

# Distributed Ledger Technologies / Blockchain for EO: From Vision to Action

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## New Technologies



Artificial Intelligence



Cloud



Internet of Things



Blockchain

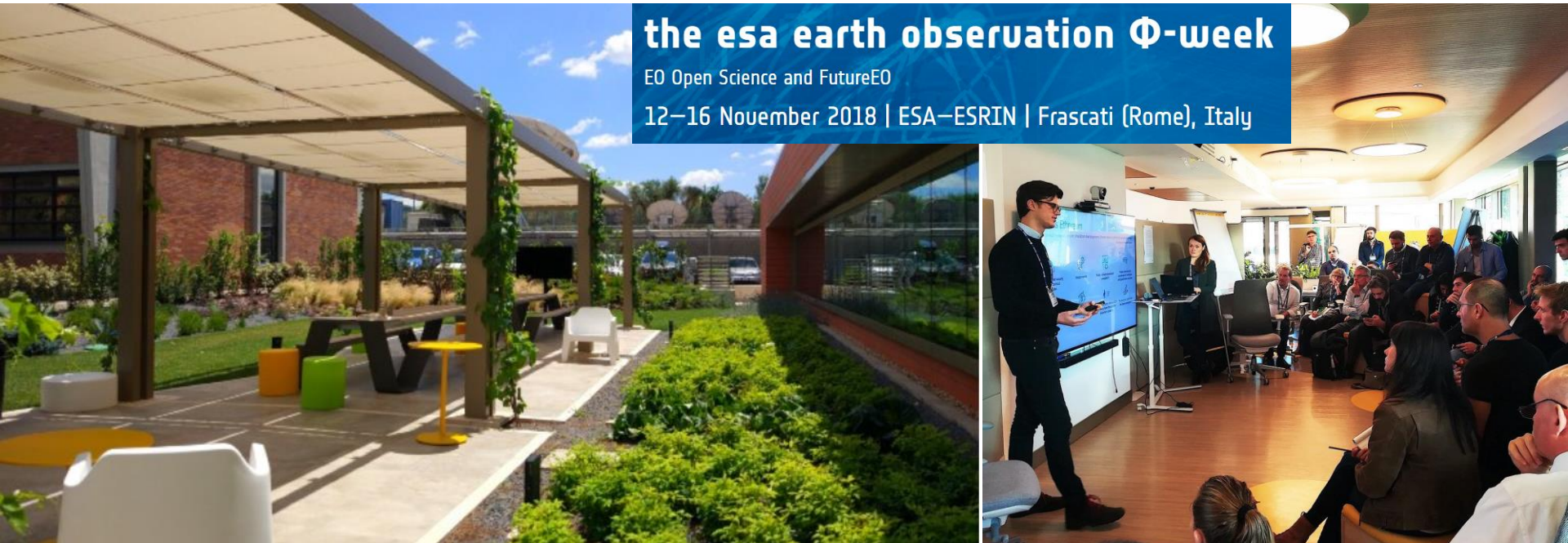


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# Blockchain/DLT Technology and EO



How can blockchain/DLT be used to address emerging challenges in EO?





## Objectives

- Identify applicability and potential for uptake of DLT in the EO sector
- Capture recommendations to ESA programmes, and inputs to national and European
- Federate the community & **develop an ambitious roadmap (White Paper)**

## Applicability, potential, risk

- Applicable to use cases which require proof of integrity and time of data – data security, digital data identity, and value chain tracking
- Applicable to new cost models – new EO data market and access solution with potential for authentication of provenance, certification and traceability of data; use and licensing
- Provide digital representation of assets for emerging DApp services and smart contracts
- Incentives in citizen science, and other community collaborations, via token engineering
- Use of DLTs in the data distribution system, at Ground Segment level
- Mind the gap between the DLT and EO ([www.doyouneedablockchain.com/](http://www.doyouneedablockchain.com/) )

