

D2.1 Mapping of legal and voluntary requirements and screening of emerging DPP-related pilots

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D2.1

Mapping of legal and voluntary requirements and screening of emerging DPP-related pilots

2.0

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Preparing the ground for the gradual piloting and deployment of the DPPs from 2023 onwards, focusing on developing a roadmap for prototypes in three value chains: electronics, batteries and textiles.

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About CIRPASS

The European Commission has strong interest and ambition in relation to emerging technologies to support the ‘twin’, green and digital, transitions and specifically in the development of a **Digital Product Passport (DPP)**. The DPP is defined by the European Commission as a structured collection of product related data with pre-defined scope and agreed data ownership and access rights conveyed through a unique identifier, and that is accessible via electronic means through a data carrier. The intended scope of the DPP is information related to sustainability, circularity, value retention for re-use, remanufacturing and recycling.

The aim of CIRPASS is to prepare the ground for a gradual deployment of DPPs, with an initial focus on the electronics, batteries and textile sectors. Spurred by the need to accelerate the transition to a more circular and sustainable economy, combined with new opportunities offered by a burgeoning data market, a large number of European and international initiatives have emerged recently. CIRPASS’s methodology consists in uniting representatives from a large number of these early DPP pilots in order to build a balanced, open and transparent community dedicated to the design and roll-out of the upcoming European DPP.

To ensure a neutral and technology agnostic stance, CIRPASS relies heavily on the involvement of leading European Research and Technology organisations, supported by three standardization organisations, an experienced pool of circular economy and sustainability consultancies, several large European industrial associations, digital technologies and web experts and digital solution providers. The CIRPASS consortium is made up of 31 partners in total.

By bringing together this community of expertise, the project will build consensus and momentum around the DPP concept and contribute to the development of common principles, prototypes and roadmaps to secure the interoperability of DPPs across value chains, sectors and market participants. Enhanced stakeholder dialogue will be achieved through extensive consultations addressing key DPP aspects such as ontologies, technical requirements and standardization needs.

1 Introduction

This purpose of this report is to define an initial set of key-data for each of the three sector groups: batteries, electronics and textiles. This initial set is provided to **initiate and structure** upcoming discussions among CIRPASS consortium partners and **facilitate** the gathering of feedback from the largest possible number of external stakeholders. This feedback will be exploited in consecutive stakeholder consultations in order to evaluate the data gathering effort and potential value of sharing this information with respect to circular business activities.

To reach the goal of defining an initial set of information requirements, this report comprises the work done by Work Package 2 (WP2) of CIRPASS during the first four months of the project, October 2022 – January 2023. WP2 focuses on the DPP information requirements, including key data, classification and profiles corresponding to legislative and stakeholder requirements. The purpose of the first two tasks of WP2 is to provide an initial list of information by mapping information that is mandatory by legislation (T2.1) or that is used in current DPP-related initiatives (T2.2). Task 2.3 will generate knowledge on required information from a use case perspective. The results from these three tasks will provide a basis which will be evaluated in the

consecutive task (T2.4). Finally, based on the results from Task 2.4 the evaluated of key data will be consolidated and reported in Task 2.5.

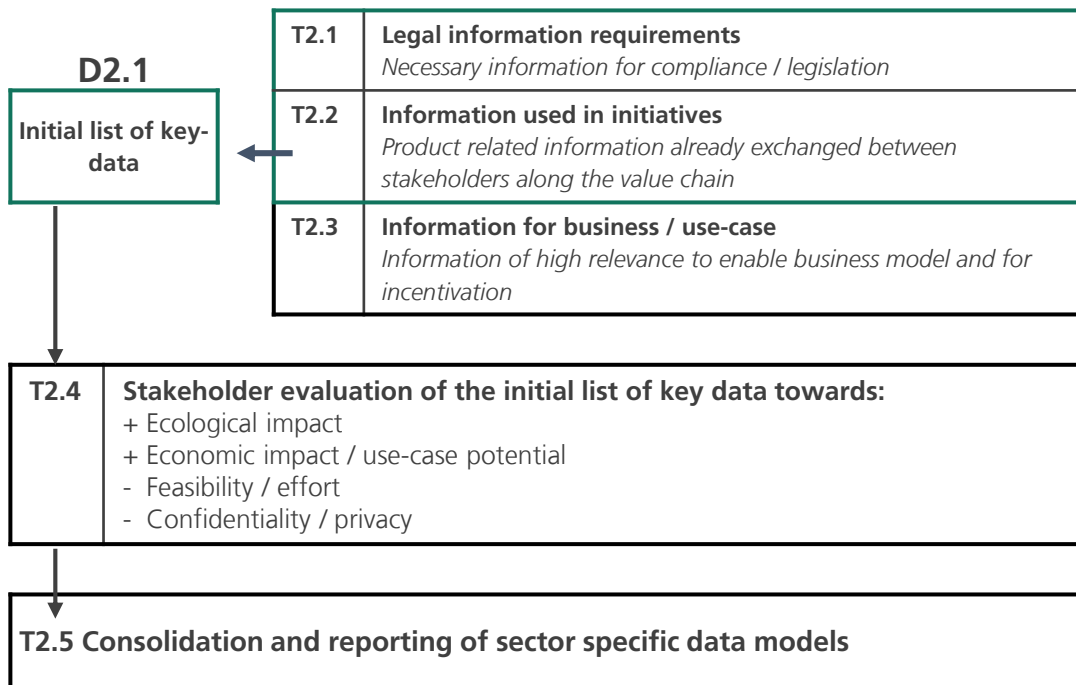


Figure 1 WP2 structure overview. Task 2.1 and 2.2. result in deliverable 2.1

Necessity for a cross-WP framework for the screening of DPP-related initiatives (WP2-WP3-WP4)

The project comprises three work packages which require an analysis of different aspects of existing digital product passport (DPP)-related initiatives: information requirements and data model (WP2), IT system architecture (WP3) and standardisation perspective (WP4). As indicated in Table 1, tasks T2.1, T2.2 overlap in the analysis of information requirements (red box), while tasks T2.2., T2.3, T3.1, T4.1 overlap in their need to gather data from ongoing initiatives and pilots (blue box).

	2022			2023												2024				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Okt	Nov	Dez	Jan	Feb	Mrz	Apr	May
T2.1 DPP - information requirements in legislation (REACH, TEX, etc.)																				
T2.2 DPP - information models (pilots, projects, initiatives, etc.)																				
T2.3 DPP - business cases and added values																				
T2.4 Consultation phase																				
T2.5 Consolidation & reporting																				
T3.1 DPP-technical architectures (pilots, projects, initiatives, etc.)																				
T4.1 Standardisation landscape (incl. standards used in pilots,...)																				

Table 1 Tasks T2.1, T2.2 overlap in the analysis of information requirements. T2.2., T2.3, T3.1, T4.1 overlap in their need to gather data from existing initiatives and pilots.

A cross-WP framework was established for coordination purposes and to avoid contacting stakeholders and experts external to the consortium multiple times by different people working on different tasks. This cross-cutting process also involved designing questions and establishing a common method for consultation. It is described in detail in section 2.2.

This report is structured as follows:

First, we describe the methodological tools that we used to define an initial set of information requirements, for each of the three sector groups, which will serve as a basis for further discussions:

- the definition of a DPP-related initiatives screening framework (section 2.1),
- the scope for the analysis of information requirements from legislation (section 2.2),
- the definition of an information categorisation framework (section 2.3).

Second, we provide:

- the results of information requirements currently employed in 70 surveyed DPP-related initiatives (3.1),
- the results of desk research of information requirements from legislation (section 3.2),
- an initial set of information requirements obtained from the combination of the previous two results. This set of information requirements will be used to initiate further discussions (section 4).

Finally, we list a number of additional elements to be considered in further discussions (section 5).

2 Methodology

2.1 Screening of DPP-related initiatives: description of a common framework and methodology

2.1.1 Objective of the DPP-related initiatives screening study

At the start of the CIRPASS project, several tasks were on the critical path to quickly produce inputs for subsequent tasks. Specifically, three tasks were identified as requiring a review of existing DPP-related initiatives¹ from the different perspectives covered by the different work packages: information requirements and data model (WP2, T2.2), IT system architecture (WP3, T3.1) and standards (WP4, T4.1).

The screening of DPP-related initiatives was thus initially intended to provide a quick scan of initiatives and produce results in the first three months of the project. Once this screening work started, it became clear, based on discussions in the task force and feedback received from external parties interested in sharing information on their initiatives, that collecting data on DPP-related initiatives was crucial for gaining a comprehensive understanding of the status of DPP-related ongoing developments. Thus, the objective of the screening study evolved into building and maintaining a knowledge base on this topic, not only in the first months of the project but throughout its entire duration. This required setting-up a process for populating this knowledge base not only with initiatives to which CIRPASS partners or their immediate network had access but also by any external party who wished to contribute.

2.1.2 DPP-related initiatives “Task Force” based on WP2/WP3/WP4 collaboration

Seeing that several work packages required access to the screening study results, a collaboration among WP2, WP3 and WP4 was sought to ensure alignment and avoid redundant contacts with external partners and experts. A dedicated cross-work package “task force” was set up to perform the initial identification and screening of the DPP-related initiatives. Specifically, the discussion focused on: the approach for the identification of DPP-related initiatives, the development of a characterisation framework for the collection of data concerning the initiatives, the development of data collection tools, progress on data collection, and approaches for data analysis and presentation. The left-hand side of Figure 2 below provides a high-level overview of the activities of the DPP-related initiatives task force which included:

- the development of an initiative characterisation framework (Step A) and tools based on that framework in the form of an excel tool and an on-line questionnaire (Step B);
- the identification of initiatives to be analysed (Step C);
- the collection of inputs on DPP-related pilots initiatives analysis via the tools (Step D).

This work established the CIRPASS knowledge base of DPP-related initiatives (Step D), i.e., initiatives that have been characterised via the framework created in Step A. Subsequently, this knowledge base was made available for use by different work packages. Depending on the specific objectives of each work package, a

¹ Already during the initial discussions at the Kick-off meeting and discussions within the taskforce, it was identified that focusing on DPP “pilots” may be too restrictive, as pilots raise expectations about some specific implementation. This could discourage the identification of initiatives that are relevant for the DPP but are in a more conceptual phase. Therefore, the broader term of DPP-related initiatives was introduced which allowed for more flexibility to make a broad identification of developments that are identified by partners or the external network as relevant or informative for the DPP.

customised set of DPP-related initiatives can be selected (Step E) based on work package-dependent, **objective criteria**. This enables customised analyses (Step F) and deliverable writing (Step G) for the specific work package. In this method section, we focus only on the steps carried out by the task force (i.e., steps A, B, C, and D). Steps E, F, and G will be covered in reports produced by all work packages that make use of the DPP-related initiatives knowledge base for their activities. In the following, Steps A to D are described separately but they were, in reality, performed concurrently and in an iterative manner.

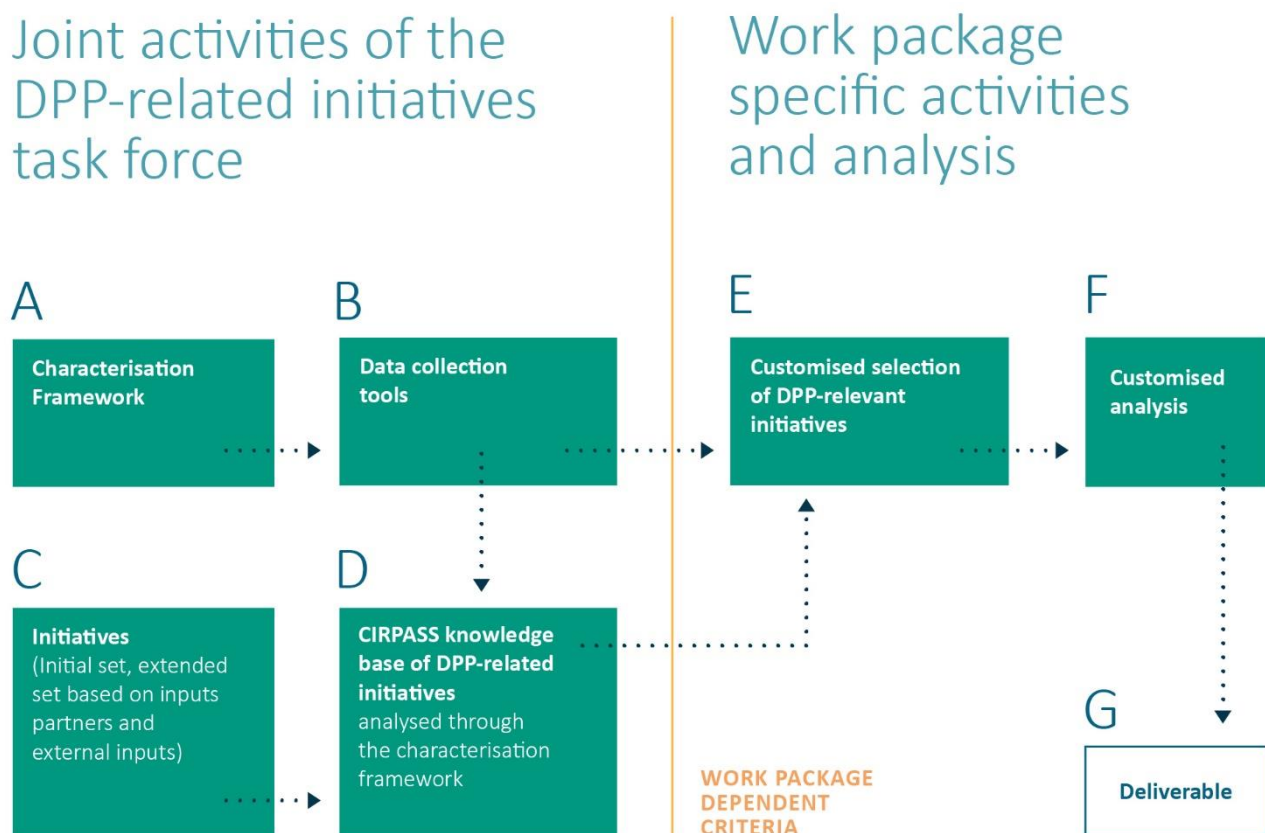


Figure 2 DPP-related initiatives screening activities carried out by the task force and the individual work packages

2.1.3 Development of the DPP-related initiatives characterisation framework (Step A)

To enable the structured and uniform description of DPP-related initiatives, a characterisation framework was required to identify dimensions and characteristics along which to organise the data collection. The characterisation framework was developed in several steps. First, some preliminary preparation, in advance of the CIRPASS Kick-off meeting, was performed by WP2 in consultation with the leaders of the three sectors and an initial idea about how the characterisation framework could be organised was developed. This initial framework was then presented during the CIRPASS Kick-off-meeting. The high-level framework (see Figure 3 below) consisted of the following dimensions: (1) Actors; (2) Technical design; (3) Data; (4) Initiative characterisation, and (5) Standards.

