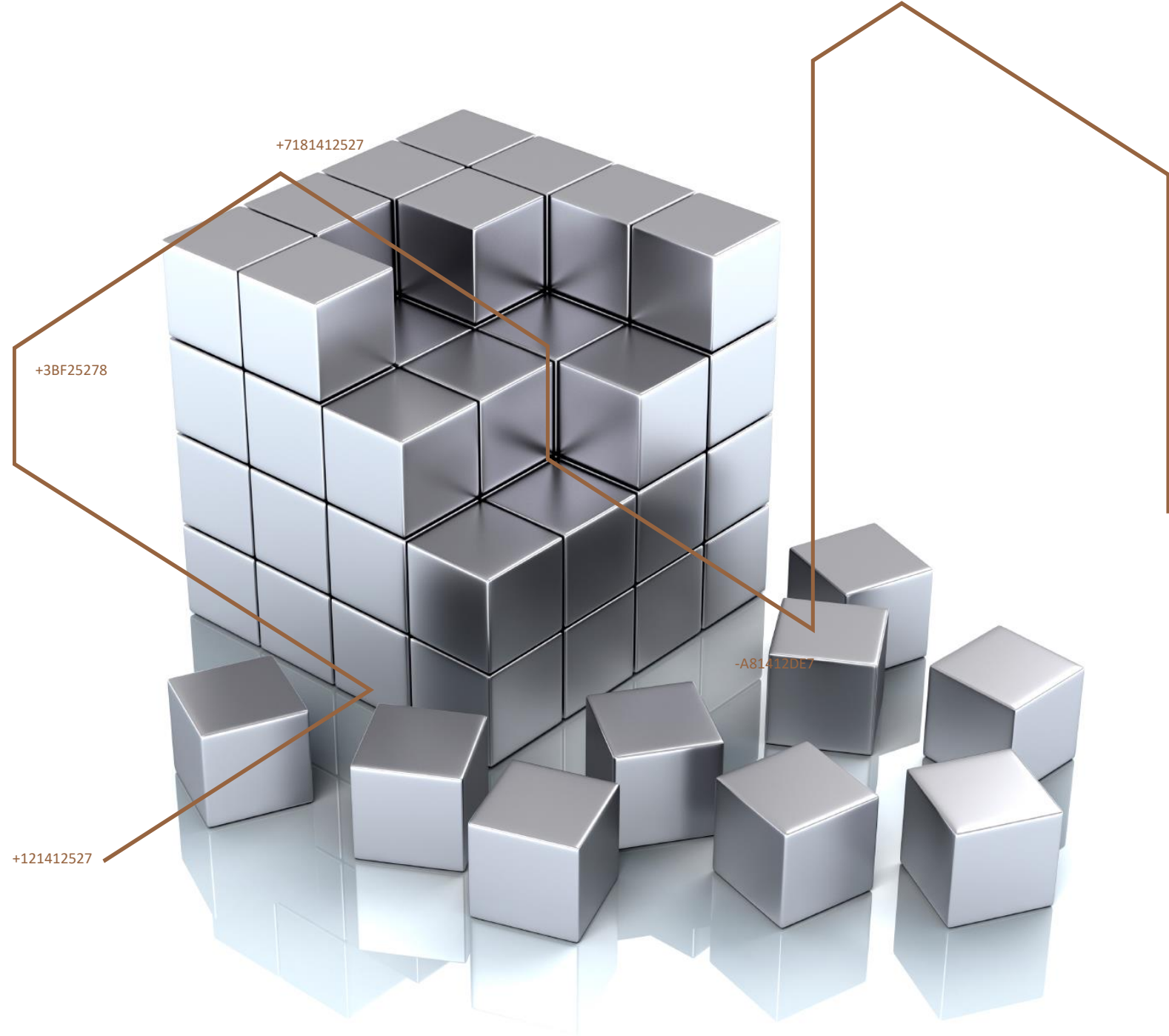


BLOCKCHAIN FOR SPACE SECTOR

SEPTEMBER 2019

PRIIT ANTON
PROGRAM MANAGER SPACE

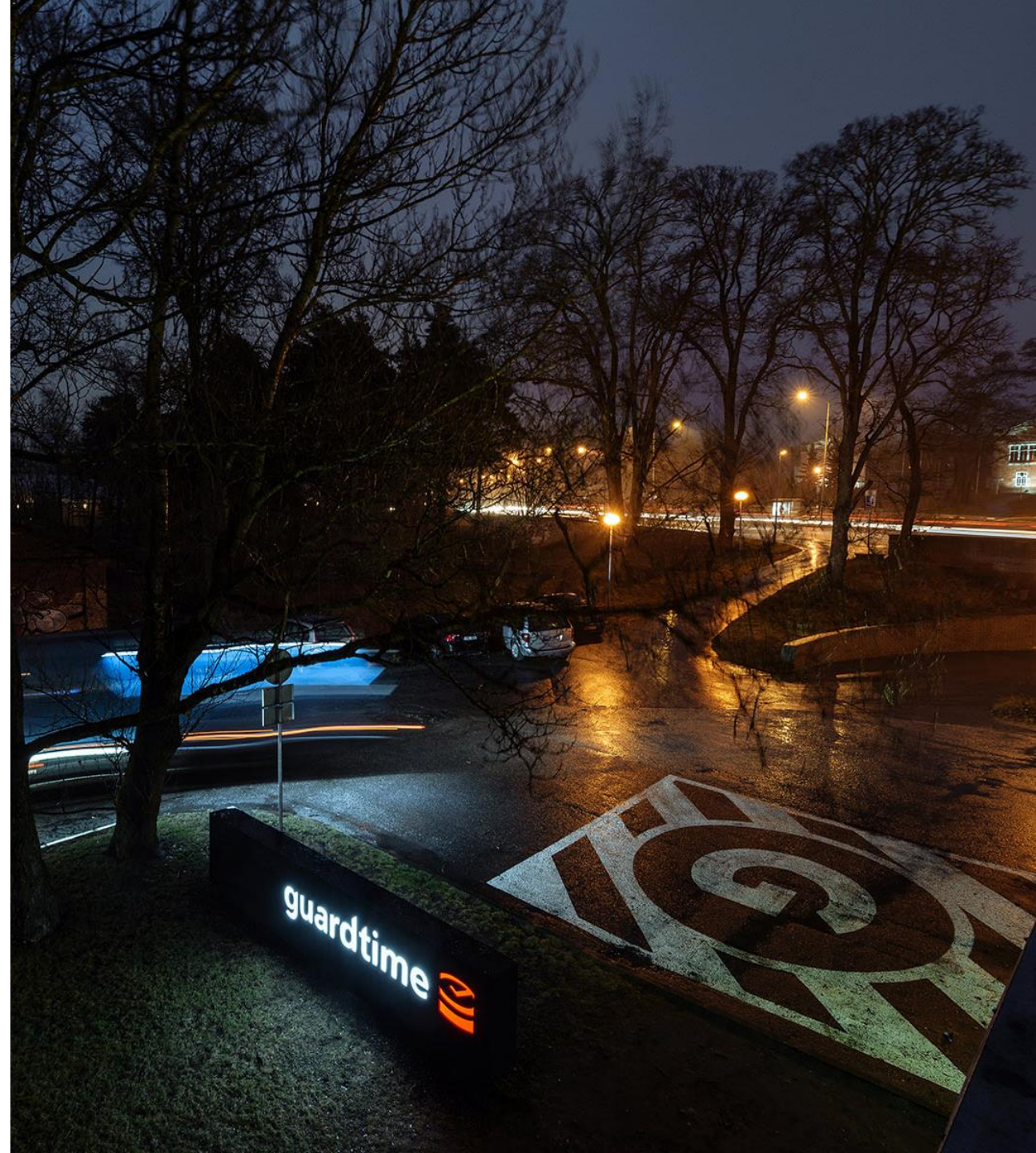


AGENDA

1. Background (Guardtime and KSI Blockchain)
2. What challenge is addressed in ESA BC4SA project
3. Use-case description
4. Potential impact

