

Requirement Category	Identified Requirement	To whom should this information be provided?	Ontology Story (Authority)	CQs (Authority)	CS (Authority)	RR (Authority)	Ontology Story (Consumer)	CQs (Consumer)	CS (Consumer)	RR (Consumer)	Ontology Story (Value Chain Actor)	CQs (Value Chain Actor)	CS (Value Chain Actor)	RR (Value Chain Actor)	Non-functional ontology requirements
Legal obligations	Ensure compliance with the Proposal for the new Ecodesign for Sustainable Products Regulation (ESPR)	Authorities, Consumers, Value Chain Actors	A product contains a substance of concern, that hinders its recycling, and does not comply with regulations. An authority that should decide on the product's compliance with respect to regulators needs to know the details of the product composition, materials and substances to determine its compliance.	(1) Does the product contain substances of concern? (2) If yes, how many and what kind of substances of concern? (3) What are the detailed breakdown of material composition of these substances?			A product contains a substance of concern, that hinders its recycling, and does not comply with regulations. A consumer wants to know if this product contains substances of concern.	(1) Does the product contain substances of concern? (2) If yes, how many and what kind of substances of concern?			A product contains a substance of concern, that hinders its recycling, and does not comply with regulations. An actor of the product's value chain wants to know if this product contains substances of concern, and if so, which kind of substances of concern.	(1) Does the product contain substances of concern? (2) If yes, how many and what kind of substances of concern?			Compliant with regulation
	Ensure compliance with Extended Producer Responsibility (EPR)	Authorities, Consumers, Value Chain Actors	A product enters the market. An authority wants to check if the producer/manufacture complies with the EPR regulation, meaning that producers have to pay the full costs of dealing with the waste they produce from when it is placed onto the market, through to the end of its life.	(1) What are the full costs of dealing with the waste the producers produce from when their product(s) is/are placed onto the market, through to the end of its life? (2) Is it already paid by the producer?			A product enters the market. A consumer wants to check if the producer/manufacture complies with the EPR regulation, meaning that producers have to pay the full costs of dealing with the waste they produce from when it is placed onto the market, through to the end of its life.	Are the full costs already paid by the producer?			A product enters the market. The producer wants to check if he complies with the EPR regulation, meaning that producers have to pay the full costs of dealing with the waste they produce from when it is placed onto the market, through to the end of its life.	(1) What are the full costs of dealing with the waste the producers produce from when their product(s) is/are placed onto the market, through to the end of its life? (2) Is it already paid by the producer?			Compliant with regulation
	Ensure compliance with EU government legislation "right to repair"	Authorities, Consumers, Value Chain Actors	A product needs to be repaired. An authority wants to check if the seller of this product complies with the "Right to Repair" regulation in order to find the respective seller if it does not comply with it.	(1) Is this product still covered by the legal guarantee? (2) What information does the seller provide to the consumers on how to repair the product?			A product needs to be repaired. A consumer wants to check whether the product is still covered by the legal guarantee, and if not, he or she wants information on how to repair the product himself or herself.	(1) Is this product still covered by the legal guarantee? (2) Does the seller provide information to the consumer on how to repair the product? (3) What is this information?			A product needs to be repaired. The seller of the product wants to check whether the product is still covered by the legal guarantee, and if not, the seller wants to provide information on to the consumer on how to repair this product.	(1) Is this product still covered by the legal guarantee? (2) Did the seller (or another actor in the value chain) already provide information to the consumers on how to repair the product? (3) What is this information?			Compliant with regulation
	Ensure compliance with the General Data Protection Regulation (GDPR)	Authorities, Value Chain Actors	A product got repaired by a person working for a repairing company. The DPP got updated including the information of who repaired this product. An authority wants to check if there is personal information included in the respective DPP and if so, if this information is protected in the sense of the GDPR.	(1) Is there personal information included in the DPP? (2) If yes, is this information properly protected or at least anonymized?			A product got repaired by the consumer itself. The consumer updates the DPP including the information of who repaired this product. The consumer wants to ensure that this information is protected in the sense of the GDPR.	Is the personal information added to the DPP properly protected in the sense of the GDPR or at least anonymized?			A product got repaired by a person working for a repairing company. The company updated the DPP including the information of who repaired this product. The company wants to ensure that this information is protected in the sense of the GDPR.	Is the personal information added to the DPP properly protected in the sense of the GDPR or at least anonymized?			Compliant with regulation
Functional suitability	Need to fit the respective sector, industry, and use case														Modularity, extensibility, evolvability
	Allow actors to make statements exclusively for the information for which they are responsible	Value Chain Actors									One or more actors can be responsible for a certain piece of information in a DPP. Those are the only actors that can add, change or replace that information. The responsibility may depend on their role in the value chain or ownership of the product.	Who/what actor is responsible for what set of information in a DPP?	Each operation (add/change/delete) has exactly one timestamp and one actor.	The access rights to add/change information can be derived based on the responsibility of the different actors?	Metadata
											An actor that has provided some data included in a DPP can go back and change that data later on. Another actor can see who is the provider of that information, and when it was added and updated. Nothing can be deleted from a DPP, only marked as obsolete.	(1) Who added/changed the information? (2) When was the information added/changed?	Each operation (add/change) has exactly one timestamp and one actor.	The latest/current version of some information can be derived from the change history.	
