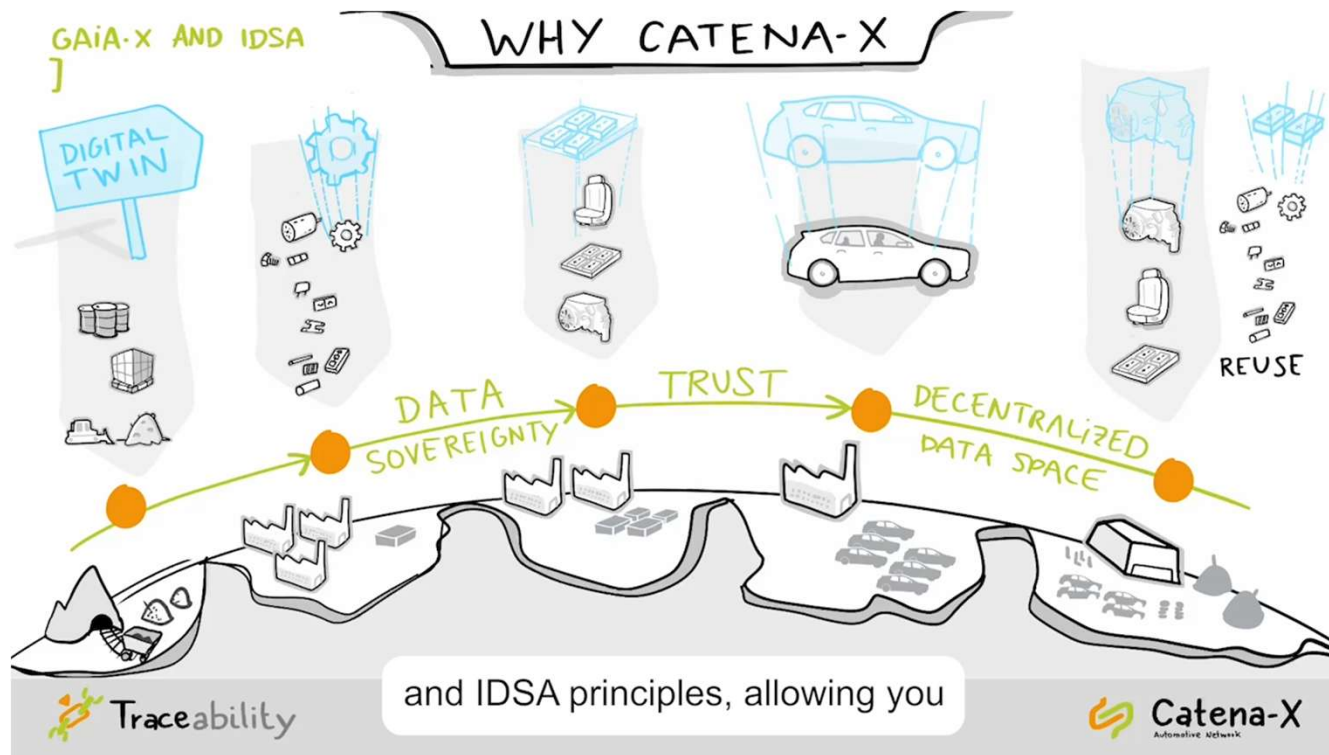


Data Exchange Process Between Two Partners

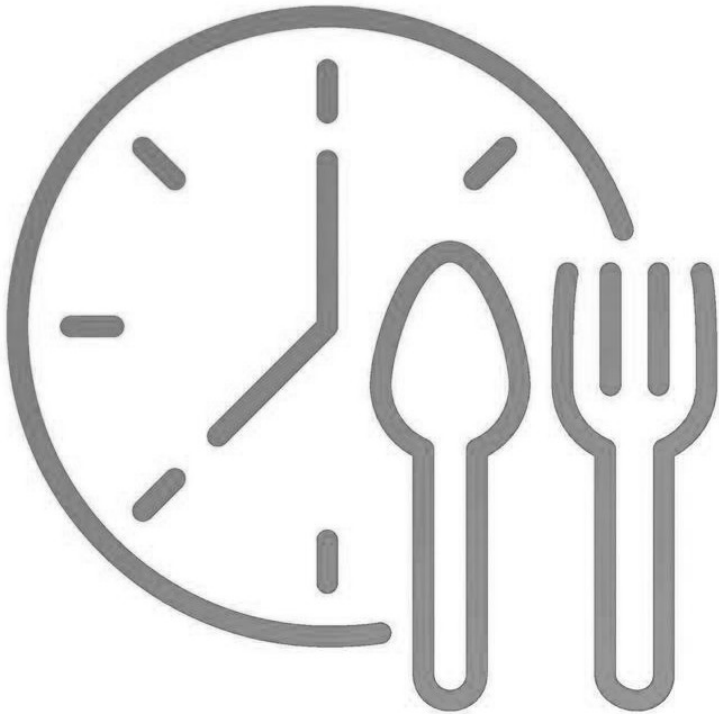


Traceability Solution Using Data Space

Video Explanation:



<https://eclipse-tractusx.github.io/docs-kits/kits/traceability-kit/adoption-view#video>



LUNCH BREAK

Day 2: Session-3 Actionable recommendation for DPP implementation

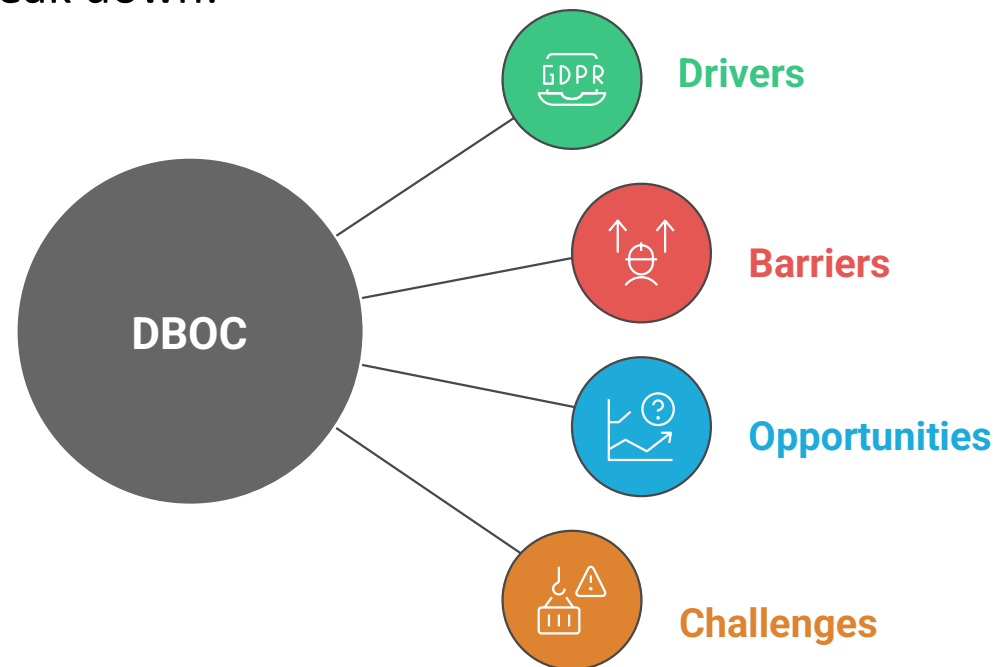
- Drivers, barriers, opportunities and challenges
- Group discussion

Group Discussion

- Drivers and challenges of DPP
- Group discussion on barriers and opportunities from different textile supply chain actors

Drivers, Barriers, Opportunities and Challenges of DPP

- To support the rollout of DPPs under the EU's Eco-design for Sustainable Products Regulation (ESPR), CirPass conducted an in-depth study to map the landscape of real-world enablers and obstacles. This was done using the DBOC approach, which helps break down:



DPP Drivers

1



Regulatory Dynamics

New sustainability regulations like ESPR and delegated acts are driving the mandatory implementation of DPPs, pushing industries toward eco-innovation.

2



Market Growth

Growing demand and regulations are expanding the circular market, with DPPs gaining value through reuse schemes and material scarcity.

3



Consumer Expectations

Consumers increasingly expect sustainability transparency, boosting demand for DPPs.

4



Regulatory Incentives

Existing policies like the Right to Repair can use DPP data, encouraging wider adoption.

5



Awareness Increase

Awareness of human rights, child labor, and environmental impacts is driving support for DPPs as tools for a circular economy.

DPP Drivers

6



Informed decisions

Consumer demand for sustainability and DPP-enabled transparency drive informed purchasing decisions.