GUARDTIME AT A GLANCE

/THE WORLD'S **LEADING BLOCKCHAIN COMPANY**
WITH ACTUAL PRODUCTION DEPLOYMENTS IN
GOVERNMENTS AND FORTUNE 500 COMPANIES,
TACKLING FUNDAMENTAL CHALLENGES IN **CYBER**
SECURITY



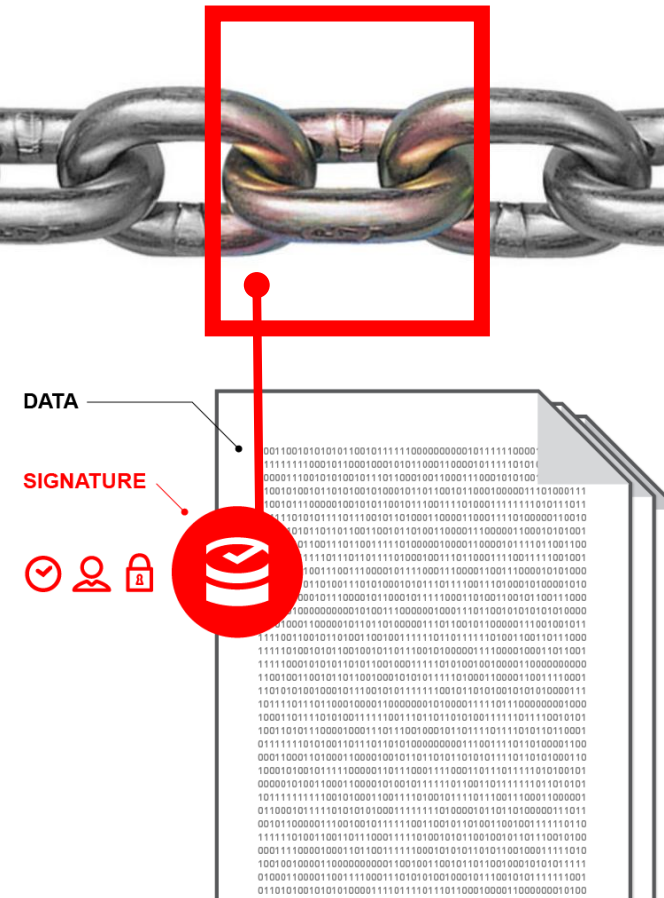
KSI[®] Blockchain Service

KSI Blockchain provides a tagging system for electronic data: **KSI Signature**.

These signatures prove the time, integrity and provenance (human or machine) of the data without relying on trusted third parties, public/private keys or credentials that can be compromised or hacked