	Allow decentralized data storage locations for the DPP information	Value Chain Actors									A manufacturer wants to share additional information regarding one of his products in order to prove a specific statement (e.g. recyclability of the product).	(1) What kind of additional information is provided (in terms of data source type)? (2) Where to find this additional information?	Also this piece of information has exactly one responsible actor (i.e., provider of this information)		Web-standards/web-enabled ontology and data
Enable the decentralized collection of the information required for a DPP	Authorities, Consumers, Value Chain Actors	A new product has been released to the market. The product contains several components, where the DPP information is provided by several actors. An authority wants to check its publicly available information which is accessible via its DPP.	(1) What is the complete public content of the DPP?		The DPP information is composed of the main DPP model and all its submodels that are retrieved from other actors.	A new product has been released to the market. The product contains several components, where the DPP information is provided by several actors. A consumer wants to check its publicly available information which is accessible via its DPP.	(1) What is the complete public content of the DPP?			The DPP information is composed of the main DPP model and all its submodels that are retrieved from other actors.	(1) What is the complete content of the DPP from the viewpoint of this actor?			The DPP information is composed of the main DPP model and all its submodels that are retrieved from other actors.	
Security, confidentiality, and IP protection	Ensure nonrepudiation														Verifiable metadata, immutable statements
	Enable data verification	Authorities, Consumers, Value Chain Actors	An authority wants to check/verify the DPP information provided by the value chain actors for a specific product.	(1) What part of the data has been verified? (2) What methodology was used to verify the data?		A consumer wants to check/verify the DPP information provided by the value chain actors for a specific product they are considering to buy.	(1) What part of the data has been verified?			A value chain actor wants to check/verify the DPP information provided by another value chain actor for a specific product.	(1) What part of the data has been verified? (2) What methodology was used to verify the data?			Immutable statements	
	Ensure data sovereignty														
Interoperability	Ensure secure data storage														
	Provide clear semantics	Value Chain Actors									A new and very specific product enters the market. The producer/manufacture wants to provide the respective information for this product via its DPP. But the ontology/data model does not allow to provide a specific piece of information. So, the employee of the producer has to understand the existing ontology in order to extend it and specify it for the new product.	(1) What is the definition and axiomatization of the ontology? (2) What are the consequences of extending/changing the ontology?		Use of standards, usability of ontology (humans and machines), use of best practices, FAIR publishing of ontology	
		Authorities, Consumers, Value Chain Actors	An authority wants to understand what the information of a product means and how it can be compared to the information of other products.	(1) What is the meaning of a specific information within a DPP?		A consumer wants to understand what the information of a product means and how it can be compared to the information of other products.	(1) What is the meaning of a specific information within a DPP?			A value chain actor wants to understand what the information of a product means and how it can be compared to the information of other products.	(1) What is the meaning of a specific information within a DPP?				
	Standardize data schemas describing the products	Value Chain Actors									There is already an existing ontology for a specific product that should be re-used because it is already a de-facto standard and it would be very time-consuming to model it again as an extension of the DPP ontology / ODPS. An employee of the product's producer wants to use this de-facto standard ontology and therefore wants to integrate it into the DPP ontology.	(1) What is the potential overlap or connection between the existing ontology and the DPP ontology? (2) What are the consequences of integrating the existing ontology into the DPP ontology?		Alignments to standards, consensus on the ontology	
	Provide an application interface (API) for data provision and data request														
Modularity and modifiability	Ensure flexibility to add/edit/remove actors, products, or product attributes	Value Chain Actors									A product changes over time (e.g. because it got refurbished by the manufacturer). Thus, the product attributes change. The producer wants to update the product attributes of this product. But he cannot add all the information because the "old" DPP ontology module does not cover all the new, additional aspects. So, the producer wants to adapt the DPP ontology module in order to cover the new specifications of the refurbished product.	(1) What are the consequences of changing/adapting the ontology?		Modularity, extensibility, evolvability, use of a flexible data model (e.g. graph data)	