7



Resource scarcity

Unreliable global resource supply chains drive businesses to support DPPs for better recycling and circularity.

8



Existing infrastructure

Existing serialization, digital labels, standardization, and IT solutions provide a strong foundation for building circular economy and DPPs.

9



Cost savings

Firms see DPPs driving transparency, efficiency, cost savings, new revenue, tech adoption, and customer demand.

10



User data demand

Firms and e-commerce platforms increasingly seek customer and product data, which DPPs can facilitate.

DPP Barriers

- Loss of traceability during use phase
- Diverse digital readiness across various countries
- Diversity of IT systems among firms
- High complexity of IT architecture
- Lack of awareness about current developments among firms
- Lack of expertise and proficiency
- Lack of willingness to provide product data
- Unclear financial benefits
- Lack of leadership and innovation pathway.
- Cultural resistance and path dependency
- Increasing customer power
- Missing data from international actors outside the EU
- Unclear benefits for the supply chain
- Wide diversity of specifications and standards for single products

DPP Opportunities

- Providing information on the material composition for recycling
- Increasing recovery and use of recycled materials
- Increasing economic benefits from sustainable products
- Simplifying maintenance and repair
- Providing sorters and recyclers with valuable insights
- Improving product design based on data
- Limiting greenwashing and plagiarism
- Reducing costs with automated data exchange
- Reducing waste and improving resource efficiency
- Creating an interoperable infrastructure for data exchange
- Scaling up circularity
- Educating the customer about sustainability impacts
- Facilitating take-back of used products
- Simplifying access to product data in real-time
- Shifting towards service business models
- Promoting cultural change towards circularity and sustainability

DPP Challenges

- Ensuring data quality
- Achieving interoperability between data models and IT systems
- Ensuring user identification and authentication
- Establishing a suitable data architecture
- Ensuring security protocols and data protection
- Lock-in issues with service providers
- Lack of standardized frameworks makes measuring environmental impact via DPPs difficult.
- Overemphasis on recycling may overlook more sustainable circular strategies.
- Scaling DPP IT systems could raise energy use and carbon footprint; planning must address this early.
- Electronic components for DPPs (e.g., RFID, QR codes) may contribute to rising e-waste.

Group Discussion Guide

Objective:

Support clear, productive discussions on Digital Product Passport (DPP) implementation in the textile and garment industry.

Discussion Format:

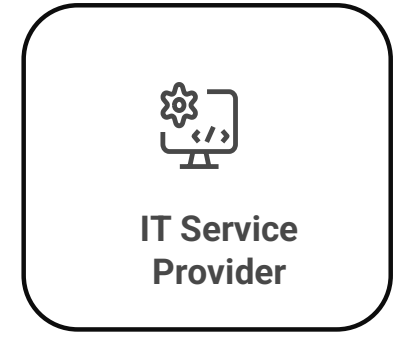
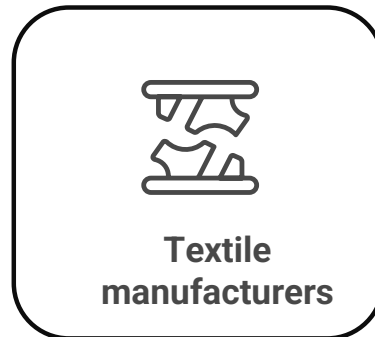
Time: 20 minutes

Present the outcomes – 5 min/group

Roles: 1 Facilitator, 1 Notetaker, All participants

Formation of Groups

Formation of Groups



Participant Worksheet

Participant Worksheet

Discussion Topic: _____

Group role: _____

Group Members: _____

Drivers identified

Barriers Identified:

Opportunities Identified:

Challenges Identified:



Q&A Session



Training for Trainers- Day 3

By
Dr. Fahim Chowdhury

Day 3 Session-1: DPP Demo and Forward planning

- DPP Demo
- SME challenges
- Forward planning

DBP: Data-attributes

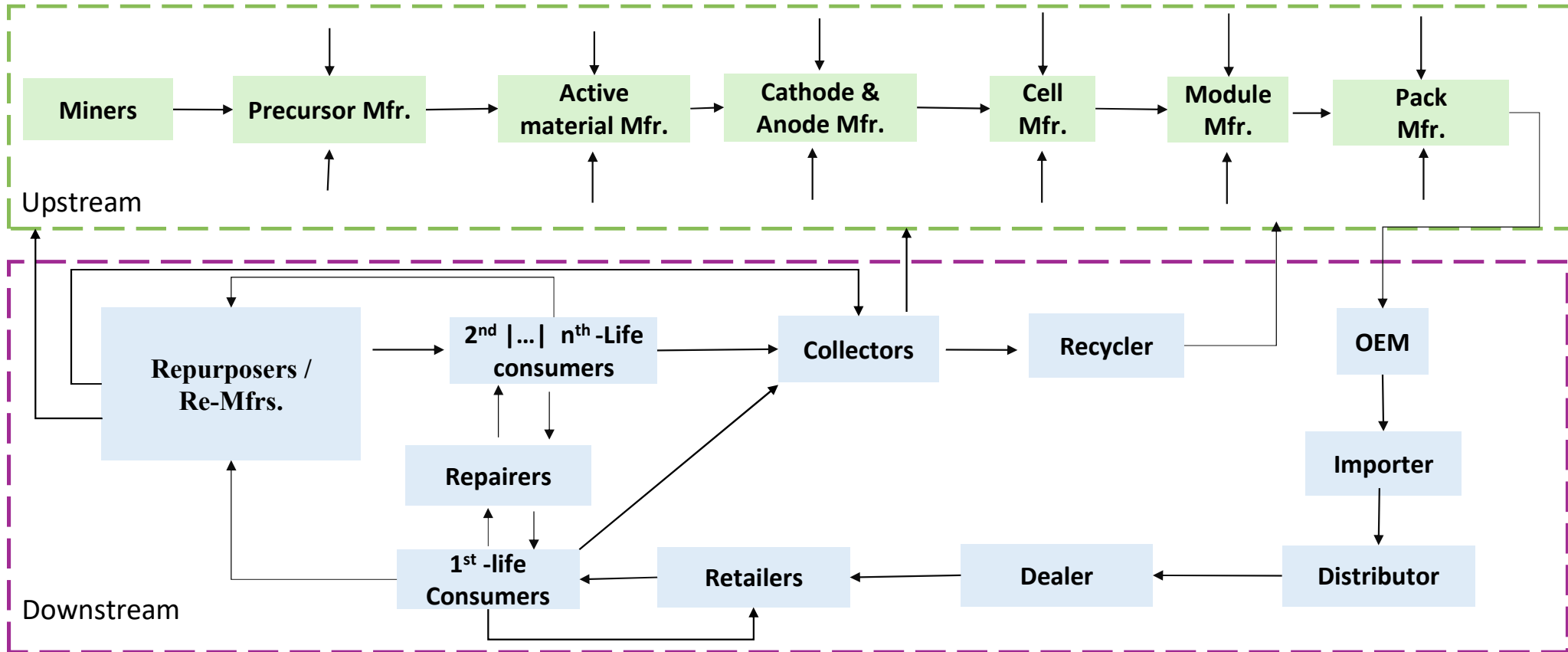
| Data Attribute Categories | Total |
|--|------------|
| General Product & Manufacturer Information | 8 |
| Materials & Composition | 17 |
| Value Chain Traceability | 5 |
| Environmental & Social Impact | 9 |
| Circularity & EOL Management | 20 |
| Compliance, Labels & Certifications | 7 |
| Performance and durability | 50 |
| Total data | 116 |

| Data access rights | Mandatory | Non-mandatory | Total |
|--------------------|-----------|---------------|------------|
| Public | 58 | 10 | 68 |
| Restricted | 38 | 10 | 48 |
| Total | 96 | 20 | 116 |

| Granularity level | Total |
|-------------------|-------|
| Model | 82 |
| Individual | 34 |


| Data behaviour | Total |
|----------------|-------|
| Static | 87 |
| Dynamic | 29 |

EV battery Value chain



Case Study: Digital Battery Passport

Crane





Automotive Battery

Battery Passport Identification
2b6f790...18d9a19

Battery Identification
LIR18650

Blockchain status
✔ Verified



Edit View full passport

<https://admin-demo.digiprodpass.com/passports/2b6f790b-388b-472a-bf42-70f0c18d9a19>