Highlights

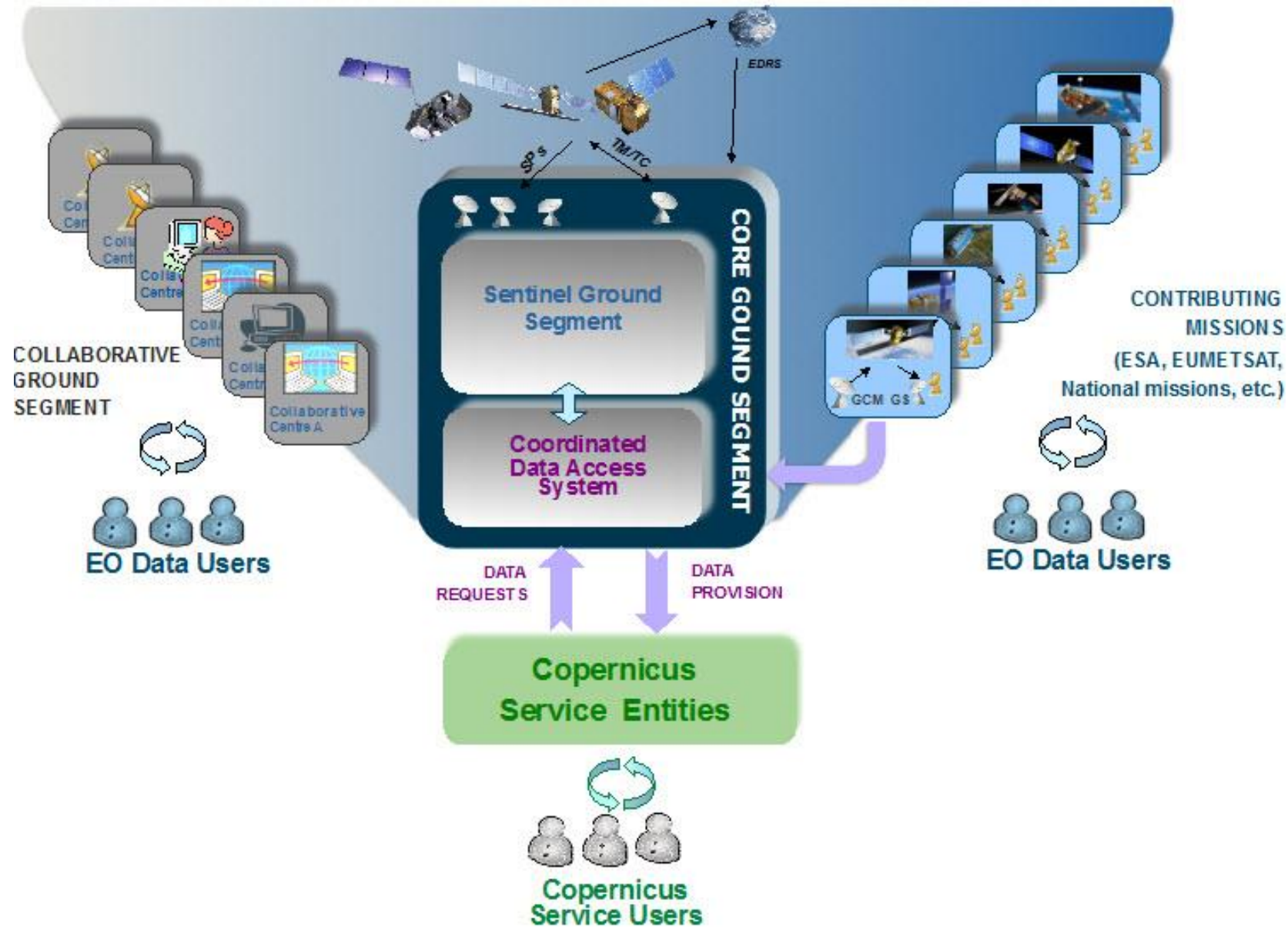
- Designed for data ingest at massive scale
- Guaranteed signature response in next second
- KSI Signature allows independent verification of data properties by third parties
- Proven track record, 24/7 uptime since 2010



KSI BLOCKCHAIN KEY FEATURES

- Relies on cryptographic hash functions, formal security proof
- Widely witnessed (physical and digital) trust anchors, no secrets
- Scalability 10^{12} sig/s, globally
- Time resolution 1s, settlement time ~ 1 s
- Actual data and signing patterns not disclosed
- Offline and independent verification, no trusted parties
- Permissioned / private calendar blockchain with deterministic and linear growth in time
- Not vulnerable to quantum threat