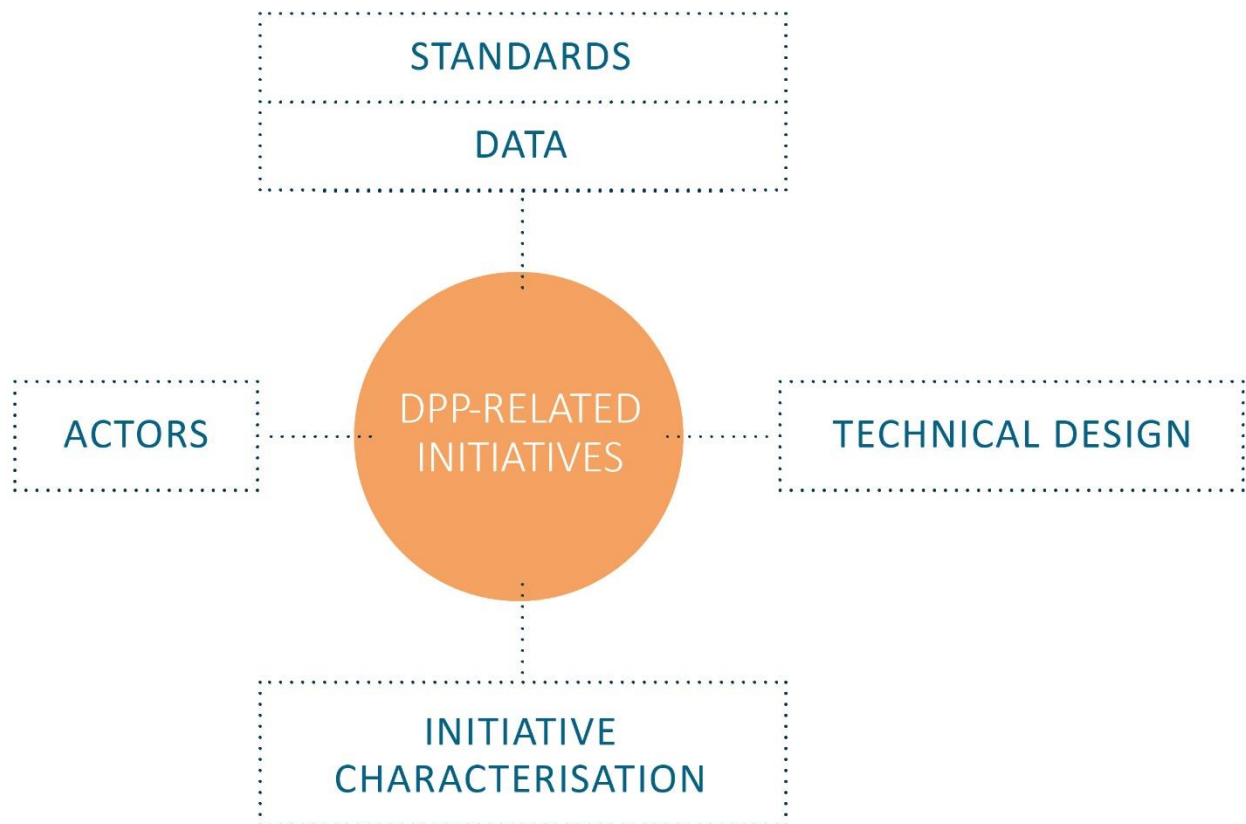


Figure 3 Initial high-level dimensions of the characterisation framework as discussed during the CIRPASS Kick-off meeting

Following the CIRPASS Kick-off meeting, the refinement of the characterisation framework was taken on by a WP2/WP3/WP4 “task force” to further define and fine-tune the characteristics and dimensions according to the needs of the different work packages. During the discussion, it was decided that the standards dimension would not be part of the joint data collection effort which chose to focus on deployed solutions and piloting initiatives. Nevertheless, participants from the standardisation work package (WP4) stayed actively involved in the taskforce and followed the process to ensure that the work of identifying the shortcomings of existing standards and future needs for standardization is aligned with the work on the initiatives screening. An initial version of the DPP-related initiatives characterisation framework was developed in early November 2022.

2.1.4 Data collection tools (Step B)

Two tools were developed to gather data using the characterisation framework.

2.1.4.1 An Excel tool based on the characterisation framework

An Excel tool implementing the characterisation framework was developed first. Sector leaders and partners who had in-depth knowledge of specific DPP-related initiatives were asked to test the tool and provide feedback both on the use of the tool and on the content of characterisation framework. Based on the feedback, the characteristics were refined and final adjustments to the Excel tool were implemented. Task force participants collectively started accumulating DPP-related initiatives’ data using a common file hosted on the project’s file system. Additionally, the Excel-based tool made it easy to share the empty

characterisation framework template with experts external to the CIRPASS consortium. These inputs were then consolidated in the shared Excel file.

2.1.4.2 An online questionnaire tool based on the characterisation framework

During the feedback collection process, a limitation of the Excel tool was identified. For example, while some characteristics potentially allowed multiple-choice answers, the Excel tool permitted to select only one option. While multiple choice options could be indicated via colon separation, this approach had limitations with respect to the production of figures. Also, as the objective of the screening study evolved from a quick scan into a more comprehensive and open consultation, the need for a more user-friendly tool for external parties that wished to contribute and a more efficient tool for gathering and exploiting the data became apparent. An online tool in the form of a questionnaire was therefore developed using Google Forms. This online tool had several advantages, such as enabling the task force to:

- (a) share a link and automate data collection, as the results were directly collected in a database and there was no need for CIRPASS members to collect back the Excel files and to enter manually the entries in the shared file;
- (b) add more explanations in the fields per category;
- (c) have more flexibility compared to excel for handling multiple choice options.

To avoid issues when merging data from both tools, the Excel tool was finally abandoned and previously collected data was merged into the online questionnaire process. Annex 1 provides an overview of the characteristics used in the framework and how they were implemented in the questionnaire.

2.1.5 DPP-related initiatives data collection process and steps towards building a CIRPASS DPP-related initiatives knowledge base (Step C)

Figure 4 below illustrates the process of how DPP-related initiatives were added to the CIRPASS DPP-related initiatives knowledge base. This process followed a layered approach, starting from: (1) a limited set of initiatives to which the DPP initiatives task force had access to, in order to develop the data collection framework and tools and to perform an initial analysis; subsequently (2), the data collection process was open to all CIRPASS partners who were invited to contribute additional initiatives which they were able to bring in via their own network, and finally; (3) the data collected from external parties that actively approached the CIRPASS consortium and volunteered to contribute information about their initiatives. These processes resulted in the constitution of an initial knowledge base, which was used by WP2 and WP3 for the deliverables D2.1 and D3.1 due in the early months of the project. However, the data collection process for further expanding the CIRPASS DPP-related initiatives knowledge base will continue after these preliminary deliverables are submitted in order to capture new information about DPP-related initiatives when such information becomes available. This process will be enabled via (4) open consultation, using the online questionnaire that will be made available for public access on the CIRPASS website. This knowledge-base will be available for use by different work packages and tasks during the projects depending on their needs.



Figure 4 Approach followed for the DPP-related initiatives screening

In addition, in Figure 4 we refer to other documents and reports² which identify DPP-related initiatives. Such reports may contain lists of DPP-related initiatives collected for other purposes but may still contain valuable information and inputs to further feed the CIRPASS knowledge base. These inputs can be useful to encourage initiatives to provide additional information via the open online consultation process, either by CIRPASS members actively reaching out to initiatives and encouraging them to fill-in the on-line questionnaire, or via the CIRPASS dissemination process, where more parties will be aware of the CIRPASS project and as a result, proactively approach CIRPASS and contribute further information.

For reasons of transparency on how the initial list of initiatives was selected, in the following, steps (1) and (2) from Figure 4 are described in greater detail. These steps, depicted in Figure 5, were aimed at enabling the analysis of as many initiatives as possible by the available CIRPASS experts and in the limited time that was available for producing the first deliverables. As stated above, seeing the time constraints, the decision to open the DPP-related initiatives consultation to parties external to the consortium was not made from the start.

² See for example (1) Jansen, M., Gerstenberger, B., Bitter-Krahe, J., Berg, H., Sebestyén, J., Schneider, J. (2022). Current approaches to the Digital Product Passport for a Circular Economy (Wuppertal Paper no. 198). Wuppertal Institute. Or (2) Rietveld, E. Het Productpaspoort: Basisvoorwade voor duurzame economie (in Dutch). Available on-line at: <https://publications.tno.nl/publication/34639215/e4sCIK/rietveld-2022-productpaspoort.pdf>.

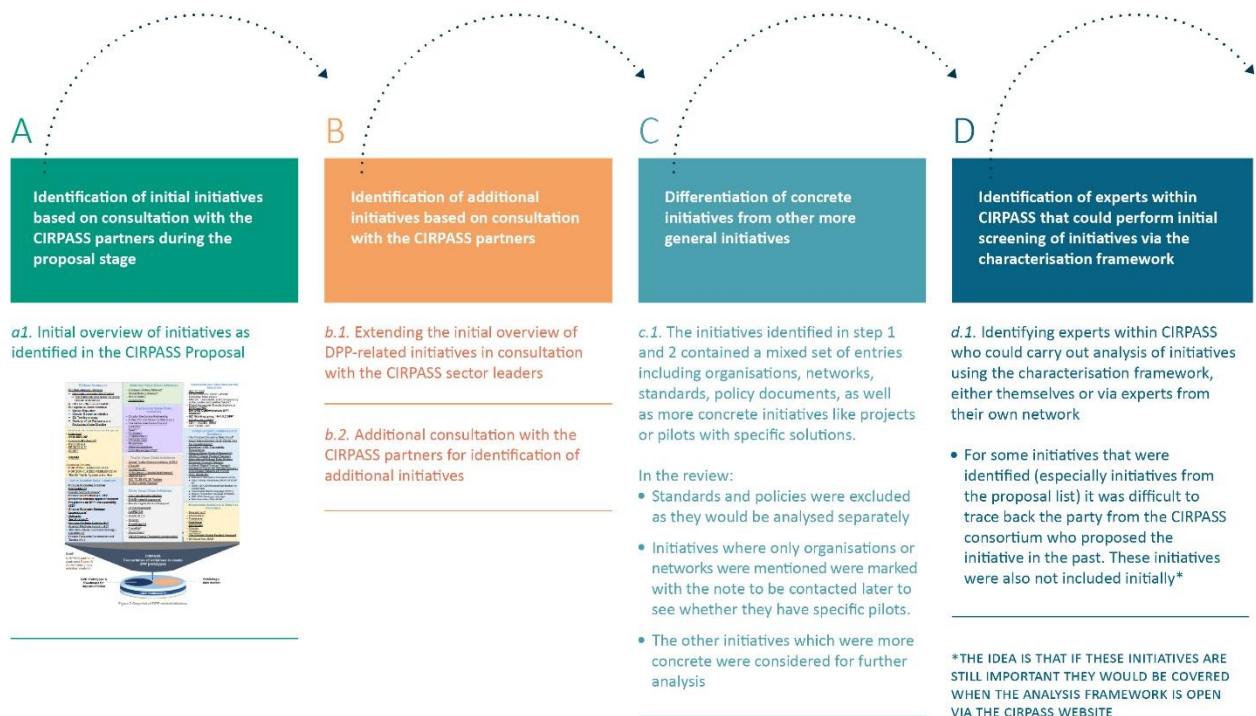


Figure 5 Way of working for identifying DPP-related initiatives within the reach of the CIRPASS network

The initial starting point were the initiatives already identified during the CIRPASS proposal writing process. Next, the sector leaders were asked to complete this list with other relevant initiatives related to their sectors. All CIRPASS partners were then asked to add initiatives that they considered relevant. As the CIRPASS consortium brings together a rich pool of experts on the topic of DPP, the resulting list made up the inventory of DPP initiatives known to the CIRPASS consortium at that time.

When reviewing the initiatives that were identified, the task force found a wide variety of entries. For example, standards and standardisation initiatives, policies, names of organisations and networks, projects, operational pilots, and existing solutions were identified as *initiatives*. To gather concrete insights on data models and system architectures, a review of the identified initiatives took place to focus on pilot implementations or specific data sharing architectures and solutions. During this review, standards and policies were excluded, as they would be analysed separately in other tasks. Also, initiatives for which only organisations or associations were mentioned were marked as initiatives to be contacted later to check whether they have specific pilots that might be analysed via processes (3) or (4) as described in Figure 4.

The remaining initiatives were reviewed to identify contact people within the CIRPASS network who could be approached to analyse specific initiatives either because they have specific knowledge about the initiative or they have contacts via their network to parties that have knowledge on the initiative. For some initiatives, CIRPASS partners were assigned to perform an initial characterisation based on publicly available information. After the assignment of contact persons for each initiative, these persons were asked to either categorise the initiative via the questionnaire or the Excel tool³ themselves or to forward the request to experts in their network. Finally, to make sure that all the CIRPASS partners had been reached, an internal

³ After the questionnaire was developed it became the preferred tool for the data collection. Still some partners had access and security issues for using the questionnaire and preferred the excel tool, so both channels were used for the data collection even after the questionnaire became available.

project newsletter was circulated encouraging all partners to fill in the online questionnaire concerning any other DPP-related initiatives.

2.1.6 Data consolidation (Step D)

As discussed earlier, the CIRPASS DPP-initiatives knowledge base has a broader purpose in informing the other CIRPASS tasks and work packages. Therefore, the maintenance of the knowledge base over time is important so that it can provide information on latest state of the art and capture new developments that emerge as the project progresses. As described above, a data consolidation step was necessary to merge all collected data into the online questionnaire process. Further data cleaning operations will be performed on the information collected before its publication.

2.1.7 Limitations and considerations for the data collection and analysis

The data collection efforts as discussed in the previous sections are subject to several limitations discussed below.

- Limited access to information and incomplete information: this limitation was identified from the start. Nevertheless, there is still value in collecting even partial information and we recognize that for some initiatives we may have more details than others.
- Limitations of the characteristics of the evaluation framework: in the development of the characterisation framework, we focused on a limited set of characteristics to allow for structured data collection with a focus on actors, basic characteristics, data and technical architecture. Limiting the questionnaire to a reasonable length was also a criterion to increase the response rate of external parties. While the characterisation framework went through several rounds of evaluation to refine the characteristics, both feedback received and experience have shown that it is perfectible (e.g., some missing definitions for terminology used). However, a decision was made not to change the framework in order to maintain the coherence of past data collected with any data that might be collected in the future.
- Use of two different tools for the data collection: While the Excel tool and the online questionnaire were both built on the same characterisation framework, the different ways of data entry led to some differences in the way some of the multiple-choice options were implemented. The merge of data onto the online tool resulted in some data loss.

Despite these limitations, the screening exercise proved to be of very high value and usefulness.

2.2 Information requirements from legislation - analysis scope (T2.1)

In this section, the scope and sources for the extraction of information requirements from legislation are defined. Limiting the scope to existing and proposed European legislation, the objectives of the DPP, as defined in recent presentations by European officials⁴, were used to identify relevant legislation for the three focus product group sectors, as shown below.

⁴ Neale, W., & Galatola, M. (2022). Ecodesign for sustainable-products regulation digital product passport. In Taiex-eir multi-country flagship workshop on digital product passport implementation. European Commission.

Table 2 DPP objectives and related relevant legislative areas

Goal of DPP	Information requirements in legal areas
1. <i>Sustainable production</i>	Cross-sectorial legislation
2. <i>Extending product lifetimes and optimizing product use, provide new business opportunities to economic actors through circular value retention and extraction based on improved access to data</i>	Product legislation (electronic, textile, battery)
3. <i>Support consumers in making sustainable choices</i>	Product legislation (electronic, textile, battery)
4. <i>Enable the transition to circular economy by boosting material and energy efficiency and transition to sustainable business modules such as Products as a Services (PaaS)</i>	Product legislation (electronic, textile, battery)
5. <i>Support authorities to verify compliance</i>	Technical goal

The objective sustainable business models such as “Product as a Service” (PaaS) and relevant information useful for such business models are elaborated in detail in Task 2.3 of the CIRPASS project.

