
Blockchain and distributed ledger technologies — Taxonomy and Ontology

*Technologies des chaînes de blocs et technologies de registre
distribué — Taxinomie et ontologie*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 307, *Blockchain and distributed ledger technologies*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

A taxonomy is useful for defining information and data classification rules and for identifying classification items and classification criteria. An ontology aims at clearly showing the concepts that make up the conceptual basis and the vocabulary of the technology under consideration and at creating a foundation that is a prerequisite for understanding the concepts through the definition of their mutual relations (synonyms, inclusions, dependencies, etc.).

A consistent taxonomy is a valuable resource in its own right that also supports and helps to understand other relevant standards.

This document includes a taxonomy of concepts, a taxonomy of DLT systems, and a taxonomy of application domains, purposes and economic activity sections for use cases. This document includes an ontology providing classes and attributes as well as relations between concepts.

Figure 1 shows the relationships between this document and other standards developed by ISO/TC 307.

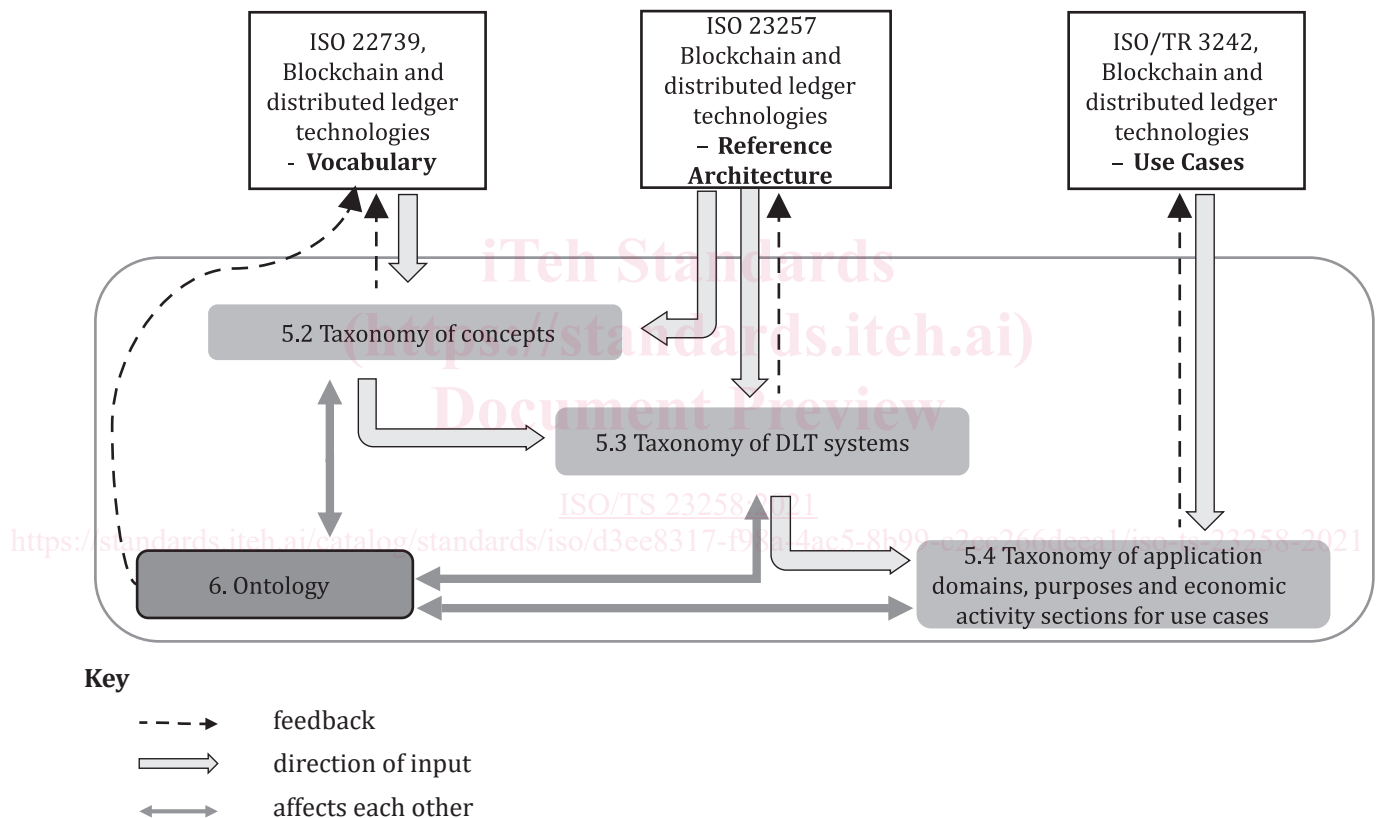


Figure 1 — Relationships between this document and other standards developed by ISO/TC 307

Blockchain and distributed ledger technologies — Taxonomy and Ontology

1 Scope

This document specifies a taxonomy and an ontology for blockchain and distributed ledger technologies (DLT). The taxonomy includes a taxonomy of concepts, a taxonomy of DLT systems and a taxonomy of application domains, purposes and economy activity sections for use cases. The ontology includes classes and attributes as well as relations between concepts.