EUROPEAN SPACE AGENCY – BLOCKCHAIN FOR SPACE ACTIVITIES



WHY IT IS DIFFERENT - TRUTH VS TRUST

MAKING SURE THE FENCE IS OK



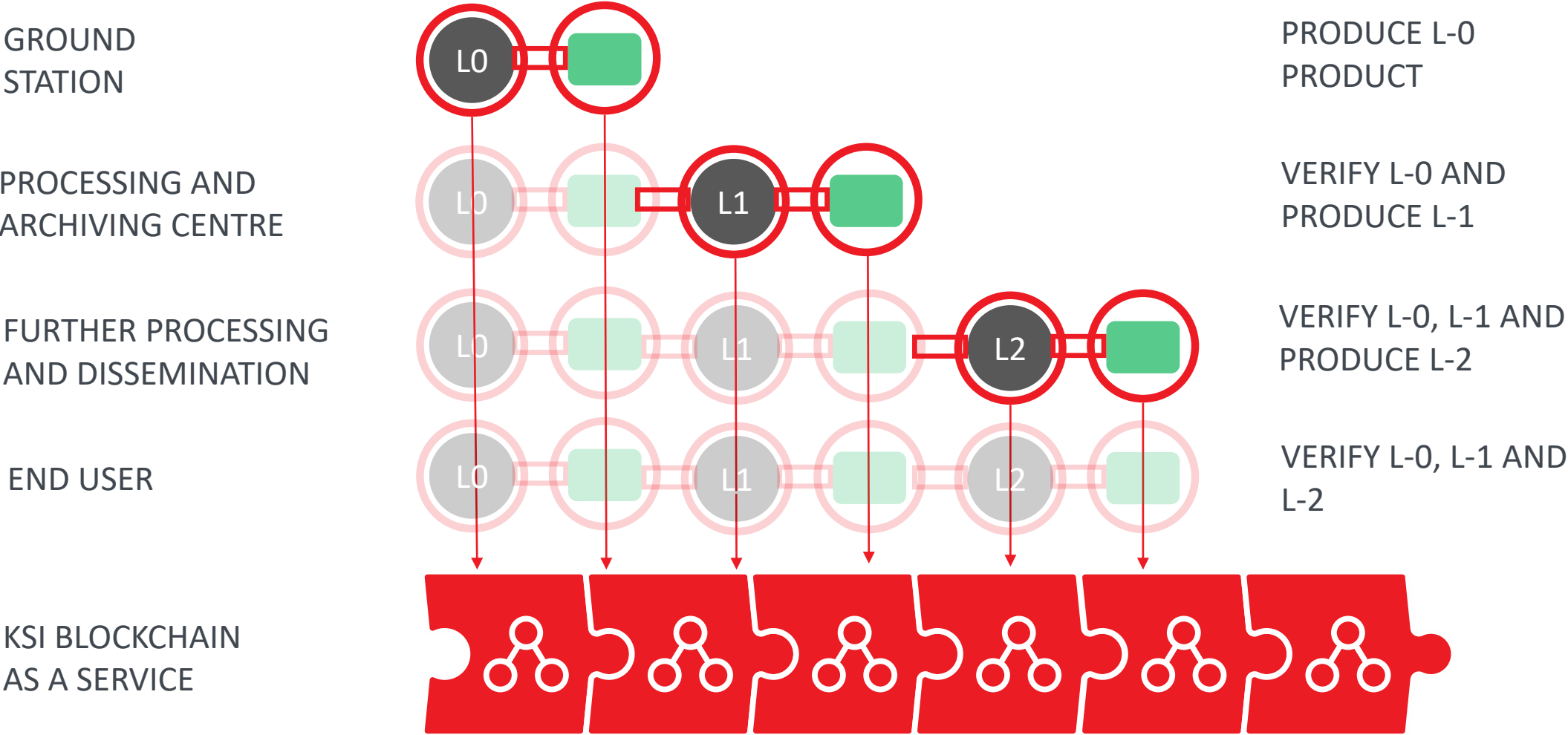
MAKING SURE THE DATA IS OK

WHAT ARE THE GOALS?