The online database of “EUR-LEX” (<https://eur-lex.europa.eu/>), which provides access to European law and the related texts, was used as primary source for the screening. The texts of the identified legal acts were used for the extraction of information requirements and other useful information like the data provider, the target user and the format. The most recent regulations and regulation proposals provide the most comprehensive information requirements and are the focus of this study, complemented with older legislation of relevance. Since the ESPR Proposal includes horizontal product information requirements with few exclusions, we assumed below that these requirements might potentially be applied to the textile ⁵and electronics sectors. The ESPR Proposal further refers to information requirements in other existing legislation e.g., REACH Regulation. For batteries, the Battery Regulation provides for specific information requirements.

Below, the legal areas shown in the table above are specified in more detail by the title of the legal act including its abbreviation and is clustered per sector and legal area.

Cross-sectorial legislation:

- “REACH” Regulation (EC) No 1907/2006 on the registration, evaluation, authorisation and restriction of chemicals
- “CLP” Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures
- Textiles, electronics sector: “ESPR” Proposal 2022/0095 (COD) on ecodesign requirements for sustainable products

Textile legislation

⁵ The textile sector comprises a wide group of products, including furniture (according to Textile Regulation). The preliminary study by the JRC (technical report) on new product priorities distinguishes i.a. textiles, mattresses, furniture and toys.

- “Textile” Regulation (EU) No 1007/2011 on textile fibre names and related labelling and marking of the fibre composition of textile products

Electronics legislation

- “Ecodesign” Directive 2009/125/EC establishing a framework for the setting of ecodesign requirements for energy-related products
- “Energy Labelling” Regulation (EU) 2017/1369 setting a framework for energy labelling
- “RoHS” Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment
- “WEEE” Directive 2012/19/EU on waste electrical and electronic equipment

Battery legislation

- “Battery Directive” 2006/66/EC on batteries and accumulators and waste batteries and accumulators
- “Battery Regulation Proposal” 2020/0353 (COD) concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) No 2019/1020

2.3 Information categorisation framework

To facilitate the analysis of information requirements, information needs to be structured in an unambiguous way. Since the data provider is assumed to be unique for each information point, it is particularly appropriate for structuring. Alternative perspectives for defining information categories might be used, e.g., data user or business case, but might lead to ambiguities, e.g., disassembly information might be used by user, repairer and recycler. To avoid confusion, this study thus uses a **data provider perspective** for structuring information requirements. The following table uses the concept of data provider to define stakeholder groups and related information categories.

Table 3 DPP information categories

Value chain relation	Data provider	Information category
Value chain - Internal	Upstream data provider (cradle to gate): Material and product manufacturer, logistics, supplier, retail, distribution etc.	<ul style="list-style-type: none"> • Product identification, company identification • Functional and technical specifications • Material and composition information • Product design and service-related information
	Downstream data provider (gate to grave): consumer, repair and reconditioning operators, refurbishment, remanufacturing, waste operators including collectors, sorters, recyclers, etc.	<ul style="list-style-type: none"> • Product usage history • Product repair history • End-of-Life (EoL) history
Value chain - External	Compliance and circularity data providers using data from upstream (and potentially	Compliance and circularity information: <ul style="list-style-type: none"> • Mandatory compliance (certification norms), pictograms and markings

	downstream) ⁶ and potentially aggregating this information into indicators and labels: conformity assessment bodies ⁷ , certification and standardisation bodies, etc.	<ul style="list-style-type: none"> • Non-mandatory compliance (standards) & associated labels • Indicators (e.g. circularity indicator, environmental impact)
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The information categories presented above could be transformed into other categorisation systems, e.g., structured with a data user or business case perspective. For example, market surveillance authorities are an important data user. The data user perspective will be further explored in later project tasks (T2.3 and T2.4).

In the future, the above information categories may be further detailed and adapted to more granular stakeholder groups if and when commonly or formally accepted stakeholder group definitions are available, e.g., in the revisions of the ESPR, ISO TG323, etc.

3 Results

This section describes in chapter 3.1 the results of information requirements currently employed in DPP-related initiatives and in chapter 3.2 the results of desk research of information requirements from legislation with a focus on the ESPR and Battery Regulation Proposal.

3.1 Information requirements from DPP-related initiatives

In this section, we analyse the information currently exchanged by a number of existing data sharing initiatives and schemes related to the DPP. This analysis was performed using the data gathered using the screening tool described in section 2.2. Results presented below were obtained using the 70 survey answers received before December 12, 2022. However, answers were not provided for all questions and, due to the small sample, the results of this survey cannot be considered representative of general DPP-related data sharing schemes. The results presented below should only be perceived as a means for creating an initial list of information requirements to be used for discussion in later consultations.

While the screening tool questionnaire is clustered in three blocks of questions (general characteristics, information requirements and IT architecture), the analysis below focuses on the first two. All questions on information requirements allow multiple choice answers, with the option for additional input in an “other” field. In certain cases, additional input was provided in the wrong section (e.g., “PEF information” in functional specifications). In such cases, the answer is taken into account in the appropriate section.

3.1.1 General characteristics of analysed initiatives

Proposed answers for the currently active focus sector of the initiative included textiles, electronics, batteries, automotive, construction, food and cross-sector (more than one). Multiple answers were possible for this question. The figure below indicates that the majority of sampled initiatives focus on textile products (26 answers, 38,8%), 14 on electronic products and 10 on batteries. Other sectors are represented such as food, construction, mining, packaging and chemicals. The diagram shows that **almost a third of initiatives are already working across sectors**. As a general result, most initiatives stated that their data model

⁶ For example, the calculation of the carbon footprint for batteries might include end-of -life stages.

⁷ In the Battery Regulation Proposal, a conformity assessment body is defined as a body that performs conformity assessment activities including calibration, testing, certification and inspection.

(information requirements) is flexible and can be extended with any kind of information. This was often stated in the individual field “others”.

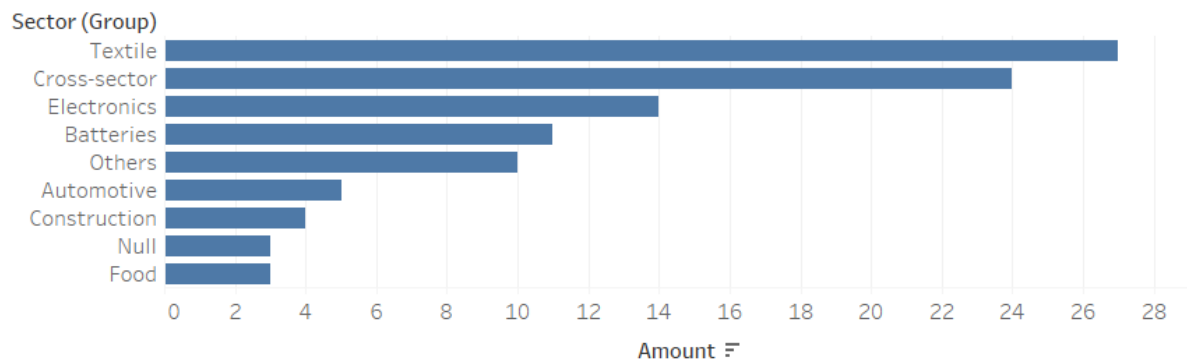


Figure 6 Number of participating initiatives in the survey, per sector of current activity. Multiple answers were possible.

Initiatives were asked to identify their “type” with proposed answers including ‘platform’, ‘product data scheme’, ‘traceability solution’, ‘standard’ or ‘other’. Multiple answers were possible. In the sampled initiatives, at least 37.5 % identify to the term “platform”, followed by “traceability solution” (28.1 %). Other initiatives define themselves as “standards” (10.9 %) or “product data schemes” (7.8 %). Results show that, among initiatives that previously identified as “traceability solutions”, we find respondents that focus either exclusively on the supply chain or exclusively on the finished products. We thus observe that the use of the word ‘traceability’ is not clearly defined which can potentially lead to some confusion.

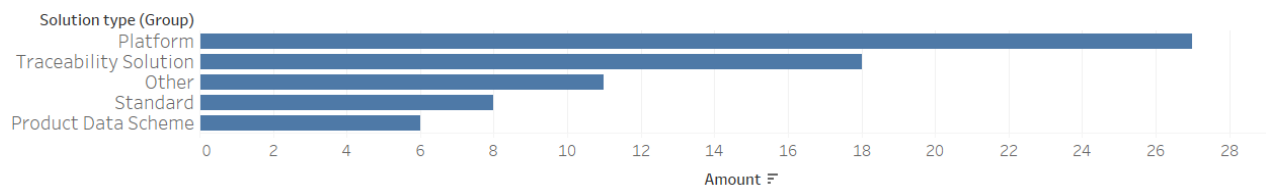


Figure 7 Characterisation of initiatives by type of solution. Most initiatives identify as platforms.

The large majority of initiatives (46 out of 67 initiatives) focus **both** on the exchange of information within the supply chain and on the final product. Some initiatives have a sole focus either on the final product (11 initiatives) or the supply chain data exchange (10 initiatives).

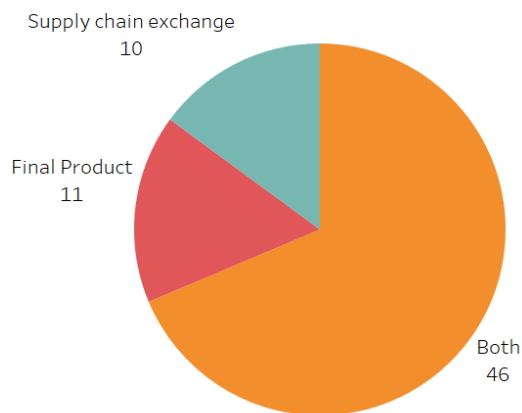


Figure 8 Characterisation of initiatives by focus on finished product or supply chain exchange (67 answers)

The market scope of initiatives is largely at international level (73%, 49 out of 67 answers) which reflects global value chains and the fact that a large quantity of materials or parts (and associated information) are produced outside Europe. 13 initiatives (20,9%) have a focus on the European market and 4 on national markets.

Market scope

67 Answers

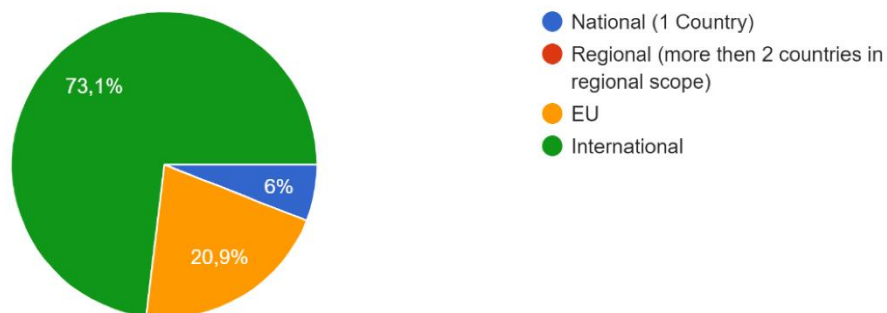


Figure 9 Market scope of initiatives. A single answer was allowed. (67 answers)

For the question on technology readiness and maturity of the initiative, three answers were possible: concept, prototype and application. Multiple answers were possible for this question. Figure 10 shows that 58.8 % of initiatives (40) identify as an application. Other initiatives are in prototype phase (24) or concept phase (10). Certain initiatives selected multiple answers.

Technology readiness

68 Answers

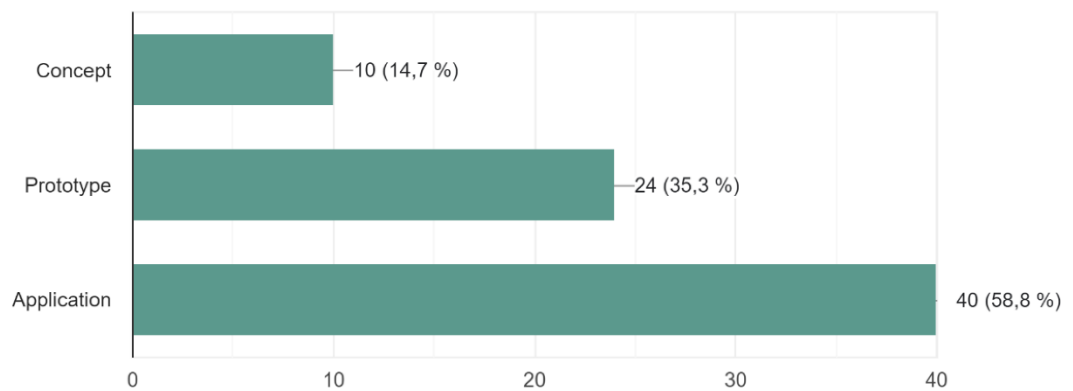


Figure 10 Technology readiness level of initiatives. Multiple answers were possible. (68 answers)

Figure 11 shows the distribution of target groups, defined as the **users** of the data and/or platform. Multiple choices were possible for this question. The five most important target groups are distributors and retailers, recyclers, product developers and designers, remanufacturing / reuse / repair actors and consumers. Interestingly, the number of initiatives that declared 'other' target value chain stakeholders is of similar importance, with provided answers: company identification providers, installers and technicians, developers, trusted intermediaries, projects or product information system experts.

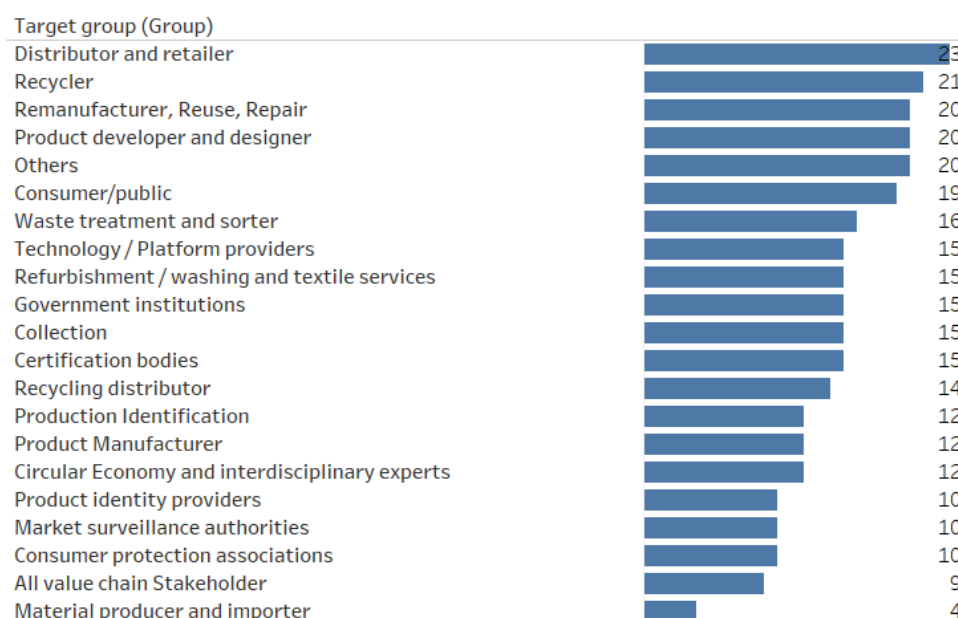


Figure 11 Distribution of target group of the initiatives. Multiple answers were possible.

