BLOCKCHAIN FOR DATA MARKETPLACE: ENHANCING SECURITY, PRIVACY, AND TRUST

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Team

2 Professor + 1 Program manager
1 PhD student

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Introduction

Research Programme
• Blockchain and DLT in Social systems and smart societies

Context
• University of Turin
• Links Foundation
• DATA CELLAR

Data Marketplace
• Create a federated energy dataspace
• Develop a decentralized data marketplace
Data Cellar Objectives

Ambition

• Create a public energy data space that will support the creation, development and management of Local Energy Communities (LEC)

• Based on an open and interoperable cloud-to-Edge data Exchange architecture & aligned with current and future EU data spaces initiatives

• DLT-Driven Marketplace to engage users and extract value of data

https://datacellarproject.eu/
Addressed Challenges in Blockchain-based data marketplaces

By implementing a reputation system that rates data providers and enforce data quality standards within smart contracts.

By leveraging the security features of the blockchain network, such as encryption, cryptographic hashing, and consensus.

Implementing privacy-preserving techniques, such as encryption and pseudonymization.

Enhance trust between data providers and data consumers by providing transparency, immutability, and decentralization.

Data Quality
Trust
Security
Privacy
Software architecture overview - Marketplace

- **Applications** layer is the topmost layer of our architecture. This layer in our use case consists of applications such as:
  - **Data Cellar Market** that provide users with a platform to onboard services like data, algorithms, and compute-to-data. Users can publish and mint data NFTs and datatokens.
  - **Wallet** that enables users to hold datatokens as assets, and use data services by spending datatokens.
Software architecture overview - Marketplace

- **Libraries layer** consists of libraries used by the applications to interact with the smart contracts.
  - These libraries encapsulate the calls to the smart contracts and provide features like publishing new assets, facilitating consumption and much more. Additionally, the libraries also integrate with **Provider** to provision and access data services and **Ocean Aquarius** for metadata.
Software architecture overview - Marketplace

- **Middleware layer** provides the necessary infrastructure for discovering and accessing data assets. This layer comprises:
  - **Aquarius**, a metadata cache for faster search.
  - **Provider**, which facilitates downloading assets and DDO encryption.
Software architecture overview - Marketplace

- **Smart Contracts** layer is the lowest layer of our architecture, and it is responsible for managing the interactions between data providers, consumers, and the network. This layer consists of
  - smart contracts deployed on the Ethereum mainnet. These smart contracts are used to facilitate the creation, management, and trade of datatokens. The libraries interact with these smart contracts to provide features like publishing new assets, facilitating consumption, and much more. Additionally, the smart contracts support various token standards like ERC721 and ERC20 to represent data assets and licenses to access them.
Gaia-X compliance of Data Cellar (especially on Gaia-X Trust Framework and federated architecture)
CONTACTS

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