



European Blockchain Week: Blockchain and AI for European Green Deal

Semantic Blockchain The Case Study of ONTOCHAIN POC4COMMERCE



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Introduction

- **Semantic Blockchain** is a vision of blockchains enabled with semantically annotated transactions (in particular adopting Semantic Web technologies).
- Semantic Web tools and languages aim to reach full machine interoperability, to promote common data formats, and to exchange protocols on the web, share and reuse data across applications and across enterprise and community boundaries.
- A formal semantic knowledge representation capturing the blockchain smart contracts
 - facilitates the understanding of blockchain concepts,
 - enables the interlinking with out-of chain information,
 - enables the automatic discovery of smart contracts,
 - enables a token exchange system with a precise and intelligent query mechanism capable of determining what, when, and how certain assets have been generated, exchanged or destroyed.

Related Works

- A few existing efforts provide ontologies for blockchain contexts, in particular
 - Blockchain Ontology with Dynamic Extensibility (BLONDiE) project (Ugarte Rojas, 2017) provides a comprehensive vocabulary that covers the structure of different components of three main blockchains, Ethereum, Bitcoin, Hyperledger.
 - Ethon ontology (Pfeffer et al., 2016) provides a semantic interpretation of smart contracts as services.
- **Our motivation:** Blockchains need enhanced *semantic description to facilitate the discovery of unknown smart contracts and of the related operations fulfilled during their life-span.*

POC4COMMERCE'S Vision

- **POC4COMMERCE has been supported by the ONTOCHAIN NGI European project grant agreement no. 957338**
- **POC4COMMERCE provides a consistent, unambiguous, and shared semantic model for the ONTOCHAIN ecosystem by delivering an ontological stack for its building blocks in general and of eCommerce in particular.**

POC4COMMERCE's Vision

POC4COMMERCE realizes the Semantic Blockchain vision through an ontological approach that:

- provides a stack of ontologies (*OC-Found*, *OC-Commerce*, *OC-Ethereum*) for representing
 - involved stakeholders such as:
 - actors, in particular commercial actors,
 - digital and physical assets,
 - supply chains, including distribution, pricing, and selling mechanisms,
 - blockchains, smart contracts and related fungible, non-fungible, and semi-fungible (tokens),
 - and of their relations such as:
 - actor interactions,
 - offerings on assets,
 - price determination mechanism,
 - users feedbacks and experience valuations,
- supports and enables a semantic search engine (**OC-Commerce Search Engine**)
 - to profitably find goods, products, information, and services, meeting the end-user requirements.

POC4COMMERCE's Vision

Competency	OC-Found	OC-Commerce	OC-Ethereum
Agent	X		
Agent interaction	X		
Asset		X	
Offering		X	
Auction and bargaining operation		X	
Ethereum block and transaction			X
Smart contract agent			X
Smart contract interaction			X
Token			X
Token operation (minting, transferring, destroying)			X

- Which are the available offerings about NFTs representing a specific type of asset with peculiar characteristics ?
- What are the offerings that can be purchased through specific payment methods?
- What is the smart-contract generating the given NFT?
- What is the supply chain of a specific product or service?
- Which NFTs has been sold by a specific seller?

POC4COMMERCE Use Case

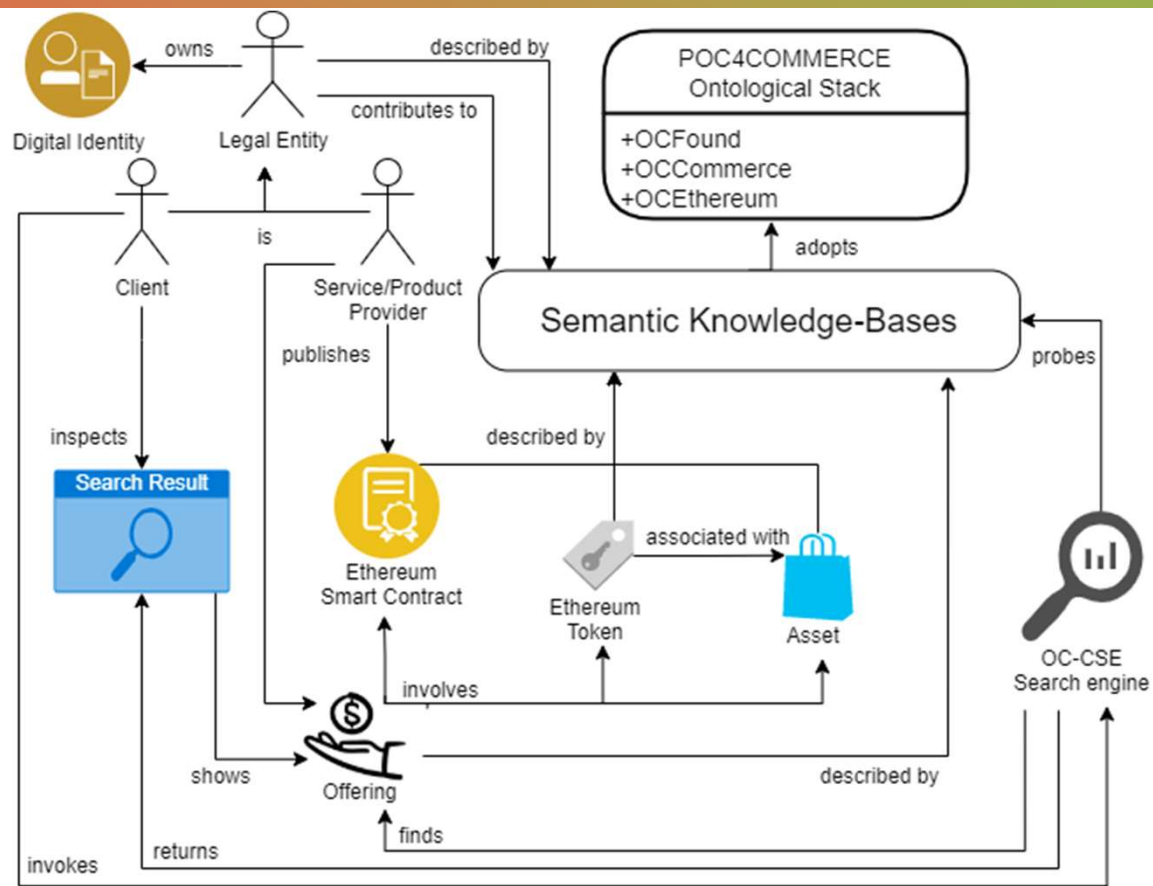
The POC4COMMERCE ontological stack

- **OC-Found**
 - describes *actors* and their *actions*.
- **OC-Commerce**
 - describes *offerings* and *auctions*.
- **OC-Ethereum**
 - describes *smart contracts* and *tokens*.

The POC4COMMERCE search engine **OC-CSE**

- performs reasoning,
- probes the *semantic knowledge bases*.

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THANK YOU



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