3.1.2 Information generated in the upstream value chain

Upstream stakeholders include all actors from material sourcing to the consumer. Data is provided by material producers and suppliers, product manufacturers, retailers and importers. Below, an overview of each information category is provided.

3.1.2.1 Product and company identification

To the question “How do you identify the data provider (e.g., manufacturer ID)?”, the most common answer is the name and address of the company. However, almost all initiatives use some form of data provider identification, including a wide variety of both standardised and proprietary schemes. ⁸One initiative mentions the need to conserve the anonymity of the data provider.

Next, product traceability was defined as **event** data related to the history, time and location of activities on the product. The multiple-choice answers proposed were date, location, transport means (e.g. vessel, track) and operators. The majority of initiatives declared allowing for the recording of the date and location, while some allow for the tracking of the operator and transport means. It should be mentioned that only 36 of 70 answers are provided, which is coherent with the fact that only a fraction of the initiatives identify themselves as traceability solutions (Figure 7).

⁸ Example answers include: GS1 GLN, IEC 61406, SKU ID, OAR ID, UUID, DNV, GTS ID.

Product traceability

36 Answers

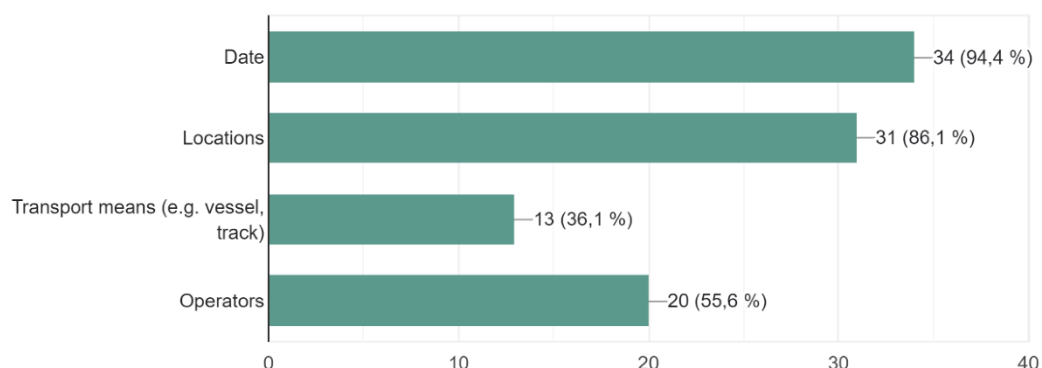


Figure 12 Answers related to product traceability. Multiple answers were possible.

3.1.2.2 Functional and technical specifications

This section comprises questions on the technical and functional specifications of the end/consumer product which are defined as features or behaviour of a product **when in use**. Each specification can be measured in an objective manner and expressed within specific values. The example of water repellence of a jacket was provided in the questionnaire to give an indication of a technical specification. An example of a technical specification for a battery is its capacity. Possible answers to the question were left very open to allow for a wide range of answers: ‘minimum functional specifications for compliance (e.g. energy consumption)’, ‘other functional specifications’, ‘not relevant / not possible’, ‘possible/ flexible data model’, ‘other’.

When such information is provided, minimum functional specifications for compliance are available in 22 initiatives, including energy consumption for electronic products. 25 initiatives stated that generally individual specifications are possible or that their system is based on a flexible data model. 11 initiatives stated “other functional specifications” which groups information such as regional requirements, colour group, weight, health protection features, capacity, maximum voltage, and power consumption.

Functional and technical specifications (Group)

Possible / flexible data model	25
Minimum functional specifications for compliance	22
Other functional specifications	13

Figure 13 Answers related to ‘as-designed’ functional and technical specifications. Multiple answers were possible.

The presence of the answers “colour group” and “weight” points to the need to expand the information categorisation framework to other categories such as ‘retail information’. Most initiatives acting in the textile sector did not provide an answer to this question indicating that this information category is of less relevance to them or not in their scope.

3.1.2.3 Material and composition information

Product composition includes data related to its ingredients (material declaration) and the compliance to Declarable Substance List. Possible answers to the question included ‘material information for EU compliance (e.g. REACH, RoHS)’, ‘material information for other compliance’, ‘material information after own/individual

list', 'full material declaration', and 'possible / flexible data model'. Most initiatives focus on material information for European or other compliance and 20 initiatives define their own material information list. **In 15 answers, initiatives selected full material declaration.** In 11 answers, the 'Possible/flexible data model' option is selected. Answers in the field 'other' include material information for recyclers, conflict minerals, recycled and renewable content, metal content, fibre composition, fabric type, and waste type.

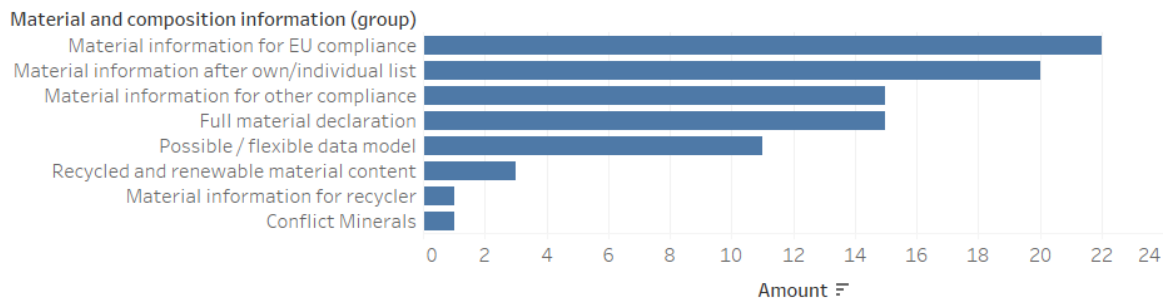


Figure 14 Answers related to material and composition information (46 answers, multiple answers were possible)

The following diagram colour-indicates the number of answers to the above questions per sector, noting that an initiative can be active in multiple sectors. We observe that material information for electronics is mainly used for EU or other compliance. Due to the fewer information requirements for textile products, this is relatively less frequent for initiatives acting in the textile sector.

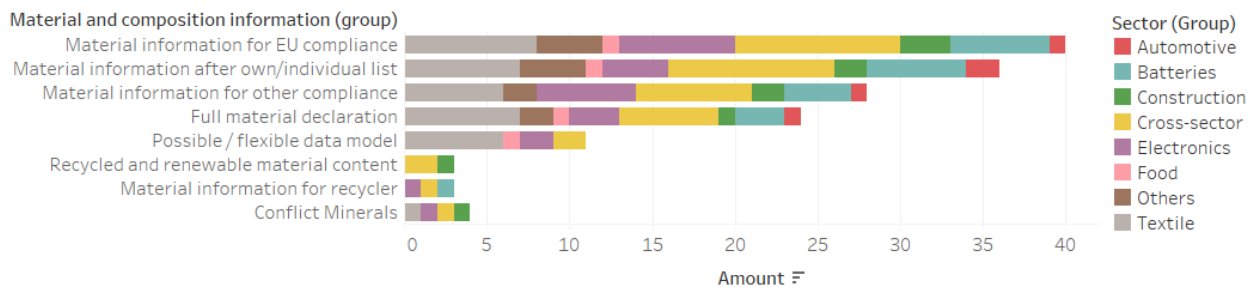


Figure 15 Sectoral distribution of answers related to material and composition information

The full material declaration answer was selected more often in the textile sector. Interestingly, the full material declaration answer was selected by three initiatives involved in the electronics sector. Seeing the complexity of these products, this was rather surprising. These initiatives focus either on compliance reporting or are related to the profiling of product waste materials, or provide detailed list of the product's material contents.

3.1.2.4 Product design and service-related information

Product design & service-related information comprise product level properties and characteristics that result from the assembly of parts (e.g., the use of specific screws), whilst service-related information comprise warranty and information to facilitate recycling as well as repair and update options. Many initiatives allow for the provision of design-related information like manuals, disassembly maps, maintenance , washing and repair instructions (23 initiatives) as well as service-related information like warranty and recycling information, repair and update options (25 initiatives). It was again mentioned by several (8) respondents that the initiative has a flexible information model.

As some of the answers only apply to a specific sector, Figure 16 shows the results per sector (grouped). The size of the circles indicates the number of answers. Each small dot indicates a distinct initiative.

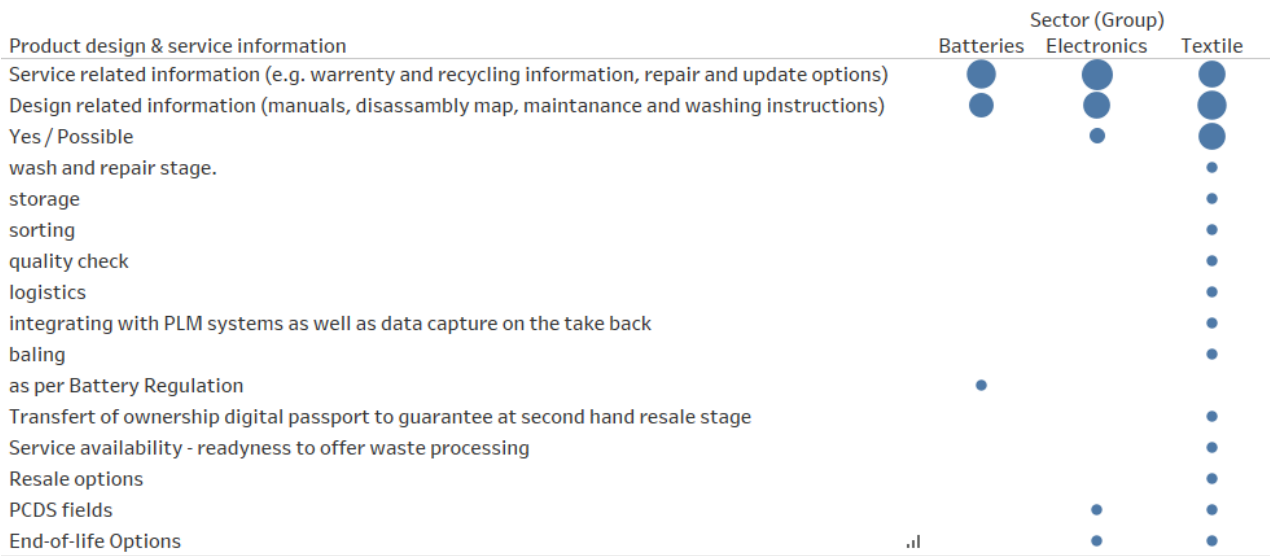


Figure 16 Product design and service-related information (grouped) per sector

Sector specific information relate to resale, waste treatment or recycling. This figure shows that many textile sector initiatives are focusing on providing a wide variety of design and downstream service-related information. Other information from textile related initiatives that is provided as a free text include resale options, end-of-life options, service availability for waste handling, information on take-back, sorting, and wash and repair. “PCDS fields” refers to the Product Circularity Data Sheet⁹ initiative which provides a means for structured declaration of information on the design for use, reuse and disassembly of products.

3.1.3 Information generated in the downstream value chain

Downstream information is **dynamically and cumulatively** generated in the use phase by the user or consumer, while repair or end-of-life information is provided by service technicians, waste treatment or recycling operators. On average, these questions were answered the least which indicates that initiatives primarily focus on upstream or circularity data. This can be interpreted as an absence of provision for the possibility of adding dynamic data into the DPP. However, by counting the number of initiatives that provided at least product usage, repair or End-of-life data, **we found that 31 initiatives indicated that they manage (collect and update) downstream dynamic data.**

It should be noted that downstream information, like the usage or repair history, is specific to each individual product. From a technical perspective this entails the identification of each individual product, referred to as item-level or serialized identification. This study focuses on the analysis of information requirements provided for the electronics, textile and battery sectors only.

⁹ <https://pcds.lu/>

3.1.3.1 Product usage history

Product usage data was defined as information provided by the user. Predefined answer options included ‘user identification and method’, ‘usage data such as purchase date, use cycles, etc.’, and ‘possible / flexible data model’. Many individual entries were provided. The smallest dot is equal to one answer.

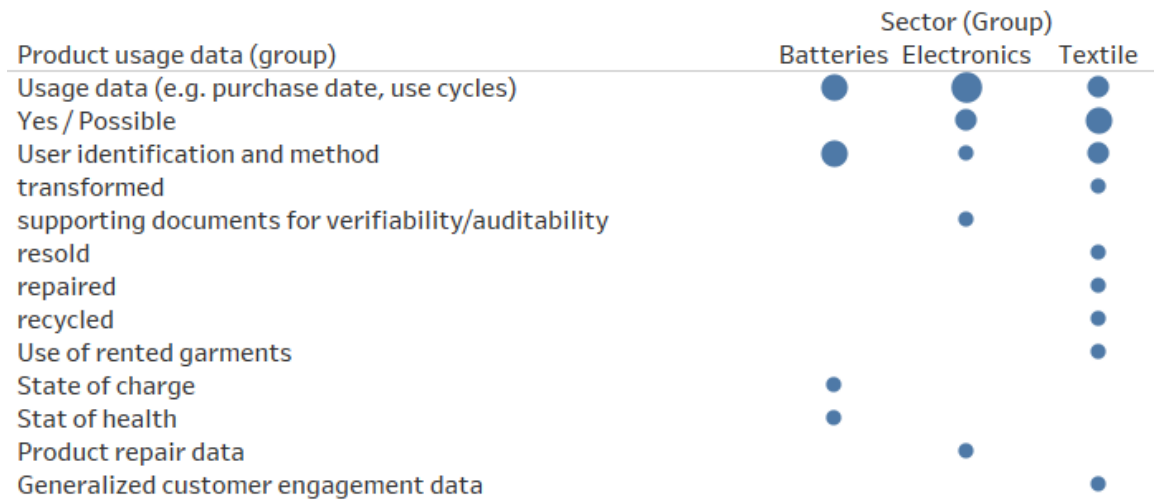


Figure 17: Product usage data grouped per sector (45 answers from 24 initiatives). Multiple answers were possible.

3.1.3.2 Product repair history

In this section, we investigate the provision for dynamic repair-related information. Here we assume that the repair will not lead to a change of product use (“repurposing”) in which case a new DPP might need to be issued. Possible answers to the question of product repair data included ‘Repair company identification (e.g. ID, address, etc.)’, ‘Repair related information (e.g. date of repair, exchanged part, etc.)’, and ‘Possible / flexible data model’. From the overall of 70 surveyed initiatives, 24 provided one or more answers. In 15 initiatives the repair company can be identified and in 7 initiatives repair information like the date of repair or exchanged parts are considered.