Data from various actors

| | Miner | Refiner | Precursor & CAM producer | Cell & Module Producer | Pack Producer | OEM | Repairer | Re-user Remanufacturer Re-purposer | Collector, Dismantler | Recycler |
|---|-------|---------|--------------------------|------------------------|---------------|-----|----------|------------------------------------|-----------------------|----------|
| General Product & Manufacturer Information 8 | | | | | +6 | +2 | | | | |
| Materials & Composition 17 | +1 | +6 | +10 | | | | | | | |
| Value Chain Traceability 5 | +4 | | | | | +1 | | | | |
| Environmental & Social Impact 9 | +4 | | +1 | | +3 | +1 | | | | |
| Circularity & EOL management 20 | | +4 | +1 | +5 | +3 | | | +2 | | +5 |
| Compliance labels & Certifications 7 | | | | +3 | +4 | | | | | |
| Performance & Durability 50 | | | | | +25 | +24 | +1 | | | |

■ Dynamic data
 ■ Data updated / added to existing attributes
 ■ Data creation/added
 ■ Data created in previous steps



Day 3 Session-1: DPP Demo and Forward planning

- Demo of a DPP solutions
- SME challenges
- Forward planning

SME Introduction

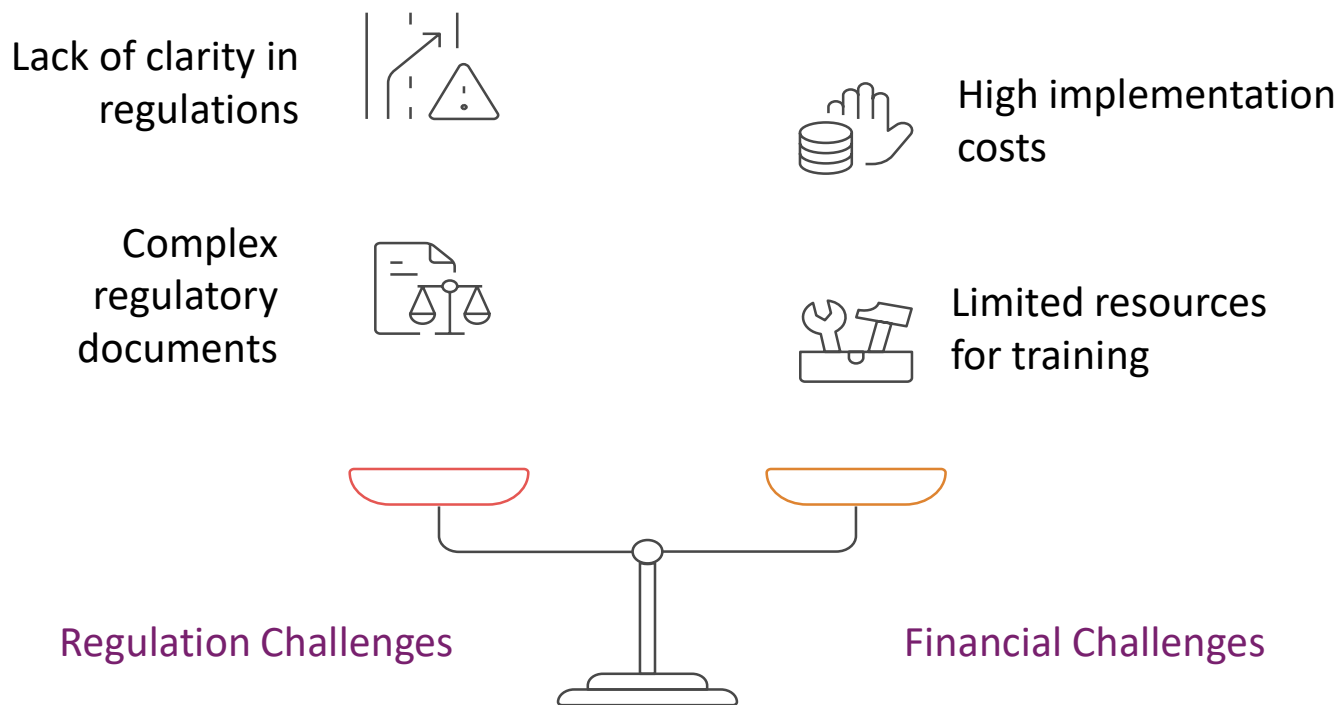
What are SMEs?

- Small and Medium-sized Enterprises (SMEs) are businesses with limited scale in employees, revenue, and production capacity.
- Play a **vital role in the textile sector** covering activities such as yarn production, fabric manufacturing, garment making, dyeing, printing, and finishing.