- + Verify integrity and time of EO data products and their provenance throughout the supply chain
- + Compatible with variety of missions and data formats
- + Interoperability – allow cryptographic proofs to be extracted and transported for verification and amending
- + Demonstration of deployment based on Copernicus data architecture



BLOCKCHAIN FOR SPACE ACTIVITIES



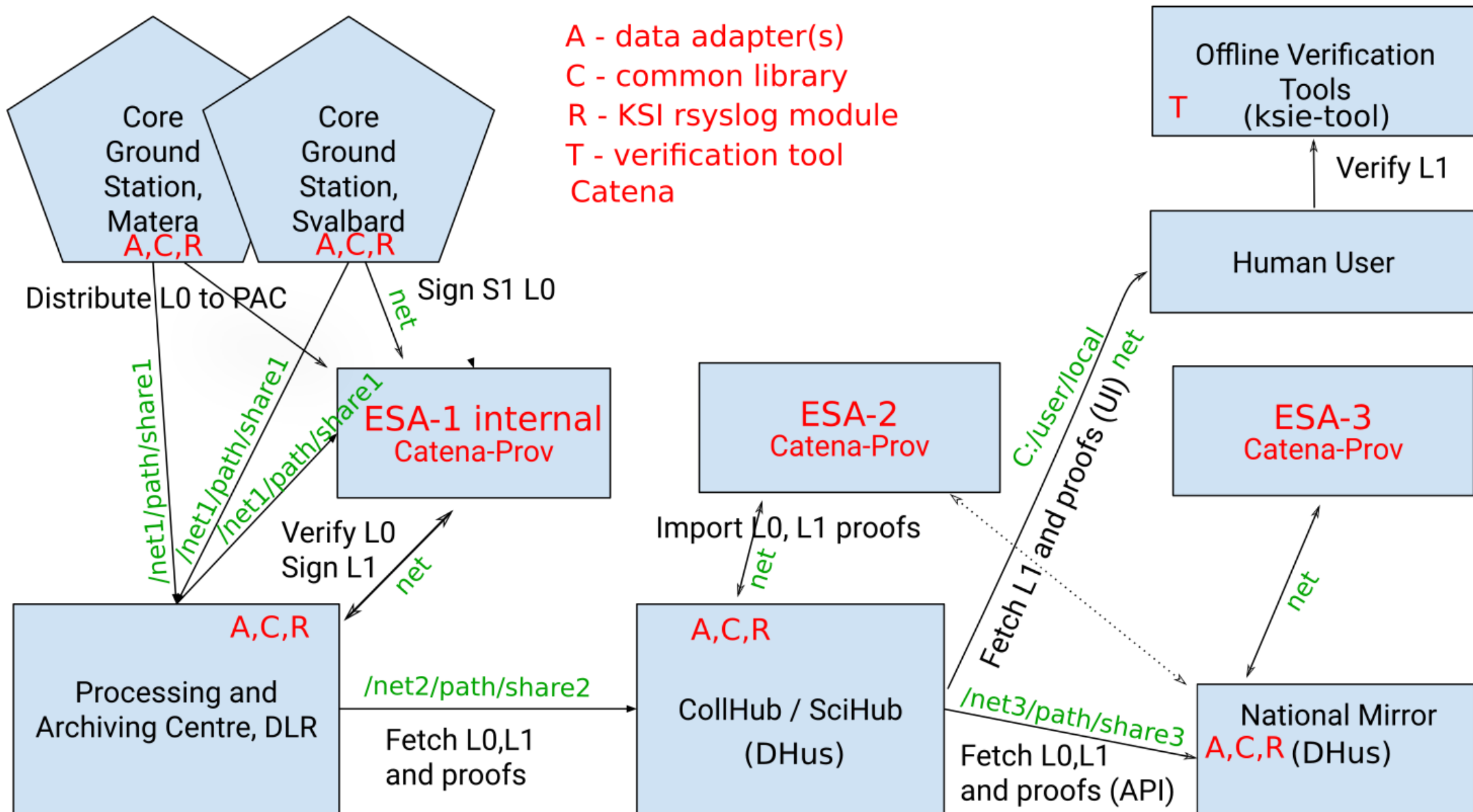
IMAGERY THAT WE ORDER



IMAGERY THAT WE MIGHT GET



BC4SA GENERAL ARCHITECTURE CONCEPT



Live Demo: The Data Hub Software (DHuS)

- Possible states:

- RESULT_OK



- RESULT_WARN



(green?)