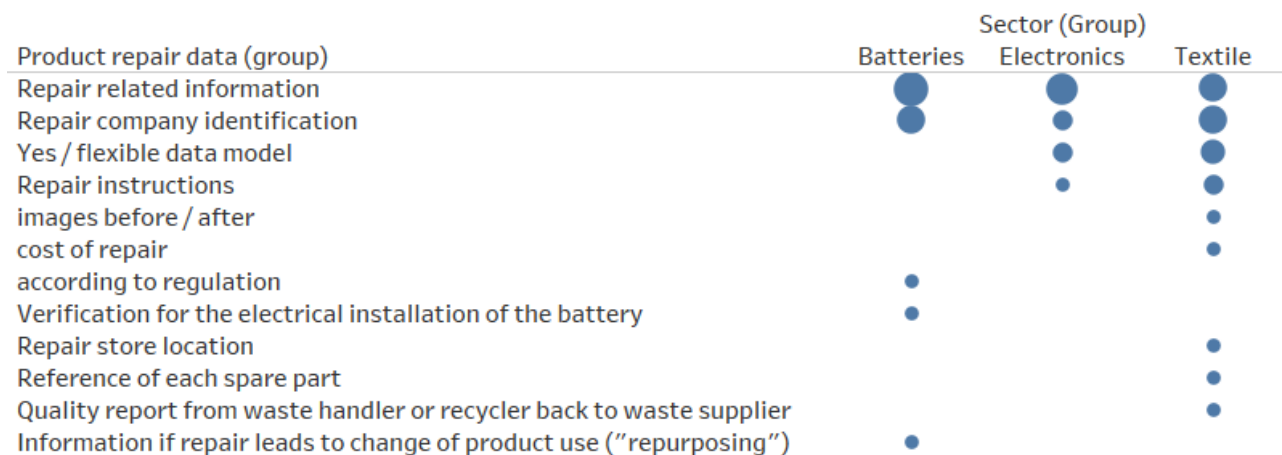


Figure 18 Product repair data (grouped) per sector (48 answers from 24 initiatives). Multiple answers were possible.

The answer “repair instructions” is considered in the section product design information in section 3.1.2.4(Chapter 3) . The answer “quality report from waste handler to waste supplier” was not considered because it cannot be attached to a specific product.

3.1.3.3 End-of-life (EoL) history

The provision for End-of-Life history data assumes that the product data record is not destroyed when the product is recycled¹⁰. Possible answers included 'Recycler company identification (e.g. ID, address, etc.)', 'Recycling related information (e.g. date of recycling, etc.)', and 'Possible / flexible data model'. The identification of recycler is possible in 7 of the surveyed initiatives. Only two initiatives include recycling-related information (date of recycling, etc.).

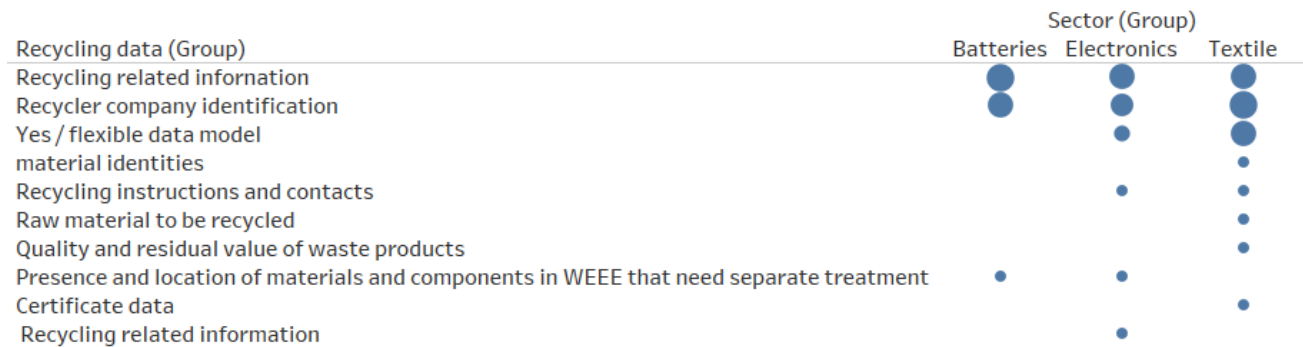


Figure 19 Recycling data (grouped) per sector (47 answers from 27 initiatives). Multiple answers were possible.

Other information mentioned in the free text field include resell data, recycling data (material quality information), quality report from waste handler to waste supplier, material identities and brand of origin and raw materials (textiles).

3.1.4 Compliance and circularity information

The question on compliance and circularity information proposed several answers: 'Circularity indicators (score e.g. reparability index)', 'Environmental indicators (e.g. CO2 footprint)', 'Environmental labels (e.g. EU eco flower)', 'Social labels', 'Labels (cross-sectoral or multi-criteria)', 'Compliance related information (e.g. RoHS/REACH/WEEE compliant)', 'Certifications, norms, standards (e.g. ISO/IEC/EN)', and 'Possible / flexible data model'. This section on circularity information was answered by 54 of the surveyed initiatives. Circularity information can be clustered into indicators, labels as well as certification, norms and compliance^[OB]. Indicators are highly aggregated information that indicate a state e.g. the reparability of a product, often expressed on an alphanumeric scale (a, b, c or 1, 2, 3 etc.) and sometimes supported by a graphic.

The clusters give an indication about the distribution of answers:

- Compliance (certification, standards)
 - 10 compliance related information e. g. for RoHS, REACH, WEEE
 - 16 certification norms and standards
- Non-mandatory compliance (labels)
 - 17 environmental and social labels
 - 14 cross-sectoral and multi-criteria labels
- Indicators
 - 10 circularity indicators (reparability index, reuse index, recycling index)
 - 14 social and environmental indicators like CO2 footprint

¹⁰The Battery Regulation states that when a battery is recycled, the "DPP should cease to exist."

It was mentioned that additional data fields for circularity information are possible/can be provided. REACH and compliance related information is sometimes referred to as certification or circularity information.

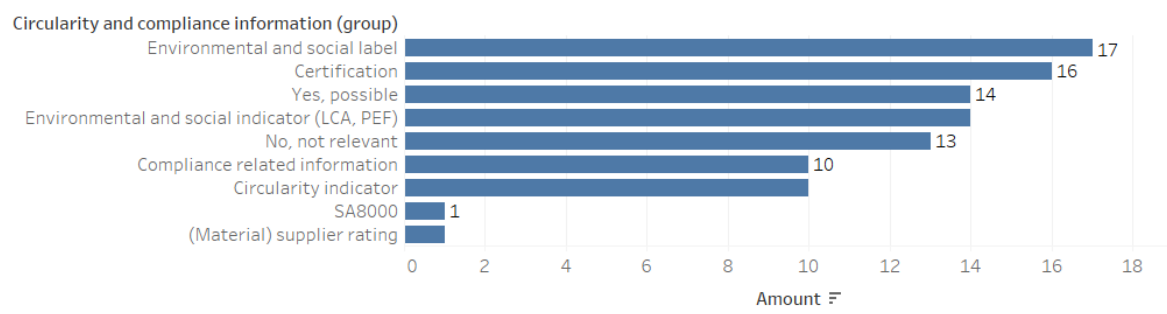


Figure 20 Circularity and label information data (grouped)

Other information that are used individually include environmental and social LCA, PEF, recycling index, responsible chain certifications, SA8000. Other answers include 'Product carbon footprint', 'GOTS' (a textile processing standard), and 'certification' in general.

3.2 Information requirements from legislation

In this section, we map information that is mandatory for existing and for potentially upcoming legal compliance. The scope and reglementary texts on which this screening was performed were defined in section (2.2). The information requirements extracted from this study will be included in the initial set of information requirements to be used to initiate further discussions in consecutive consultation processes.

Figure 21 shows, for each sector, the mandatory information requirements clustered according to the categorisation framework described in section 2.3. Furthermore a color coding of the boxes indicates if the information is disclosed to public (yellow), specific stakeholder i.p. recycler/repair (grey) or market surveillance information (blue). Information from upcoming legislation (Battery Regulation proposal 2020/0353 COD) is indicated by diagonally striped boxes.

Information category	Sub-category	Sector			
		Batteries	Cross-sector	Electronics	Textile
General product and co..	Identification		■		
Functional and technical specifications	Energy			■ ■	
	Performance	■			
Material information	Hazardous substances (SVHC, PO..		■ ■ ■ ■ ■ ■	■ ■	
	Hazardous substances, location			■	
	Material composition				■
	Material origin	■			
	Recycled content	■			
	Recycling			■	
Product design related information	Use, Repair (instruction, updates,..			■ ■	
	Disposal	■	■	■	
	Repair (prof. instructions)	■		■	
	Dismantling, disposal			■	
	Dismantling, Material composition			■	
Circularity information	Carbon footprint	■			

Figure 21 Overview of existing legal information requirements for each sector, clustered into information categories

The overview shows three general trends: first, material information requirements in the electronics sector and from chemical legislation (cross-sector) primarily address market authorities (B2G) or other professional actors (B2B). Second, product design information requirements are most commonly found for energy-related products which are regulated through the Ecodesign Directive, in particular addressing the general public (e.g., use and maintenance information) or specific stakeholders (professional repair information). Third, the proposed Battery Regulation requires the disclosure of several information to the end-user like recycled content or to the manufacturer such as the material origin (country, name, address of raw material supplier).

The sections below employ the terminology extracted from the corresponding legal acts to designate ‘data providers’ and ‘data users’, revealing heterogeneous vocabulary between legislation and the need to harmonize these in the future.

Since the ESPR Proposal is the legal text that proposes the broadest scope, it is addressed first below.

3.2.1 Upcoming information requirements from the ESPR Proposal¹¹

The proposal for a Ecodesign for Sustainable Products Regulation (ESPR)¹² currently covers a wide range of **general** requirements which do not necessarily result in **information** requirements. Ecodesign requirements listed on ESPR Article 5 (1) comprise:

- a) “durability;
- b) reliability;
- c) reusability;
- d) upgradability;
- e) reparability;
- f) possibility of maintenance and refurbishment;
- g) presence of substances of concern;
- h) energy use or energy efficiency;
- i) resource use or resource efficiency;
- j) recycled content;
- k) possibility of remanufacturing and recycling;
- l) possibility of recovery of materials;
- m) environmental impacts, including carbon and environmental footprint;
- n) expected generation of waste materials. “

Horizontal **information** requirements for the product passport are outlined in ANNEX III and Article 7(2) of the ESPR. Article 7(5) refers to information as required within REACH Regulation. For overview purposes, the following information requirements are structured using the categorisation framework defined in section 2.3):

- **Product identification (ANNEX III)**
 - “(b) the unique product identifier at the level indicated in the applicable delegated act adopted pursuant to Article 4;”
 - “(c) the Global Trade Identification Number as provided for in standard ISO/IEC 15459-6 or equivalent of products or their parts;¹³
 - “(d) relevant commodity codes, such as a TARIC code as defined in Council Regulation (EEC) No 2658/871;”
- **Manufacturer identification (ANNEX III)**
 - “(g) information related to the manufacturer, such as its unique operator identifier and the information referred to in Article 21(7);”
 - “(h) unique operator identifiers other than that of the manufacturer;”
 - “(i) unique facility identifiers;”
 - “(j) information related to the importer, including the information referred to in Article 23(3) and its EORI number;”

¹¹ Available at https://environment.ec.europa.eu/system/files/2022-03/COM_2022_142_1_EN_ACT_part1_v6.pdf

¹² https://environment.ec.europa.eu/publications/proposal-ecodesign-sustainable-products-regulation_en

¹³ Other approaches are discussed e.g. IEC 61406-series. See chapter 4

- “(k) the name, contact details and unique operator identifier code of the economic operator established in the Union responsible for carrying out the tasks set out in Article 4 of Regulation (EU) 2019/1020, or Article 15 of Regulation (EU) [...] on general product safety, or similar tasks pursuant to other EU legislation applicable to the product.”
- **Material and composition information (Article 7(5) relates to REACH Regulation)**
 - “(a) the name of the substances of concern present in the product;”
 - “(b) the location of the substances of concern within the product;”
 - “(c) the concentration, maximum concentration or concentration range of the substances of concern, at the level of the product, its main components, or spare parts;”
 - Article 7 (a) include, as a minimum, requirements related to the product passport referred to in Chapter III and requirements related to substances of concern referred to in paragraph 5; and
- **Product design and service-related information (ANNEX III and Article 7(5))**
 - “(d) relevant instructions for the safe use of the product;”
 - “(e) information relevant for disassembly”
 - “(f) user manuals, instructions, warnings or safety information, as required by other Union legislation applicable to the product”
 - Article 7 (b) as appropriate, require products to be accompanied by:
 - Product design (i) information on the performance of the product in relation to the product parameters referred to in Annex I;
 - Product design (ii) information for consumers and other end-users on how to install, use, maintain and repair the product in order to minimise its impact on the environment and to ensure optimum durability, as well as on how to return or dispose of the product at end-of-life;
 - (iii) information for treatment facilities on disassembly, recycling, or disposal at end-of-life;
 - (iv) other information that may influence the way the product is handled by parties other than the manufacturer in order to improve performance in relation to product parameters referred to in Annex I.”
- **Compliance and circularity (ANNEX III)**
 - “(e) compliance documentation and information required under this Regulation or other Union law applicable to the product, such as the declaration of conformity, technical documentation or conformity certificates;”
 - “information relevant to ecodesign requirements that manufacturers may include in the product passport in addition to the information required pursuant to Article 8(2), point (a), including information on specific voluntary labels applicable to the product.” That shall include EU Ecolabel.

Necessary to mention is the horizontal ecodesign requirement on the “presence of substances of concern” (Article 5 (1) g). The proposal for the ESPR defines “substances of concern” (Article 2 (28)) as a substance that:

- (a) meets the criteria laid down in Article 57 and is identified in accordance with Article 59(1) of Regulation (EC) No 1907/2006 (REACH).
- (b) is classified in Part 3 of Annex VI to Regulation (EC) No 1272/2008 (CLP) in one of the following hazard classes or hazard categories:
 - carcinogenicity categories 1 and 2,
 - germ cell mutagenicity categories 1 and 2,
 - reproductive toxicity categories 1 and 2,
 - respiratory sensitisation category 1,
 - skin sensitisation category 1,
 - chronic hazard to the aquatic environment categories 1 to 4,
 - hazardous to the ozone layer,
 - specific target organ toxicity – repeated exposure categories 1 and 2,
 - specific target organ toxicity – single exposure categories 1 and 2; or
- (c) negatively affects the re-use and recycling of materials in the product in which it is present.

Some articles indicate that information by other existing Union law is required.

The “**data provider**” is the economic operator responsible for providing the information to the economic operator responsible for issuing the DPP. The latter is defined (Article 9 (3)) as: “the **economic operator placing the product on the market**” who “shall provide dealers with a digital copy of the data carrier to allow the dealer to make it accessible to customers where they cannot physically access the product. The economic operator shall provide that digital copy free of charge and within 5 working days of the dealer’s request.”

The group of **data providers** can be further extended to include stakeholders that can potentially introduce or update information in the product passport including, where needed, the creation of a new product passport, and include “manufacturers, repairers, maintenance professionals, remanufacturers, recyclers, competent national authorities, and the Commission, or any organisation acting on their behalf” (Article 8, 2.(g)).

The **data users** include “customers, end-users, manufacturers, importers and distributors, dealers, repairers, remanufacturers, recyclers, competent national authorities, public interest organisations and the Commission, or any organisation acting on their behalf” (Article 8, 2.(f)).

From these paragraphs, we observe that consumers and end-users are explicitly not foreseen to introduce or update information in the product passport. Further analysis is required to establish if the proposed list of stakeholders might be lacking important stakeholder groups such as collectors and sorters, refurbishment operators, retailers and brands. The need for greater refinement or, on the contrary, the possibility of grouping several actors into a single stakeholder category, will be linked to the expression of information requirements.

3.2.2 Current information requirements

In following, information requirements from relevant existing legal acts, as listed in Section 2.2, are extracted. The sections below employ the terminology extracted from the corresponding legal acts to designate **data providers** and **data users**.