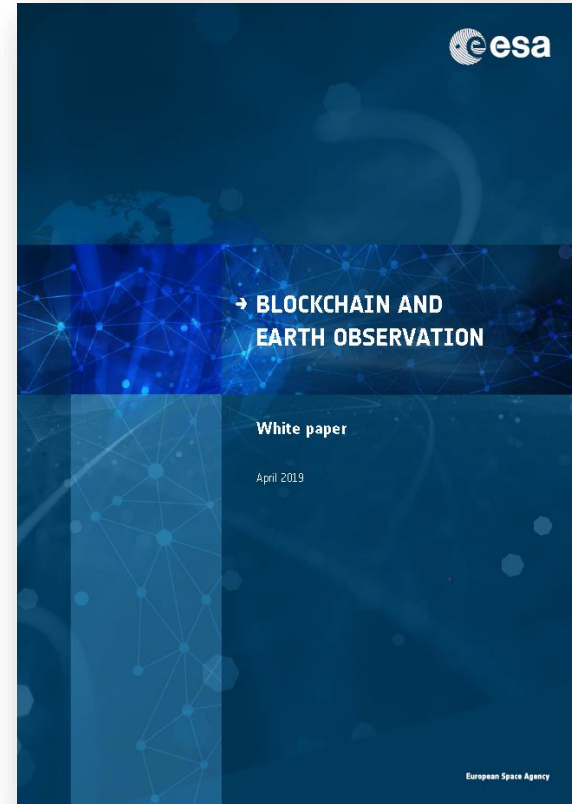
⇒ **Do: Address DLT for EO, requirements definition & technology scouting, followed by prototyping**

⇒ **Don't: Huge flagship activities off the bat**

# Blockchain and EO: White Paper

Common themes for blockchain and EO:

- **Digital / physical assets**
- **Digital provenance/identity**
- **E-commerce**
- **Creating Value**
- **Understanding limitations**



- Define **priority areas** to address real industry challenges
- Enable the **transfer of knowledge, techniques and expertise** between DLT/blockchain developers and the world of EO science, research and business applications (in both directions)
- Foster **partnerships** between DLT and EO industry players in order to stimulate development of innovative EO business solutions
- Empower the **new generation** of researchers, data entrepreneurs, and digital startups on the crossover of DLT and EO capability
- Harness **the involvement across communities**, users and contributors through novel collaboration schemes.

# Agenda for the day



Part 1: Setting the stage, Introduction to Distributed Ledgers & Blockchain.

Part 2: Existing implementations.

Part 3: Working Session: Framework for use cases and overcoming technical and business hurdles



# Working Session: Framework for use cases and overcoming technical and business hurdles



# Main findings 2018



1. The long-term objective for ESA should be to **deliver an entryway** for the European EO industry, R&D and science community while the adoption of DLT intensifies in other sectors of the digital economy
2. ESA can ensure an appropriate **framing of the challenges and opportunities** for the EO community, including potential applications which might appear as blockchain technology matures
3. Addressing projects at **low TRL** levels is key
4. Understanding **the limitations** of blockchain/DLT is important
5. **Where should we start?**



- Emerging standards (ISO TC/307; Draft Reference Architecture for DLT/Blockchain; geospatial data handling in distributed ledgers)
- Incentivisation in community collaborations
- Governance of distributed processing in cloud infrastructures
- The expansion of EO platform functionalities (BaaS)
- Future architectures of distributed systems and processing scenarios

- EO data and information product integrity, traceability, automated certification and auditability.
- Supply chain tracking in the EO upstream segment.
- Role of Digital Identity solutions (“Digital Twin Concept”)
- EO data access and trading
- Intellectual Property Rights protection
- Role of EO in the digital representation of assets in Dapps

# Opportunities



- EOEP5 Open Call for proposals (every quarter, 150kE)
- Phi-Lab industrial partnerships and residency placements
- Examples of dedicated ITTs in 2018/2019 (completed)
  - Building trust in digital economy
  - Synergistic use of blockchain and deep learning for space data
  - Decentralised ground segment Authentication using Blockchain Technology
  - Blockchain for Space Activities: EO data provenance
  - CB-XEO: Consensus Based eXplainable Earth Observation
  - Blockchain Kick-Start (Feb-April 2019; Business applications)
  - ....