- RESULT_NOK

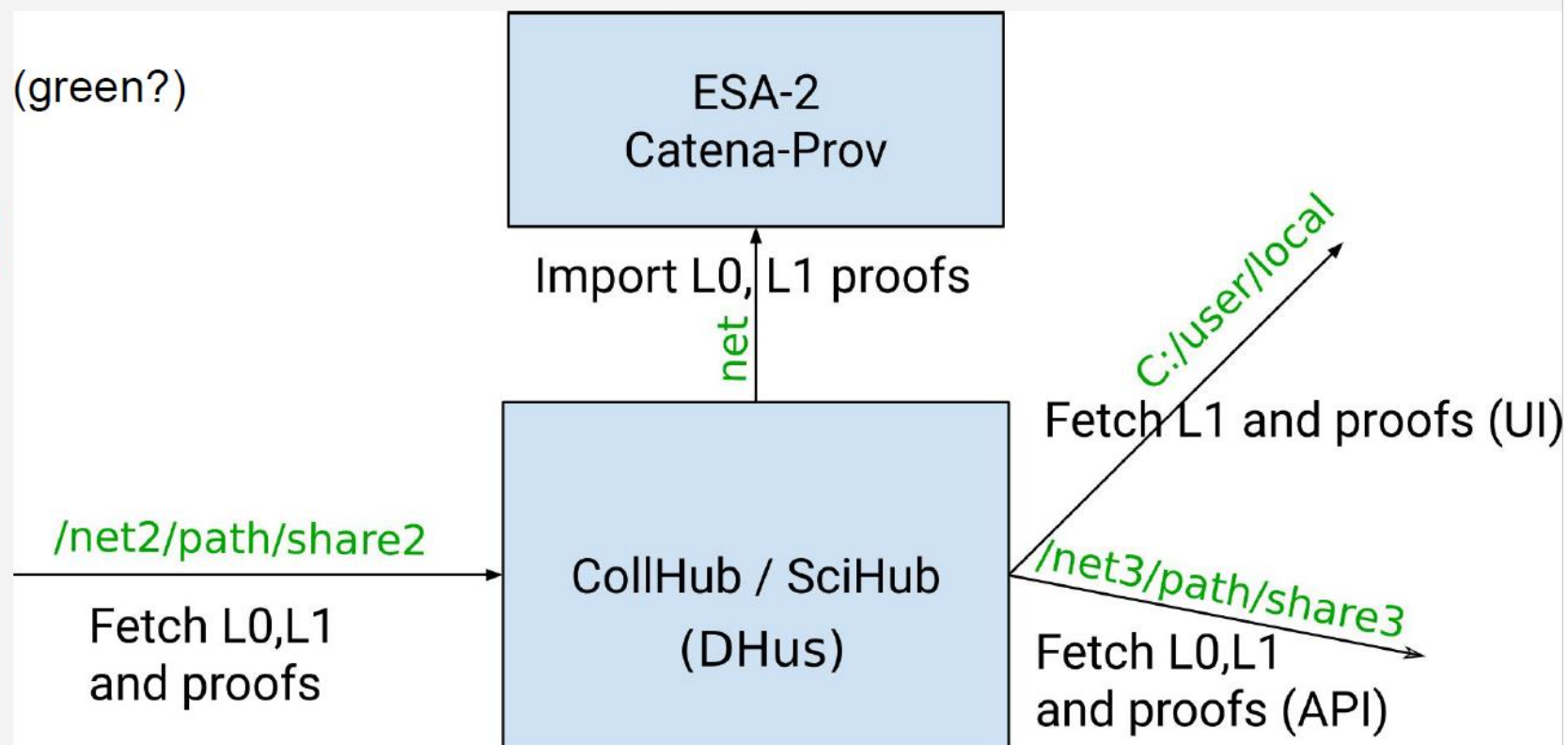


- PROOF_NA



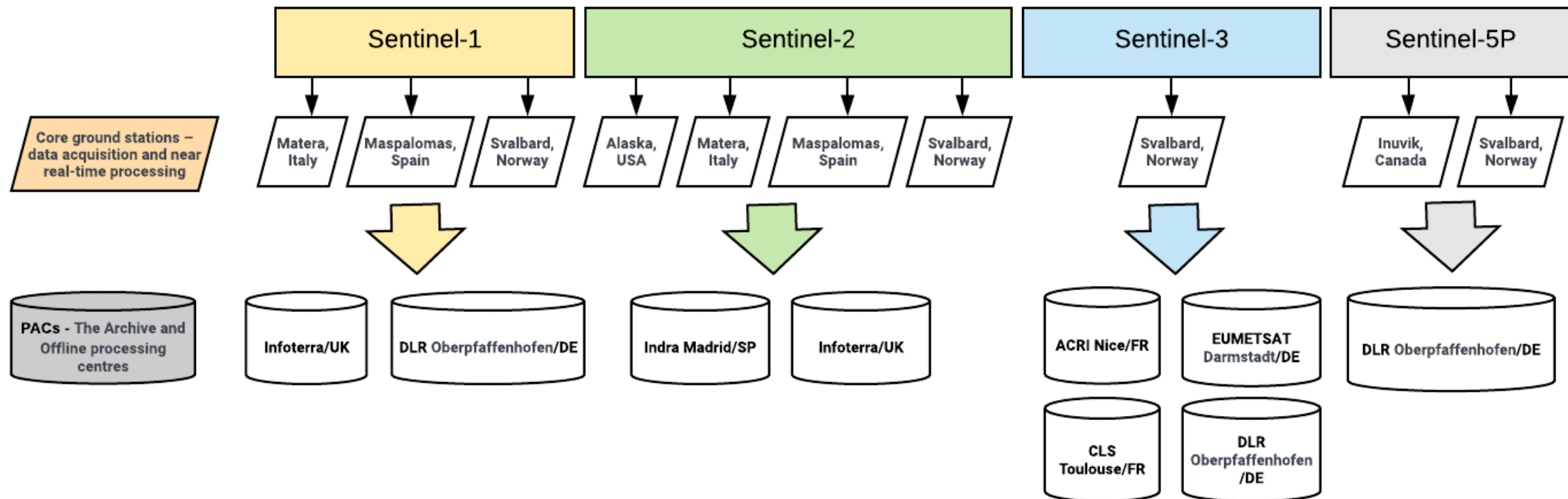
- From DHus:

- EO product
 - KSI proof (small file)



WHERE IT COULD BE IMPLEMENTED

- + Ground stations receiving Sentinel data
- + Processing and archiving centers for Copernicus and support missions
- + National data hubs
- + In EU cloud-based DIAS platforms



+ Commercial
EO service
providers

+ Commercial
satellite
operators



ADDITIONAL USE - KSI[®] BLOCKCHAIN FOR SPACE DATA SECURITY

- + **Integrity assurance** and **long-term provenance** of
 - + EO and Science data archive
 - + audit logs of high-security missions
 - + key management facilities
 - + mission operations archive
 - + manufacturing supply chain
 - + quantum-immune identity management