3.2.2.1 Cross-sector

The following table provides a comprehensive overview of the existing cross-sector information requirements applicable to the three product groups which are the focus of this study (electronics, textiles, and batteries).

Where? (Legislation)	What? (Information requirement)	Who? (Data provider)	To whom? (Data user)	How? (Data format)
REACH Regulation, Article 31	Substances and mixtures with hazards	Material producer and importer	Market surveillance Recipient of the material	Registration dossier Safety data sheet
CLP Regulation	Hazardous substances	Material producer and importer	All supply chain actors, including consumers	Label, markings
REACH Regulation Article 33	Products with SVHC content above 0,1%	Manufacturer of articles and/or complex objects	All actors throughout the product lifecycle	SCIP database

Table 4: Overview of current cross-sectoral information requirements, data provider, target data user and format

The table shows that material producers, importers to the EU as well as manufacturers are obliged to provide material information in different types and formats to different stakeholders. Information on substances and mixtures with hazards are to be disclosed to market surveillance (REACH Article 31, Table 5). Articles with specific SVHC content must be registered to the SCIP database which is available to all supply chain stakeholders, including consumers and recyclers.

Two information requirements above are not directly linked to finished products (defined as articles or complex objects) or are only relevant in specific cases: The information obligation in REACH Regulation Article 31 applies to substances and mixtures and is thus not a reporting obligation for finished products. The CLP Regulation requires the classification and labelling of substances and mixtures with hazardous potential which becomes applicable for products containing a REACH candidate list substance.

3.2.2.2 Electronics sector

The electronics sector is subject to product legislation including the Ecodesign Directive, Energy Labelling Regulation, RoHS Regulation, and WEEE Directive. Mostly manufacturer, importer or authorised representatives are required to provide information on material content as well as on product design and technical and functional aspects.

Where? (Legislation)	What? (Information requirement)	Who? (Data provider)	To whom? (Data user)	How? (Data format)
RoHS Regulation	Confirmation of absence of certain hazardous substances	Manufacturer	Market surveillance	CE marking

<i>Energy Labelling Regulation</i>	Product information sheet on energy consumption & performance (to consumers) Technical documentation (to market surveillance)	Manufacturer	Consumers, Market surveillance, Distribution	Label, Information sheet, EPREL registration
<i>Ecodesign Directive</i>	Product group specific substances (e.g., cadmium in displays)	Manufacturer, Importer, authorised representative	Recycler, Waste treatment	Datasheet, website, packaging, Label
<i>Ecodesign Directive</i>	Product group specific repair information (disassembly instructions, component map, etc.)	Manufacturer, Importer, authorised representative	Repairer	Manual, Manufacturer website
<i>Ecodesign Directive</i>	Use, repair information (maintenance, spare parts, updates)	Manufacturer, Importer, authorised representative	Consumers	Manual, website
<i>WEEE Directive</i>	Disposal, return and collection scheme information	Producer, Distributor and/or Member States	Consumers	Various
<i>WEEE Directive</i>	Information on different materials and location of dangerous substances and mixtures in EEE	Producer	Waste treatment	Manual, electronic media

Table 6: Overview of information requirements for the electronics sector structured by data provider, target data user and format

Information on product design and service for the public (consumers) includes information on installation, use, maintenance, and basic repair. Recycling information for consumers includes information on return options at end-of-life and disposal and collection schemes. These are required in various formats: as “instructions for use, at the point of sale and through public awareness campaigns” (Article 14, WEEE Directive). For consumers, legislation mostly aims to provide easy-to-understand aggregated information such as an energy efficiency label or crossed-out-wheelie bin label. The CE-marking as required by the RoHS Regulation is currently affixed on the product.

It should be noted, that by definition of the WEEE Directive ‘producer’ not only comprises EEE manufacturer but “any natural or legal person who, irrespective of the selling technique used, sells or places EEE products on the market.” (WEEE Directive)

Some legislation sets information requirement only for specific stakeholders. The Ecodesign Directive sets professional repair as a target group which should get necessary information to perform repair. The WEEE Directive applies the same idea to waste treatment facility operators who are provided with information on different materials and their location in the product to facilitate the separation of parts which include hazardous materials.

3.2.2.3 Textile sector

The Textile Regulation sets information requirements on the textile fibre name and material composition for each component. For multi-fibre textile products, the information should be labelled or marked with the name and percentage by weight of all constituent fibres in descending order on the textile product.

The current Textile Regulation states that: “Labelling or marking of the fibre composition should be compulsory to ensure that correct and uniform information is made available to all consumers in the Union. However, the Regulation mentions that economic operators may indicate, in addition, the presence of small

quantities of fibres requiring particular attention to keep the original quality of the textile product. Where it is technically difficult to specify the fibre composition of a textile product at the time of its manufacture, it should be possible to state, on the label or marking, only those fibres which are known at the time of manufacture provided that they account for a certain percentage of the finished product.”

Where? (Legislation)	What? (Information requirement)	Who? (Data provider)	To whom? (Data user)	How? (Data format)
<i>Textile Regulation</i>	Textile fibre name and material composition for each component	Manufacturer, Importer, Distributor	Consumer	Label
<i>Ecodesign Directive</i>	Hazardous substances (relevant to textile)	Manufacturer	Consumer	Seal with or w/o certificate, e.g. OEKO-TEX on website, packaging (Article 5, 1.)

Table 7 Overview of information requirements for the textile sector structured by data provider, target data user and format

However, some materials are specifically exempt from the disclosure, if their content is lower than a specific threshold (5-10%).

The material composition must be indicated in a standardised and readable way on a label for the consumer and other value chain stakeholder.

3.2.2.4 Battery sector

The Battery Directive aimed to promote a high level of collection and recycling. Manufacturers are obliged to provide disposal information to consumers by means of labels and information campaigns.

Where? (Legislation)	What? (Information requirement)	Who? (Data provider)	To whom? (Data user)	How? (Data format)
<i>Battery Directive</i>	Information on disposal, return and collection schemes	Manufacturer	Consumer	Label, information campaigns
<i>Battery Regulation Proposal</i>	See below	See below	See below	Digital product passport for batteries, label, website

Table 8 Overview of information requirements for the batteries sector structured by data provider (who?), target user (to whom?) and format (how?)

Major differences can be seen when comparing the Battery Directive to the **Battery Regulation Proposal**. The objectives, outlined in the preamble of the Battery Regulation Proposal comprise:

- “(13) Batteries should be designed and manufactured so as to optimise their performance, durability and safety and to minimise their environmental footprint.”
- “(20) Increased use of recovered materials to take into account the risk of supply of cobalt, lead, lithium and nickel [...]”
- “(24) [...] Reduce the life cycle environmental impact of batteries [...]”

The Battery Regulation proposal defines battery specific information requirements as follows:

Article 7 **Carbon footprint** of electric vehicle batteries and rechargeable industrial batteries

- “(a) administrative information about the manufacturer;
- (b) information about the battery model for which the declaration applies;
- (c) information about the geographic location of the battery manufacturing facility;
- (d) the life-cycle carbon footprint of the battery, calculated as kg of carbon dioxide equivalent per one kWh of the total energy provided by the battery over its expected service life;
- (e) the carbon footprint of the battery differentiated per life cycle stage as described in point 4 of Annex II;
- (f) identification number of the EU declaration of conformity of the battery;
- (g) a web link to get access to a public version of the study supporting the carbon footprint values referred to in points (d) and (e).”

Article 8 **Recycled content** in industrial batteries, electric vehicle batteries and automotive batteries

- “1. technical documentation containing information about the amount of cobalt, lead, lithium or nickel recovered from waste present in active materials in each battery model and batch per manufacturing plant.”

Article 13 **Labelling of batteries**

- “2. portable and automotive batteries shall be marked with a label containing information on their capacity and portable batteries shall be marked with a label containing information on their minimum average duration when used in specific applications.”

Article 14 Information on the **state of health** and **expected lifetime** of batteries

- “to the legal or natural person who has legally purchased the battery or any third party acting on their behalf for the purpose of
 - (a)evaluating the residual value of the battery and capability for further use;
 - (b)facilitating the reuse, repurposing or remanufacturing of the battery;
 - (c)making the battery available to independent aggregators or market participants through energy storage”
- Annex VII (pg. 293) adds details on parameters for determining the state of health of batteries

(29) Additionally, it is important to guide the end-user to discard waste batteries in an appropriate way.

Annex XIII Information to be included in the battery passport

- “(a) Information specified in Part A of Annex VI; Information on the label of batteries:
 - 1. the manufacturer’s identification in accordance with Article 38(8);
 - 2. the battery category and its identification in accordance with Article 38(7a);
 - 3. manufacturing place (geographical location of a battery manufacturing facility);
 - 4. manufacturing date (month and year);
 - 5. weight; 5a. capacity;
 - 6. chemistry;
 - 7. hazardous substances contained in the battery other than mercury, cadmium or lead;
 - 9. usable extinguishing agent.
 - 10. Critical raw materials contained in the battery above a concentration of 0,1 % weight by weight
- (b) Material composition of the battery, including its chemistry, hazardous substances contained in the battery other than mercury, cadmium or lead, and critical raw materials contained in the battery;

- (f) Carbon footprint information referred to in Articles 7(1) and 7(2);
- (g) Information on responsible sourcing as indicated in the report on its due diligence policies referred to in Article 45e(3)
- (h) Recycled content information as contained in the documentation referred to in Article 8(1);
- (ha) The share of renewable content;
- (i) Rated capacity (in Ah);
- (j) Minimal, nominal and maximum voltage, with temperature ranges when relevant;
- (k) Original power capability (in Watts) and limits, with temperature range when relevant;
- (l) Expected battery lifetime expressed in cycles, and reference test used;
- (m) Capacity threshold for exhaustion (only for electric vehicle batteries);
- (n) Temperature range the battery can withstand when not in use (reference test);
- (o) Period for which the commercial warranty for the calendar life applies;
- (p) Initial round trip energy efficiency and at 50% of cycle-life;
- (q) Internal battery cell and pack resistance;
- (r) C-rate of relevant cycle-life test.
- (s) The labelling requirements laid down in articles 13(3) and (4);
- (t) The EU declaration of conformity referred to in Article 18;
- (u) The information regarding the prevention and management of waste batteries laid down in point (a) to (f) of Article 60(1)."

It is outlined that certain information in the battery passport should not be public but rather for a limited number of persons with legitimate interest, for example dismantling information which are essential for repairers (Annex XIII and recital 93a Battery Regulation Proposal).

The Battery Regulation proposal uses the following **terminology** when referring to DPP-related stakeholder groups:

Data providers include: Producers, producer responsibility organisations, parent company, subsidiary, economic operators, manufacturers, repairers and remanufacturers (these two being considered as manufacturers in the Regulation), authorised representatives for EPR (i.e., takes on the legal responsibility in relation to the manufacture of batteries, making them available or placing them on the market or putting them into service), fulfilment service providers (acting on behalf of those placing batteries on the market), traders, importers, and distributors.

Data users include: Waste management operators, waste operators, waste holders, recyclers, treatment and recycling facility operators, notified bodies, market surveillance authorities, consumers, end users, economic operator such as manufacturers, repairers and remanufacturers (these two being considered as manufacturers in the Regulation), second-life operators, permitted facilities, independent energy aggregators, energy market participants, member states, national authorities, governments, public procurement sector, contracting authorities and contracting entities, European Union, European Council, European Commission.

Excluded from these lists are actors, mentioned in the Regulation, which might be indirectly using or providing data for the DPP, such as conformity assessment bodies, subcontractors and/or subsidiaries, industry associations and groupings of interested organization, including from the private sector, which provide due diligence schemes and secondary data, suppliers, their subsidiaries and subcontractors.

4 An initial set of information requirements per sector

This section provides an initial set of information requirements for each of the three product sectors: batteries, electronics and textiles. The purpose of this initial set is to **initiate, structure and facilitate** upcoming stakeholder consultations to evaluate the effort and potential economic benefit of these initial set of information. This initial set is obtained from the combination of:

- the information requirements currently employed in 70 surveyed DPP-related initiatives (section 3.1),
- the results of desk research on information requirements from current and upcoming legislation (section 3.2).

These lists should be seen as non-exhaustive considering that they are based on literature and survey findings. The findings will not replace the future consultations for the delegated acts nor will necessarily be used to design these. In the tables, the letter “M” indicates current mandatory information while “(M)” indicates upcoming mandatory information defined in the ESPR proposal and the proposed Battery Regulation. “U” indicates information used in the initiatives. An empty cell in the data provider or data user columns of the tables below indicates that this parameter was not specified.

4.1 Electronics

The following tables summarise the initial set of potential key data per sector, unless a product group is exempted from the respective regulation, e.g. Medical devices.

Table 9 Summary of findings on current data used in the electronics sector in initiatives (U) or in legislation (M)

Information category	Information requirement (for discussion)	Data provider	Data user	Mandatory / Used
Product identification	Unique product identifier at the level indicated in the applicable delegated act	economic operator placing the product on the market	n.d.	(M)
	Global Trade Identification Number as provided for in standard ISO/IEC 15459-6 or equivalent of products or their parts	economic operator placing the product on the market	n.d.	(M)
	Product traceability (date, location, operators)	n.d.	n.d.	U
	Relevant commodity codes, such as a TARIC code as defined in Council Regulation (EEC) No 2658/87;	economic operator placing the product on the market	n.d.	(M)
Company information	Information related to the manufacturer, such as its unique operator identifier / web domain name.	economic operator placing the product on the market	n.d.	(M)
	Unique operator identifiers other than that of the manufacturer;	economic operator placing the	n.d.	(M)

		product on the market		
	Unique facility identifiers;	economic operator placing the product on the market	n.d.	(M)
	Information related to the importer, name, registered trade name or registered trade mark and the postal address, EORI number;	Importer, trade mark	n.d.	(M)
	Name, contact details and unique operator identifier code of the economic operator established in the Union responsible for the [...] EU declaration of conformity	Operator	n.d.	(M)
	Name, address	n.d.	n.d.	M
	Company ID ¹⁴	n.d.	n.d.	U
Functional and technical specifications	Product information sheet on energy consumption & performance	Manufacturer	Consumers, Distribution	M
	Technical documentation on energy specifications (EEL)	Manufacturer	Market surveillance	M
Material & composition information	CE- marking	Manufacturer	Market surveillance	M
	Disposal, return and collection scheme information	Producer, Distributor and/or Member States	Consumers	M
	Information on different materials and location of dangerous substances and mixtures (WEEE)	Producer	Waste treatment	M
	Substances of concern: name, location within the product, concentration at the level of the product, main components or spare parts	economic operator placing the product on the market	Market surveillance Manufacturers	(M)
	Hazardous substances (REACH, POP, CLP, Ecodesign, WEEE)	Manufacturer	Recycler, Market surveillance, Manufacturers	M
	Individual material declaration	Manufacturer and actors within the supply chain	n.d.	U
	Full material composition	Manufacturer and actors for the supply chain	n.d.	U
	Recycled content	Manufacturer and actors for the supply chain	n.d.	U
	Recycling oriented information	Manufacturer and actors for	n.d.	U

¹⁴ (individual, GS1 GLN, IEC 61406, SKU ID, OAR ID, UUID, DNV)

		the supply chain		
Product design & service	Use, repair information (maintenance, spare parts, updates)	Manufacturer, Importer, authorised representative	Consumers	M
	Repair information incl. disassembly instructions, component map, etc. (Ecodesign)	Manufacturer, Importer, authorised representative	Repairer	M
	Disassembly instructions (WEEE)	Manufacturer	Waste treatment	M
	Resale options, end-of-life options, service availability for waste handling	n.d.	n.d.	U
	Instructions for safe use	economic operator placing the product on the market	User	(M)
	User manuals, instructions, warnings or safety information	economic operator placing the product on the market	Consumer	(M)
	Information relevant for disassembly	economic operator placing the product on the market	n.d.	(M)
Usage history	Usage data (purchase date, use cycles, etc.)	n.d.	n.d.	U
Repair, reuse history	Repair data (date, exchanged parts, costs, images)	n.d.	n.d.	U
End of Life (EoL)	Collection rates / cumulative statistics (WEEE)	Waste treatment	Market surveillance	M
Indicators	Circularity indicator (reparability, reuse, recycling index), environmental and social impact indicator, PEF LCA,	n.d.	n.d.	U
Certification	Responsibility supply chain certifications	n.d.	n.d.	U
Label		n.d.	n.d.	