The audience includes but is not limited to academics, architects, customers, users, tool developers, regulators, auditors and standards development organizations.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 22739, *Blockchain and distributed ledger technologies — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 22739 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org/>

3.1

taxonomy

scheme of categories and subcategories that can be used to sort and otherwise organize itemized knowledge or information

[SOURCE: ISO 5127:2017, 3.8.6.07]

4 Abbreviated terms

DLT	Distributed Ledger Technology
PoW	Proof-of-Work
PoS	Proof-of-Stake
DPoS	Delegated Proof-of-Stake
BFT	Byzantine Fault Tolerance
PBFT	Practical Byzantine Fault Tolerance
TPS	Transaction Per Second

CA	Certificate Authority
IPFS	InterPlanetary File System
UML	Unified Modeling Language

5 Taxonomy

5.1 Introduction

To better understand DLT systems, it is necessary to classify them into different categories based on their similarities on different aspects. Such classification is also known as the taxonomy of DLT systems. To be able to thoroughly classify and correlate DLT systems, it is imperative to investigate and understand the existing blockchain and distributed ledger technologies as well as the relationships among the DLT system options. This taxonomy helps the potential blockchain users and other stakeholders to compare and choose the right options according to their business needs and applicable legal and regulatory requirements. Furthermore, the ability to classify DLT systems can help with knowledge advancement and can lead to a significant breakthrough in understanding and utilization of DLT systems. Furthermore, the taxonomy informs the scientific research and could support wider understanding and adoption of blockchain and distributed ledger technologies and systems.

5.2 Taxonomy of concepts

Table 1 is based on and refers to the terms and definitions in ISO 22739:2020, ISO 23257:—¹⁾ and completed with some of the concepts used in Reference [1]. It organizes the concepts into 6-level hierarchical structure with only one entry per concept. Short forms of concepts are given in square brackets and references are provided in parentheses, e.g. “[DLT user (ISO 22739:2020, 3.28)].”

Table 1 — Taxonomy of concepts

Level 1 concepts	Level 2 concepts	Level 3 concepts	Level 4 concepts	Level 5 concepts	Level 6 concepts
Asset (ISO 22739:2020, 3.1)	Digital Asset (ISO 22739:2020, 3.20)	Cryptographic Asset (Crypto-asset) (ISO 22739:2020, 3.13)	Cryptocurrency (ISO 22739:2020, 3.14)		
			Token (ISO 22739:2020, 3.76)	(Token) Fungibility (Fungible (ISO 23257:—, 3.12)	Fungible Token
				Token Metadata	Non-Fungible Token [NFT]
			Digital Asset Description		
	Privilege Description				
	(Asset) Provenance (ISO 23257:—, 3.11)	Origin of Asset			
		History of Asset			
History of Custody					
				Value Description	

1) Under preparation. Stage at the time of publication: ISO/FDIS 23257:2021.

Table 1 (continued)

Level 1 concepts	Level 2 concepts	Level 3 concepts	Level 4 concepts	Level 5 concepts	Level 6 concepts	
Consensus (ISO 22739:2020, 3.11) Smart Contract (ISO 22739:2020, 3.72) Entity (ISO 22739:2020, 3.34)	Consensus Mechanism (ISO 22739:2020, 3.12)	Fault Tolerance	Byzantine Fault Tolerance [BFT]	Practical Byzantine Fault Tolerance [PBFT]		
			Crash Fault Tolerance			
		Nakamoto Consensus	Proof of Stake [PoS]	Delegated Proof of Stake [DPoS]		
			Proof of Work [PoW]			
	Consensus Security					
	Legally Binding Smart Contract					
	Legal Entity	Group ^a				
			Organization	Autonomous Organization	Decentralized Autonomous Organization [DAO]	
		Person	Operator	Distributed Ledger Technology Operator [DLT Operator]		
		User	Distributed Ledger Technology User (ISO 22739:2020, 3.31) [DLT User (ISO 22739:2020, 3.31)]			
	Process	Action	Confirmation		Block Confirmation	
					Transaction Confirmation	
			Compliance Deletion (Delete ISO 23257:—, 3.2)		Transaction Deletion	
				Execution	Execution of Contract	Stateful Execution of Contract Stateless Execution of Contract
			Validation (ISO 22739:2020, 3.82)		Block Validation	
					Ledger Record Validation	
				Transaction Validation		

Table 1 (continued)

Level 1 concepts	Level 2 concepts	Level 3 concepts	Level 4 concepts	Level 5 concepts	Level 6 concepts		
	Thing	Activity	Archiving (Archive ISO 23257:—, 3.3)	Data Archiving (ISO 23257:—, 3.4)			
				Resource Archiving			
				Transaction Archiving			
			Hashing				
			Mining (ISO 22739:2020, 3.49)				
			Restoring (Restore ISO 23257:—, 3.6)	Data Restoring			
				Resource Restoring			
				Transaction Restoring			
			Event	Object	Disruption (ISO 23257:—, 3.10)	Attack	
						Incident (ISO 23257:—, 3.8)	
		Error			Error analytics		
		Failure (ISO 22739:2020, 3.35)					
		Fault			Fault Tolerance (ISO 22739:2020, 3.36)		
		Fork (ISO 22739:2020, 3.45)			Hard Fork (ISO 22739:2020, 3.38)		
					Soft Fork (ISO 22739:2020, 3.73)		
		Work Process	Object	Backup (ISO 23257:—, 3.5)	Data Backup		
					Resource Backup		
					Transaction Backup		
				Transaction (ISO 22739:2020, 3.77)			
				Device			