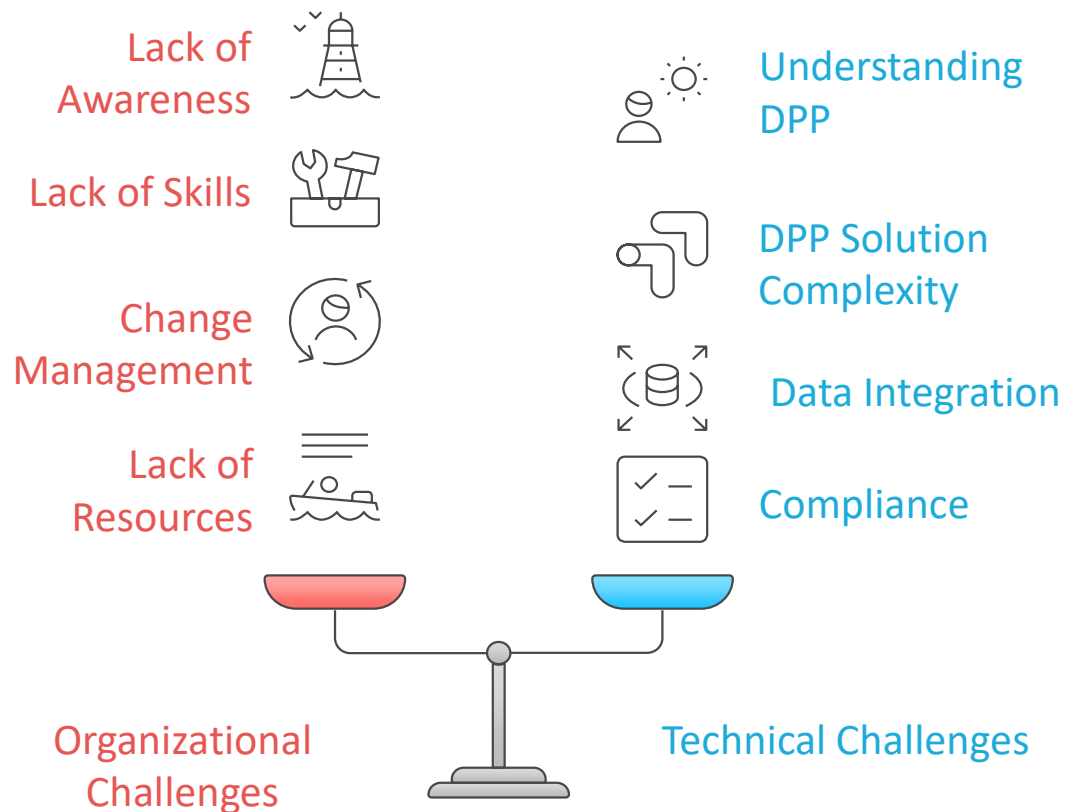
Importance of SMEs in Textile Industry

- Key contributors to local economies and employment.
- Provide flexibility and customized production.
- Act as essential suppliers and partners within the textile supply chain.

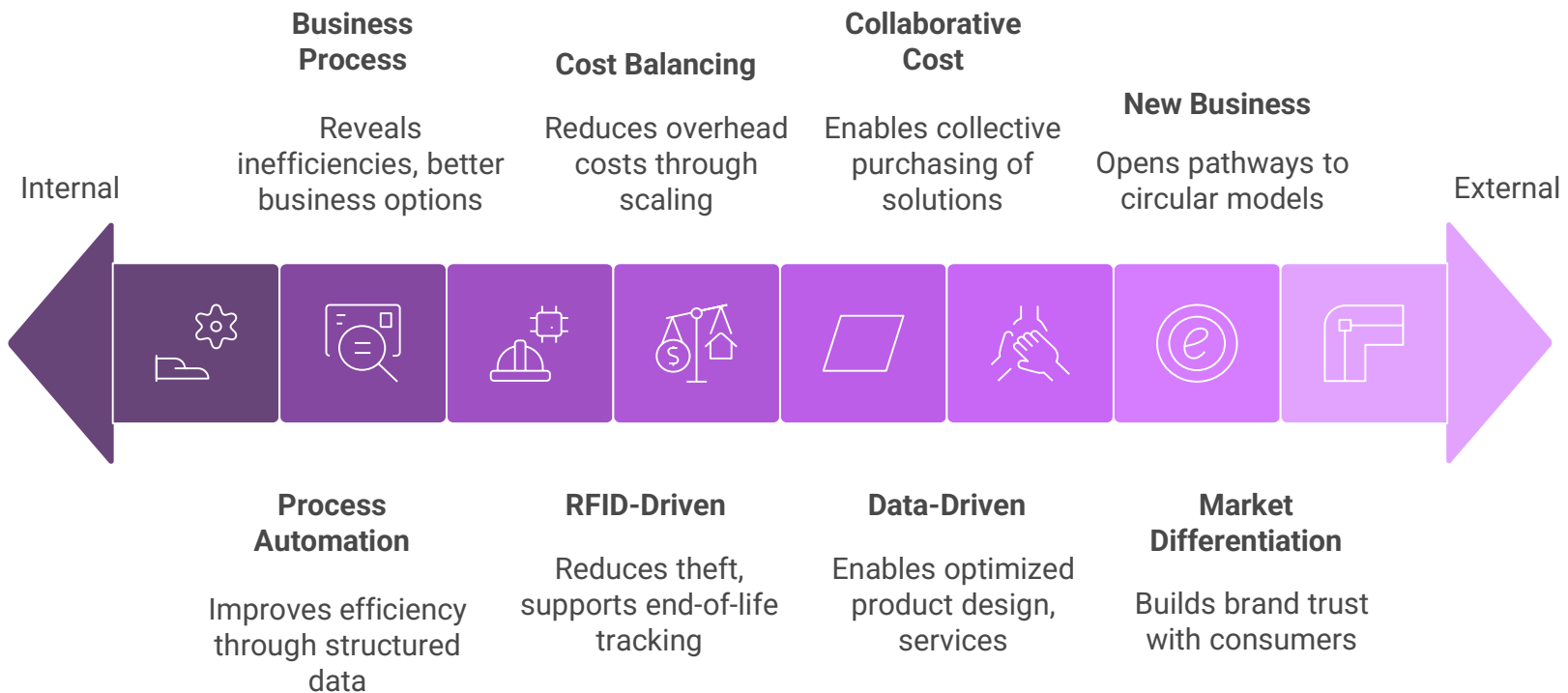
Practical Constraints



Practical Constraints



DPP impact on SME



Day 3 Session-1: DPP Demo and Forward planning

- Demo of a DPP solutions
- SME challenges
- Forward planning

Policy & Collaboration: Government's Pivotal Role

- **National Circular Economy Strategy:**
 - Develop a comprehensive roadmap for the textile sector.
- **Incentives & Subsidies:**
 - Offer financial incentives for adopting sustainable technologies, renewable energy, and recycling infrastructure.
- **Regulatory Frameworks:**
 - Implement Extended Producer Responsibility (EPR) schemes for textile waste, set clear environmental standards, and enforce labor laws.
- **Investment in R&D:**
 - Fund research into new sustainable materials, recycling technologies, and waste valorization.
- **Public Procurement:**
 - Prioritize sustainable and circular textiles in government purchases.
- **International Advocacy:**
 - Represent Pakistan's commitment to sustainability on global platforms.



Policy & Collaboration: Industry's Collective Action

- **Industry Associations:**
 - Play a crucial role in facilitating knowledge sharing, developing industry-specific best practices, and advocating for supportive policies.
- **Pre-Competitive Collaboration:**
 - Companies working together on common challenges like textile waste collection, sorting, and recycling infrastructure.
- **Supply Chain Partnerships:**
 - Building strong, transparent relationships with suppliers and buyers based on shared sustainability goals.
- **Setting Voluntary Targets:**
 - Industry leaders are committing to ambitious sustainability and circularity targets.
- **Investing in Innovation:**
 - Allocating resources to develop and adopt new sustainable technologies and business models.



Strategies for Overcoming Challenges: Policy & Finance

- **Targeted Incentives:**
 - Tax breaks, subsidies, and grants for companies investing in sustainable technologies, renewable energy, and circular business models.
- **Green Financing Mechanisms:**
 - Facilitating access to low-interest loans, green bonds, and impact investments for textile businesses.
- **Regulatory Clarity & Support:**
 - Developing clear, consistent regulations that encourage sustainability without stifling innovation, and providing technical assistance for compliance.
- **Public-Private Partnerships (PPPs):**
 - Collaborating on large-scale infrastructure projects (e.g., common effluent treatment plants, textile recycling facilities).
- **Extended Producer Responsibility (EPR) Frameworks:**
 - Implementing policies that hold brands accountable for the end-of-life management of their products, incentivizing circular design.

Strategies for Overcoming Challenges: Capacity & Infrastructure

- **National Training Programs:**
 - Developing and delivering comprehensive training on sustainable manufacturing, circular design, and recycling technologies for all levels of the workforce.
- **Establishment of Innovation Hubs:**
 - Creating research and development centers focused on textile circularity, material science, and waste valorization.
- **Development of Collection & Sorting Infrastructure:**
 - Investing in systems for the efficient collection and sorting of post-consumer textile waste.
- **Support for Recycling Facilities:**
 - Providing incentives and support for the establishment and scaling of advanced mechanical and chemical textile recycling plants.
- **Digital Infrastructure:**
 - Developing national platforms for data sharing, traceability, and material flow tracking.



Certifications & Standards: Material Certifications

- **Global Organic Textile Standard (GOTS):**
 - Leading standard for organic fibers, covering ecological and social criteria throughout the supply chain.
- **Organic Content Standard (OCS):**
 - Verifies the presence and amount of organic material in a final product.
- **Global Recycled Standard (GRS):**
 - Verifies recycled content and responsible social, environmental, and chemical practices in production.
- **Recycled Content Standard (RCS):**
 - Tracks recycled content through the supply chain.
- **Better Cotton Initiative (BCI):**
 - Promotes better environmental and social practices in cotton farming.



Certifications & Standards: Process & Social Certifications

- **OEKO-TEX Standard 100:**
 - Tests for harmful substances in textiles, ensuring product safety for consumers.
- **ZDHC (Zero Discharge of Hazardous Chemicals) Programme:**
 - Focuses on eliminating hazardous chemicals from the textile and footwear value chain.
- **STeP by OEKO-TEX:**
 - Modular certification system for sustainable textile production facilities, assessing environmental performance, chemical management, quality management, and social responsibility.
- **SA8000 (Social Accountability International):**
 - Certifies ethical production and fair treatment of workers.
- **Fair Trade Certified:**
 - Ensures fair wages, safe working conditions, and community development.



A Vision for Pakistan's Textile Future

- **Resource-Efficient:**
 - Minimizing water, energy, and material consumption through innovative processes.
- **Pollution-Free:**
 - Operating with zero discharge of hazardous chemicals and minimal environmental impact.
- **Ethically Sound:**
 - A beacon of fair labor practices, human rights, and safe working conditions for all.
- **Circular by Design:**
 - Products designed for longevity, easy repair, reuse, and high-value recycling.
- **Globally Recognized:**
 - A preferred partner for leading international brands seeking sustainable and transparent supply chains.
- **Economically Thriving:**
 - Creating new jobs, attracting investment, and contributing significantly to national prosperity.

Call to Action: Your Leadership, Our Collective Future

• To the Esteemed Ministry:

- Champion the development of a comprehensive National Textile Circularity & Sustainability Strategy.
- Allocate resources for R&D, infrastructure, and capacity building.
- Create a supportive regulatory and incentive framework.
- Foster public-private partnerships and international collaborations.

• To Industry Leaders:

- Embrace sustainable practices and circular business models.
- Invest in green technologies and transparent supply chains.
- Prioritize worker well-being and ethical sourcing.

• To Academia & Researchers:

- Drive innovation and develop local solutions.
- Educate and train the next generation of sustainable textile professionals.

- Together, you can transform Pakistan's textile industry into a beacon of sustainability and circularity, ensuring long-term prosperity and environmental stewardship.



NETWORKING & TEA-BREAK

Day 3 Session-2: Assessment and Feedback

- Post-training assessment

Interactive Session: Post-training assessment

Go to www.menti.com
Enter the code 5290 4886

Or use QR code



Summary and Key Takeaways

- DPP is essential for EU compliance
- DPP is key enabler for circular economy
- Appropriate selection and availability of DPP datapoints are vital
- Secure and trustworthy data ecosystem is required
- Success depends on technology, business opportunities, and collaboration

Resources

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Contact

- Dr. Fahim Chowdhury (fahim@technovativesolutions.co.uk)



Q&A Session