4.2 Textile

Table 10 Summary of findings on current data used in the textile sector in initiatives (U) or in legislation (M)

Information category	Information requirement (for discussion)	Data provider	Data user	Mandatory/ Used
Product identification	Unique product identifier at the level indicated in the applicable delegated act	n.d.	n.d.	(M)
	Global Trade Identification Number as provided for in standard ISO/IEC 15459-6 or equivalent of products or their parts	n.d.	n.d.	(M)
	Product traceability (date, location, operators)	n.d.	n.d.	U
	Relevant commodity codes, such as a TARIC code as defined in Council Regulation (EEC) No 2658/871;	n.d.	n.d.	(M)
Company information	Information related to the manufacturer, such as its unique operator identifier with standardized and > 1 Product identifier aside outside of ISO/IEC 15459-6, e.g. Open supply Hub ID, D-U-N-S number, GTS ID, etc.	Material supplier, Manufacturer	n.d.	(M)
	Unique operator identifiers other than that of the manufacturer;	Operator	n.d.	(M)
	Unique facility identifiers; with standardized and > 1 location identifier aside outside of ISO/IEC 15459-6, e.g. Open supply Hub ID, GTS ID, etc.	Facility	n.d.	(M)
	Information related to the importer, name, registered trade name or registered trade mark and the postal address, EORI number;	Importer, trade mark	n.d.	(M)
	Name, contact details and unique operator identifier code of the economic operator established in the Union responsible for the [...] EU declaration of conformity	Operator	n.d.	(M)
	Supply chain functions of company	n.d.	n.d.	U
	Name, address	n.d.	n.d.	U
	Company ID ¹⁵	n.d.	n.d.	U
Functional and technical specifications	Size metric - regional	n.d.	n.d.	M
Material and composition information	Fiber composition, also in small quantities requiring particular attention to keep the original quality of the textile product.	n.d.	n.d.	U
	Color brightness, color group, color description	n.d.	n.d.	U
	Fabric type	n.d.	n.d.	U
	Fabric construction type	n.d.	n.d.	U
	Waste type	n.d.	n.d.	U
	Substance of concern name, location within the product, concentration at the level of the product, main components or spare parts	n.d.	n.d.	(M)
	Individual material declaration	n.d.	n.d.	U
	Full material composition	n.d.	n.d.	U
	Recycled content	n.d.	n.d.	U

¹⁵ (individual, GS1 GLN, IEC 61406, SKU ID, OAR ID, GTS-ID, UUID, DNV)

	Recycling oriented information	n.d.	n.d.	U
Product design & service	Take-back, sort, wash and repair instructions	n.d.	n.d.	U
	Circular design orientation of product: Resale options, end-of-life options, service availability for waste handling	n.d.	n.d.	U
	Care instructions	n.d.	n.d.	U
	Instructions for safe use	n.d.	User	(M)
	User manuals, instructions, warnings or safety information	n.d.	Consumer	(M)
	Information relevant for disassembly	n.d.	n.d.	(M)
Usage history	Usage data (purchase date, use cycles, etc.)	n.d.	n.d.	U
Repair, reuse	Repair data (date, exchanged parts, costs, images)	n.d.	n.d.	U
Indicator	circularity indicator (reparability, reuse, recycling index), environmental and social impact indicator, PEF LCA	n.d.	n.d.	U
Certification	Responsibility supply chain certifications	n.d.	n.d.	U
Label	Certified labels	n.d.	n.d.	

4.3 Batteries

Table 11 Summary of findings on current data used in the battery sector in initiatives (U) or in legislation (M)

Information category	Information requirement (for discussion)	Data provider	Data user	Mandatory/ Used
Product and company information	Manufacturer's name, registered trade name or trade mark,	Manufacturer	User	(M)
	Manufacturing facility	Manufacturer	User	(M)
	Battery type, batch or serial number of the battery or other element allowing its unequivocal identification, battery model identifier	Manufacturer	User	(M)
	Date of manufacture/placing on the market	Manufacturer	User	(M)
	Product traceability (date, location, operators)	n.d.	n.d.	U
Functional and technical specifications	Battery performance specifications (power, internal resistance, energy round trip efficiency, discharge and charge rate, ratio between power and energy, depth of discharge, power capability)	Manufacturer	User	(M)
	Weight	Manufacturer	User	(M)
	Rated capacity	Manufacturer	User	(M)
	expected lifetime	Manufacturer	User	(M)
	Minimum average duration	Manufacturer	User	(M)
	Capacity fade, intern. resistance increase, energy efficiency and its fade	Manufacturer	User	U
	Charge throughput, temperature history, error memory, internal resistance	Manufacturer	User	U
Material & composition information	Recycled content (CLLN)	Manufacturer	User	(M)
	Renewable content (e.g. graphite produced from lignin)	Manufacturer	User	(M)
	Chemistry, detailed composition, including materials used in the cathode, anode and electrolyte	Manufacturer	User	(M)

	Hazardous substances in the battery other than mercury, cadmium or lead,	Manufacturer	User	(M)
	Critical raw material contained in the battery (Annex X)	Manufacturer	User	(M)
Product design & service	Information on disposal, return and collection schemes	Manufacturer	Consumer	(M)
	Part numbers for components and contact details of sources for replacement spares	Manufacturer	User	(M)
Usage history	State of health	BMS	User	(M)
	Charge throughput, temperature history, error memory, internal resistance	BMS	User	U
	Max. and min. temperature, avg. C-Rate, SoC difference, time stamp	BMS	User	(M)
	Tracking of extreme events/deep discharge cycles	BMS	User	(M)
	Charge throughput, temperature history, error memory, internal resistance,	BMS	User	U
Repair, reuse history	Status of battery ('original', 'repurposed', 'reused', 'remanufactured', 'waste') Annex XII 4(b)	Reuser/ Repurposer	Reuse	(M)
End of Life history	Information on handling and disassembly of batteries/ exploded diagrams/ safety measures	Manufacturer	Recyclers/ second-life operators	(M)
Indicator	Carbon footprint	Manufacturer	User	(M)
	Circularity indicator (reparability, reuse, recycling index), environmental and social impact indicator, PEF LCA	n.d.	n.d.	U
	Due diligence on responsible sourcing	Manufacturer	Public	(M)
Certification	Results of a test to prove compliance with all requirements	Manufacturer	Notified body/market surveillance/ Commission	(M)
Label		n.d.	n.d.	

5 Summary of main findings, recommendations and additional considerations

To reach the goal of defining an initial set of information requirements for Digital Product Passports in the batteries, electronics and textiles sectors, this report describes the work performed to map information that is mandatory by legislation and that is used in current DPP-related initiatives in these sectors. After defining the scope of the study and defining an information categorisation framework:

- Legal information requirements were extracted from publicly available online documents of the legal acts (EUR-Lex). A total of 13 legal acts were identified as relevant for the DPP information requirements and data model, including current proposals for Ecodesign and Batteries.

- Looking beyond legislation, to gain insights into the landscape of information exchanged by current DPP-related initiatives, a questionnaire was developed and the information requirements currently employed in 70 surveyed DPP-related initiatives were extracted.

An initial set of information requirements was obtained from the combination of the previous two results. This initial set will be used to **initiate and facilitate** the gathering of feedback from the largest possible number of external stakeholders. It will not replace the future consultations for the delegated acts nor will necessarily be used to design these.

Below, we describe lessons learnt while performing this study, list a number of recommendations and additional elements to be considered in further discussions. These additional considerations arose in the review process of this document.

5.1 Summary of main findings

5.1.1 Concerning existing and upcoming legal information requirements

- The new Battery Regulation Proposal, an agreement on which was reached by the European Council and Parliament in December 2022, defines both comprehensive and specific information requirements. Important new legal information requirements include carbon footprint, durability, second life and recycled content. Section 4.3 provides a detailed overview.
- The Proposal for a new Ecodesign for Sustainable Products Regulation (ESPR) includes general eco-design requirements and horizontal information requirements. It does not duplicate existing information requirements but rather refers to the information requirements from existing legislation (e.g. “This Regulation also should not result in the duplication or replacement of restrictions of substances covered by the RoHS Directive 2011/65/EU”). Furthermore, it outlines requirements for circularity which might result in future information requirements such as durability, recycled content and carbon footprint.
- Throughout legislation, the definitions and terms are not consistently used which can lead to confusion. For example:
 - Stakeholder
 - Data provider: producers and assemblers, supplier, importers, distributors, actors placing on the market, operators, etc.
 - Data user: public, professional (e.g., manufacturer, waste treatment, repair, etc.), conformity assessment bodies, preparation for reuse, collection, sorting, waste treatment, treatment facility, recycling, etc.
 - Subject: substance, chemical, mixture, material, article, complex object, component, part, product, waste, etc.
 - Information categories:
 - Material: hazardous, dangerous, toxic, substances of concern, etc.
 - Product design: disassembly, dismantling, disposal, etc.
- The proposal for the ESPR defines two “unique operator identifiers”: Annex III (g) refers to a unique operator identifier for the manufacturer, while Annex III (h) refers to a unique identifier for operators other than the manufacturer. Article 2(32) states that “the ‘unique operator identifier’ means a unique string of characters for the identification of actors involved in the value chain of products”, a more global definition. Article 11(2) refers to an economic operator that “creates” the DPP: “Where

a unique operator identifier referred to in Annex III, point (h), is not yet available, the economic operator **creating** the product passport shall request a unique operator identifier on behalf of the relevant actor.” Article 10(C) uses the word “**create**” when referring to both the economic operator placing the product on the market and to operators authorised to act on their behalf. Since the same word is used in these two contexts, an ambiguity may remain as to the need to identify the operator responsible for product compliance, including issuing the DPP, defined by Annex III (k), and the one who will actually store the data. The need to identify this last operator is not clear.

- In addition, Annex III (h) refers to a unique identifier for operators other than the manufacturer but does not define who these are.

5.1.2 Concerning currently ongoing DPP-related initiatives which took part in our survey:

- Among the initiatives that took part in the survey, 18 at least identify to the term “traceability solution”. Among these, we find respondents that focus either exclusively on the supply chain or exclusively on the finished products. We thus observe that the use of the word ‘traceability’ is not clearly defined which can potentially lead to some confusion (Figure 7).
- The large majority of initiatives (46 out of 67 initiatives) focus **both** on the exchange of information within the supply chain and on the final product (Figure 8).
- While our study focused in priority on batteries, textiles and electronics products, we see from Figure 6 that initiatives from many sectors answered our questionnaire and therefore identify themselves as being ‘related’ to the DPP. This clearly shows that the DPP has a cross-sectoral application space.
- It was very often mentioned by initiatives that their information model is flexible to add new information fields depending on their customers’ needs. This is particularly true for circularity data which is often mentioned as being open to individual certifications, labels, LCA information, etc. This is aligned with the ESPR proposal, Annex III which states “The delegated acts adopted pursuant to Article 4 shall identify information relevant to ecodesign requirements that manufacturers may include in the product passport in addition to the information required pursuant to Article 8(2), point (a), including information on specific voluntary labels applicable to the product. That shall include whether an EU Ecolabel has been awarded to the product in line with Regulation (EC) No 66/2010.”
- Among the surveyed initiatives, 31 indicated that they manage (collect and update) downstream dynamic data, such as usage or repair history. Since this information is specific to each individual product, this entails the identification of each individual product, referred to as item-level or serialized identification.
- Textile-oriented initiatives provide information for services such as leasing or pay-per-use (laundry).
- Textile-oriented initiatives provide the possibility for full material declaration.
- A wide variety of data provider identification schemes is used, both standardised and proprietary, a potential challenge for the DPP. The proposal for the ESPR indicates that the issue of identifiers will be tackled using international standards: “In order to ensure interoperability, the unique operator identifiers and unique facility identifiers enabling traceability should be released in accordance with internationally recognised standards.” (ESPR Preamble (30))
- By counting the number of initiatives that provided at least product usage, repair or End-of-life data, we found that 31 initiatives indicated that they manage (collect and update) downstream dynamic data. Interestingly, recycling data is considered in the textiles sector in terms of material identities,

residual resell value data, recycling data (material quality information), quality report from waste handler to waste supplier.

5.2 Recommendations

- *R1: Provide a clear definition for the word ‘traceability’ in the DPP context.* In the DPP-related initiative questionnaire, initiatives were asked to identify their “type” with proposed answers including ‘platform’, ‘product data scheme’, ‘traceability solution’, ‘standard’ or ‘other’. Initiatives were also asked to declare their focus, meaning either the exchange of information within the supply chain or relative to the final product or both. Results show that, among initiatives that previously identified as “traceability solutions”, we find respondents that focus either exclusively on the supply chain or exclusively on the finished products. We thus observe that the use of the word ‘traceability’ is not clearly defined which can potentially lead to some confusion. We therefore propose that the terms “supply-chain traceability” and “product traceability” be well-defined, along with potential information points that these terms may cover. This appears particularly important in a context where the term “information traceability” is increasingly used.
- *R2: Define a DPP-related glossary.* A need for a glossary and definition of terms is identified. While the definition of widely accepted and standardized glossaries is a time-consuming and ambitious goal, an Internal use to the CIRPASS consortium and associated stakeholder group, to facilitate communication among the DPP community. Many words are used with different meanings. Propose to add to this glossary any term that is not used in a consistent manner. Such words include “product”, “product granularity”, “product hierarchy”, “product composition”, “material”, “standard”, “traceability”, “value chain”, “decentralized”, “verification”, “certified”.
- *R3: Definition of stakeholders.* Throughout the legislative texts studied, the definitions and terms are not consistently used. This is particularly true with respect to the stakeholders involved. To support role-based access right management in further DPP development, it will be necessary to define or harmonise stakeholder categories and terms (some are already defined in the proposal for the ESPR, Article 2).
- *R4: Review of the information categorization framework.* For example, in section 3.1.2.2, the possibility of including a ‘retail information’ category was mentioned.

Table 12 Recommendation summary

ID	Title	Expected outcomes	Target stakeholder(s)
R1	<i>Provide a clear definition for the word ‘traceability’ in the DPP context</i>	Definition for terms “supply-chain traceability”, “product traceability” and “data traceability”	European commission, DPP stakeholders
R2	<i>Define a DPP-related glossary</i>	Need for a glossary and definition of terms	European commission, DPP stakeholders
R3	<i>Definition of stakeholders</i>	Harmonised stakeholder categories and terms	European commission, DPP stakeholders
R4	<i>Review of the information categorisation framework</i>	Extended categorisation framework	CIRPASS consortium

5.3 Additional considerations for discussion on cross-sector and sector-specific information requirements

During the review process of this document, many additional ideas and considerations were mentioned by CIRPASS consortium participants. The gathering of these considerations was not part of this present study's methodology outlined in Section 2, and therefore they did not contribute to the results presented in sections 3 and 4 above. However, we include these comments below for completeness. **The following considerations are thus not recommendations by the CIRPASS consortium but topics for upcoming discussions and consultations. To facilitate future discussions, these additional considerations (AC) are numbered below:**

- **AC1:** The ESPR proposal states that the DPP **granularity** should be specific to the 'model' (another word used is 'type'), 'batch' or 'item' depending on the nature of the product considered. Other levels of granularity that may be relevant to consider are 'variant' (same model but different materials or processes¹⁶), 'lot', 'stock keeping unit (SKU)', 'purchase order (PO)'.
- **AC2:** Consistent words and concepts should be used to describe the **composition hierarchy** of products in a manner that is applicable across sectors. For example, the data model from the IMDS automotive compliance scheme (designed with respect to the Vehicle End-of-Life Directive) employs the terms 'substances', 'materials' and 'parts' to describe every element of an automobile. Other potential terms include 'intermediate products', 'components' or 'major components'.
- **AC3: Consistent terminology** is especially important in a context where manufacturers may wish to reuse the DPP concept to voluntarily issue DPPs beyond the mandatory granularity level or mandatory composition hierarchy level, for example to describe major components of products where sharing data about these components to enable circular value retention activities would make environmental and economic sense.
- **AC4:** The distinction between 'durable', 'disposable' and 'consumable' aspects of products should be considered seeing that each aspect may have distinct design & material information.
- **AC5:** Similarly, packaging material information (e.g., recycled content) and product material information should be distinguished. An alternative would be to consider the packaging itself as a product to which would be attached a dedicated DPP.
- The possibility to aggregate data from a large number of DPP's raises several issues:
 - **AC6:** Manufacturers would benefit from the gathering of downstream product information from a large number of item-level DPP's to perform model-level statistics and thus gain a better understanding of their products and their design. However, product use information raises the issue of protecting the personal information of consumers.
 - **AC7:** Market surveillance activities would benefit from the gathering of product data from a large number of DPP's of similar product "type". However, great care must be taken in the design of such information gathering mechanisms and access roles to avoid unwittingly providing certain actors (e.g., recyclers) with detailed market intelligence.
- **AC8:** The pros and cons of decomposing "product identification" into two categories, "physical item identification" and "trade item identification", identifiers which might be identical in specific cases,

¹⁶ For example, a given model may be progressively designed with increasing levels of recycled material content, and thus with different environmental performance.

should be discussed. For example, a laptop is typically sold as a trade item that includes packaging + laptop + charger + power cord.

- **AC9:** The “company identification” category of the information categorisation framework presented in section 2.3 might distinguish "Legal entity identification" and "Location Identification". Legal Entities can be taken to court, locations can be found on Google Maps.
- **AC10:** The category “Trade and retail information” might be added to the information categorisation framework presented in section 2.3.
- Information requirements are overlapping across legislation.
 - **AC11:** Disassembly and dismantling information, required for repairer and waste treatment. Ecodesign directive refers to **disassembly** information for repairers whereas the WEEE directive refers to **dismantling** information for recyclers. Thus, the DPP may be an opportunity to harmonize these overlapping requirements.
 - **AC12:** Material information is required in several legal acts, for example the WEEE Directive, Ecodesign Directive, REACH Regulation, Textile Regulation.
- **AC13:** The role of the DPP with respect to material legislation that does not have an immediate relation to a product (e.g. REACH Article 31, CLP) while apparently seen as out of the DPP-scope should be discussed.
- **AC14:** The opportunity to use the DPP as an information collection tool (e.g., for carbon footprint information from individual suppliers or material information from suppliers) should be discussed.
- **AC15:** Some item-level information may require an increasing amount of memory to store the dynamically generated data (e.g., battery state of health (SoH) history, event trail).
- **AC16:** The calculation of certain indicators requires the collection of information (e.g., battery state of health (SoH)). Where this data should be stored and where and when this calculation should be performed should be discussed.
- **AC17:** Is there a need to distinguish “product” from “finished product”? Article 2(1) of the ESPR states: “‘product’ means any physical good that is placed on the market or put into service;” Thus, “finished product” might be defined as “any physical good that is placed on the market or put into service and is suitable for end users” in line with the definition provided by Article 2(3) of the ESPR for ‘intermediate product’.
- **AC18:** While Annex III (c) of the ESPR proposal refers to the ISO/IEC 15459-6 standard for product identification, other identification standards should be discussed (WP3, Task 3.4). The same applies to the unique operator and facility identifiers.
- **AC19:** The current Textile Regulation only requires the specification of the material composition up to a specific threshold, which is responsible for the extremely poor current global performance (<1%) of fibre-to-fibre recycling. While one of the major challenges in textiles is fibre-to-fibre recycling, a fact that is explicitly mentioned in the EU Strategy for Sustainable and Circular Textiles, and while fibres are the main components in term of weight, other materials are used in small quantities for assembly, dyeing or other properties (flame retardant, water repelling) which have a huge impact on the recyclability of the fibres, on the environment and health. The mandatory declaration of these materials, even if present in small quantities, should be considered.
- **AC20:** Several textile-oriented initiatives provide the possibility for full material declaration. Knowing the complexity of the supply chain in textiles, it would be interesting to better understand how this full material declaration is verified.

- **AC21:** The interoperability of the digital battery passport defined in the Battery Regulation and the DPP defined in the ESPR proposal must be ensured.
- **AC22:** The differentiation of products which can be handled by consumers from products which will only be handled by professional end users (e.g., an electrical vehicle battery) should be discussed. This may lead to different requirements.

6 Conclusions and future activity

This report sets out an initial set of information requirements for three focus sector groups: batteries, electronics and textiles. This initial set is provided to **initiate and structure** upcoming discussions among CIRPASS consortium partners and **facilitate** the gathering of feedback from the largest possible number of external stakeholders. To gather this set of information requirements, we used an objective methodology which consisted in extracting requirements from existing and upcoming legislative texts as well as those used in a large number of currently proposed DPP-related initiatives. This set will be exploited in consecutive stakeholder consultations.

While assembling this set of information requirements, we made some discoveries, both related to legislative acts and ongoing initiatives, which led to a number of recommendations. In addition, the review of this document by the entire CIRPASS consortium led to the collection of a large number of additional considerations which we listed extensively above for transparency. **These additional considerations are not recommendations of the CIRPASS consortium.** Future work will consist in organizing the collection of feedback, from the consortium members and, most importantly, from external stakeholders, on the listing of information requirements provided in Section 4. Future work will also address the recommendations and additional considerations listed above. Alignment with the recent JRC study on new product priorities for the ESPR will also be addressed.

7 DPP-related initiatives characterisation questionnaire

Initiative questionnaire

Please provide your e-mail address below. After submitting, you will be able to edit your answers with this address.

The questionnaire comprises three sections (1) initiatives characterization (2) data architecture (3) system architecture.

Please note: Respondents are advised that it is CIRPASS project policy to treat all submissions received as being in the public domain unless confidentiality is specifically requested

*** Required**

Initiative characterization

1. Initiative name *

Name of the project, prototype, consortium, or company offering the solution

2. Initiative short name

Short name of the initiative or an abbreviation

3. Goal / USP / Benefit

Why is it useful? Is there anything outstandingly good to be taken from here? USP: Unique Selling Point

4. Host organization name *

Who is the primary organization owning and supporting the initiative?

5. Host organization type

Name of the main organization hosting the project, initiative, or solution

Check all that apply.

☐

NGO

☐

Private Company (Industry)

☐

Association

☐

Public Organization (Policy)

☐

Public-Private Consortium

☐

Research

6. Solution type

What type of solution does your initiative develop?

Mark only one oval.

☐

Platform

☐

Product Data Scheme

☐

Traceability Solution

☐

Standard

☐

Others

7. Sector

In which sector is this initiative active?

Check all that apply.

☐

Cross-sector (more than one)

☐

Textile

☐

Electronics

☐

Battery

☐

Automotive

☐

Construction

☐

Food

☐

Others

8. Potential for cross-sectors application?

Can the solution be extended to other sectors?

Mark only one oval.

☐

Yes

☐

No

9. Focus on final product or supply chain exchange

Does the initiative focus on the final product (including downstream value chain activities) or on the supply chain exchange upstream?

Mark only one oval.

☐

Final Product

☐

Supply chain exchange

☐ Both

10. Market scope

What is the current market scope of the initiative ?

Mark only one oval.

☐ National (1 Country)

☐ Regional (more then 2 countries in regional scope)

☐ EU

☐ International

11. Current market penetration

What is the current market penetration of the initiative?

High: European and or international level / Universal / Official support by government and regulations

Medium: At regional or country level / for a specific product segment or sector / adopted by more than 100 companies with operations at regional level

Low: Few actors involved in this initiative / start-up

Mark only one oval.

☐ High

☐ Medium

☐ Low

12. Technology readiness

What is the maturity of your technology?

Check all that apply.

☐ Concept

☐ Prototype

☐ Application

13. Business model

What is the current business model?

Mark only one oval.

☐ Membership fee (per size and free use)

☐ Pay per use

☐ Free

14. Target group (e.g. data/platform user)

Who uses the platform or initiative?

Check all that apply.

☐ Market surveillance authorities

☐ Consumer/public

☐ Product developer and designer

☐ Distributor and retailer

☐ Remanufacturer, Reuse, Repair

☐ Refurbishment / washing and textile services

☐ Collection

☐ Waste treatment and sorter

☐ Recycler

☐ Recycling material distributor and retailer

☐ Certification bodies

☐ Consumer protection associations

☐ Government institutions

☐

Technical experts / developers (front-end, back-end)

☐

Production Identification

☐

Circular Economy and interdisciplinary experts

☐

Technology / Platform providers

☐

Company identity providers

☐

Product identity providers

☐

Trusted intermediaries

Other:

15. Further comments

Further facts or comments which are important

Product information and data

The following section addresses the information that can be exchanged via the/your initiative

16. Company identification (data provider)

How do you identify the data provider (e.g. manufacturer ID)?

Mark only one oval.

☐

Name, address

☐

Company ID

☐

Not relevant / not possible

☐

Possible / flexible data model

☐

Other:

17. Product traceability

Product traceability includes event data related to the history, time, and location of activities on the product

Check all that apply.

☐

Date

☐

Locations

☐

Transport means (e.g. vessel, track)

☐

Operators

18. Functional and technical specifications

Technical and functional specifications describe the features or the behaviour of a product when used e.g. the power demand of a computer or the water column of a jacket.

Check all that apply.

☐

Minimum functional specifications for compliance (e.g. energy consumption)

☐

Other functional specifications (please specify below in Field "others")

☐

Not relevant / not possible

☐

Possible / flexible data model

☐

Other:

19. Product material composition information

Product composition includes data related to its ingredients (material declaration) and the compliance to Declarable Substance List (e.g. REACH, RoHS, etc.)

Check all that apply.

☐

Material information for EU compliance (e.g. REACH, RoHS)

☐

Material information for other compliance

☐

Material information after own/individual list

☐

Full material declaration

☐

Not relevant / not possible

☐

Possible / flexible data model

☐

Other:

20. Product design & service information

Product design related information comprise properties and arrangement of parts on a product level, whilst service design related information comprise warranty and recycling information as well as repair and update options.

Check all that apply.

☐☐

Design related information (manuals, disassembly map, maintenance and washing instructions)

☐

Service-related information (e.g. warranty and recycling information, repair and update options)

☐

Not relevant / not possible

☐

Possible / flexible data model

☐

Other:

21. Circularity info & label (for consumer)

Do you allow the provision of indicators, label, compliance information via your initiative?

Check all that apply.

☐

Circularity indicator (score e.g. reparability index)

☐

Environmental indicator (e.g. CO2 footprint)

☐

Environmental label (e.g. EU eco fower)

☐

Social label (e.g. ...)

☐

Label (cross-sectional or multi-criteria)

☐

Compliance related information (e.g. RoHS/REACH/WEEE compliant)

☐

Certifications, norms, standards (e.g. ISO XY)

☐

Not relevant / not possible

☐

Possible / flexible data model

☐

Other:

The next questions focus on dynamically generated information from the use and EoL phases

22. Product usage data

Do you include information from the user ?

Check all that apply.

☐

User identification and method (please specify below in field "others")

☐

Usage data (e.g. purchase date, use cycles, please specify below in field "others")

☐

Not relevant / not possible

☐

Possible / flexible data model

☐

Other:

23. Product repair data

Check all that apply.

☐

Repair company identification (e.g. ID, address, etc.)

☐

Repair related information (e.g. date of repair, exchanged part, etc.)

☐

Not relevant / not possible

☐

Possible / flexible data model

☐

Other:

24. Recycling data

Check all that apply.

☐

Recycler company identification (e.g. ID, address, etc.)

☐

Recycling related information (e.g. date of recycling, etc.)

☐

Not relevant / not possible

☐

Possible / flexible data model

☐

Other:

IT architecture for data exchange

25. Product ID: type

Does the DPP identify as an instance or a category of products ?

Check all that apply.

☐

Instance

☐

Category

☐

Other:

26. Product ID: granularity

If by category, what is the granularity of the category?

Check all that apply.

☐

Model

☐

Batch

☐

Production order

☐

Single Item

27. Type

How is the ID linked to the product? e.g. QR Code or RFID, other?

Check all that apply.

☐

RFID

☐

QR code

☐

Digital watermark

☐

Bluetooth label

28. Machine readable data carrier

Is the DPP ID on the product machine readable?

Mark only one oval.

☐

Yes

☐

No

29. Resolver

Does the ID link directly to information on the web or is there an intermediate resolver?

Mark only one oval.

☐

Yes

☐

No

30. ID minting

Mark only one oval.

☐

Centralized

☐

Decentralized

31. Data storage location

Is all DPP related information stored in one location or database?

Mark only one oval.

☐ Centralized

☐ Decentralized

32. Data transport openness level

How is the DPP information transported between actors, customers etc?

Mark only one oval.

☐ standardized

☐ proprietary

☐ data ports

☐ Other: _____

33. Data packaging

Does the system allow data access only via API or can another actor get packaged data?

Mark only one oval.

☐ Data transfer

☐ API

34. Level

Do you use simple access control or advanced features like roles & attributes?

Mark only one oval.

☐ simple

☐ advanced

35. if advanced

if advanced, is your system attribute or role based

Mark only one oval.

☐ attribute based

☐ role based

36. Data use management

Do you use advanced data & rights management? Is it only used to label or is it enforced?

Mark only one oval.

☐ labelling

☐ enforcement

☐ role based

37. Evidence

If advanced, how do you create evidence that things were done correctly?

Mark only one oval.

☐ blockchain

☐ verifiable credentials

☐ Other: _____

38. Convenience

Do users of the DPP system have features for convenience like apps or wallets?

Mark only one oval.

☐ Wallet

☐ Data ports

☐ Other: _____

39. Data protection

Do you use privacy enhancing technologies, anonymization etc?

Check all that apply.

☐

PETs

☐

anonymization

☐

Other:

40. Traceability

In order to trace the good of the DPP, what technology do you use?

Check all that apply.

☐

Tagging (QR)

☐

Tagging (NFC/RFID)

☐

Other:
