



**KRAKEN**

**Brokerage and market platform  
for personal data**

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**Removing obstacles which prevent citizen's controlling  
and widely sharing their personal data**

Juan Carlos Pérez Baún, Atos

**Citizen Control of Personal Data Workshop (25<sup>th</sup> February 2021)**

This project has received funding from the European Union's  
Horizon 2020 research and innovation programme under  
grant agreement No 871473



[www.krakenh2020.eu](http://www.krakenh2020.eu)



## Agenda

1. **KRAKEN Overview and partners**
2. **Objectives**
3. **Challenges**
4. **Architecture overview**
5. **Self-Sovereign Identity**
6. **Crypto-Analytic tools**
7. **Marketplace**
8. **Health & Educational pilots**
9. **Agile methodology**

# KRAKEN OVERVIEW



➤ EU Horizon 2020 R & I programme under grant agreement No 871473



➤ KRAKEN is an Innovation Action part of the Big Data Value

➤ Public-Private Partnership (PPP)

➤ 36 months from December 2019 to November 2022

➤ Coordination: Atos

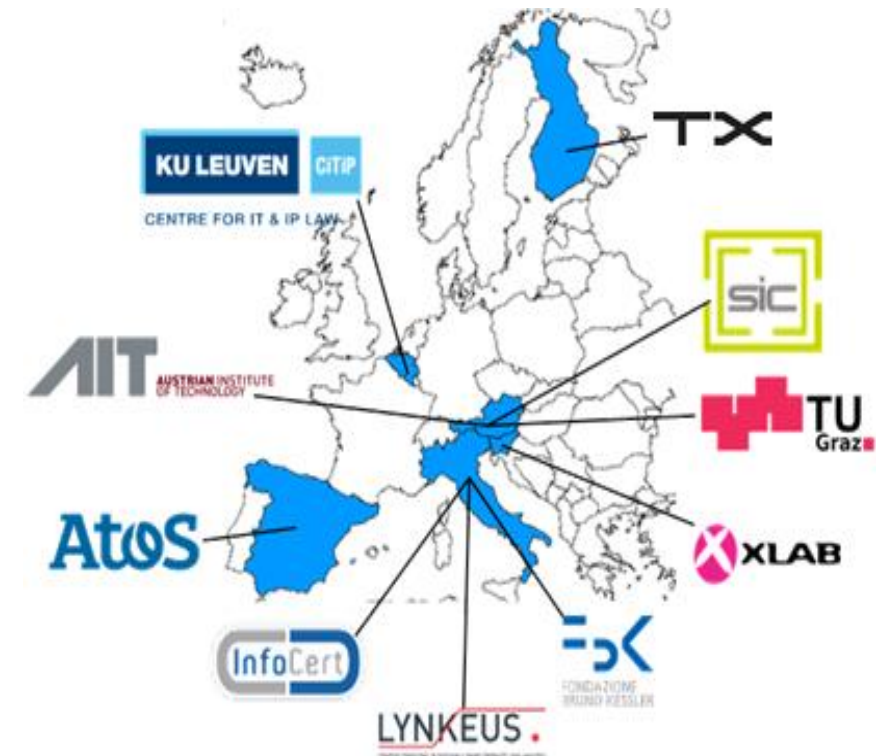


## 6 Countries

Spain  
Italy  
Austria  
Slovenia  
Belgium  
Finland

5M €

10 Partners



# KRAKEN PARTNERS & ORGANIZATIONS



## INDUSTRY PARTNERS

## RESEARCH ORGANIZATIONS

## SMEs PARTNERS

Atos Spain S.A.

- Project Coordinator
- SSI

Graz University of Technology

- Education pilot
- Cryptography

Austrian Institute of Technology GmbH

- Cryptography

Lynkeus srl

- Health pilot

XLAB razvoj programske opreme in svetovanje d.o.o.

- Cryptography

InfoCert S.p.A

- Technical coordinator
- SSI

Katholieke Universiteit Leuven

- Legal Expert

Fundazione Bruno Kessler

- UI

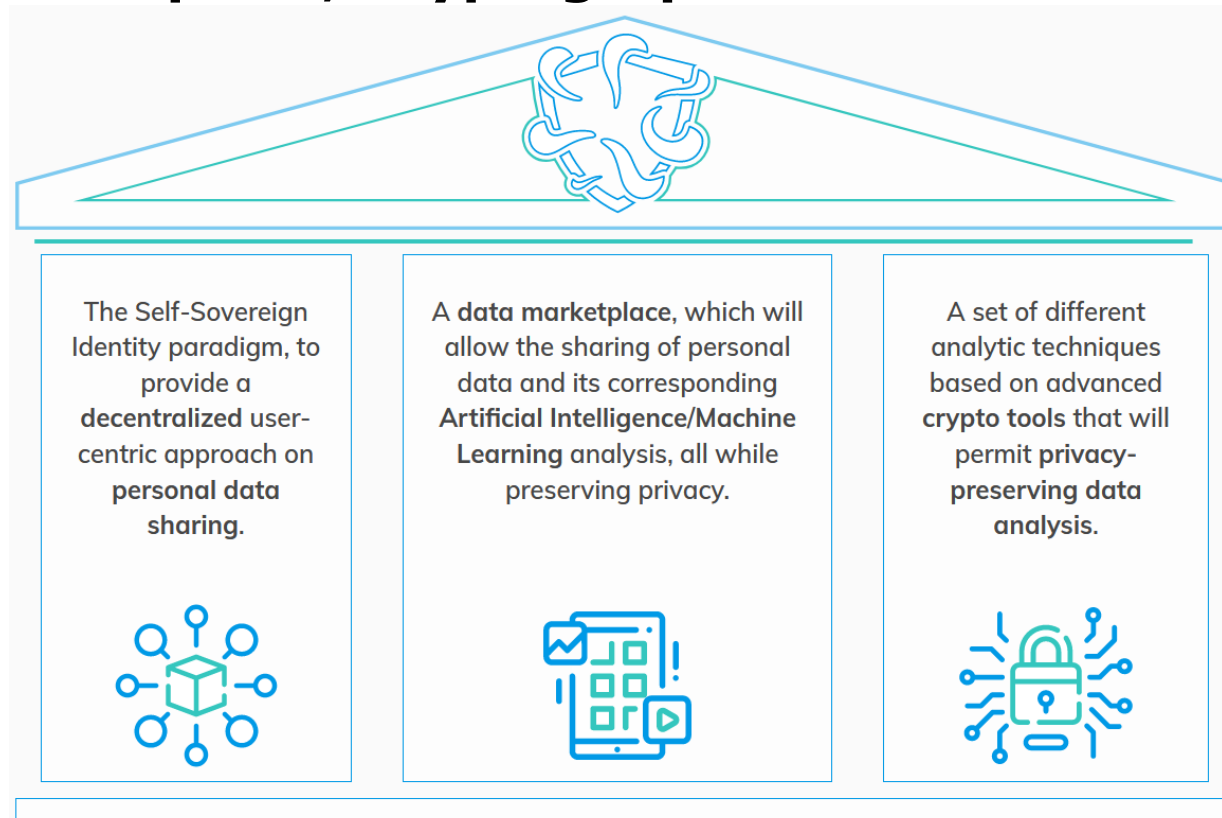
Stiftung Secure Information and Communication Technologies

- Cryptography

TX Technology Exploration Oy

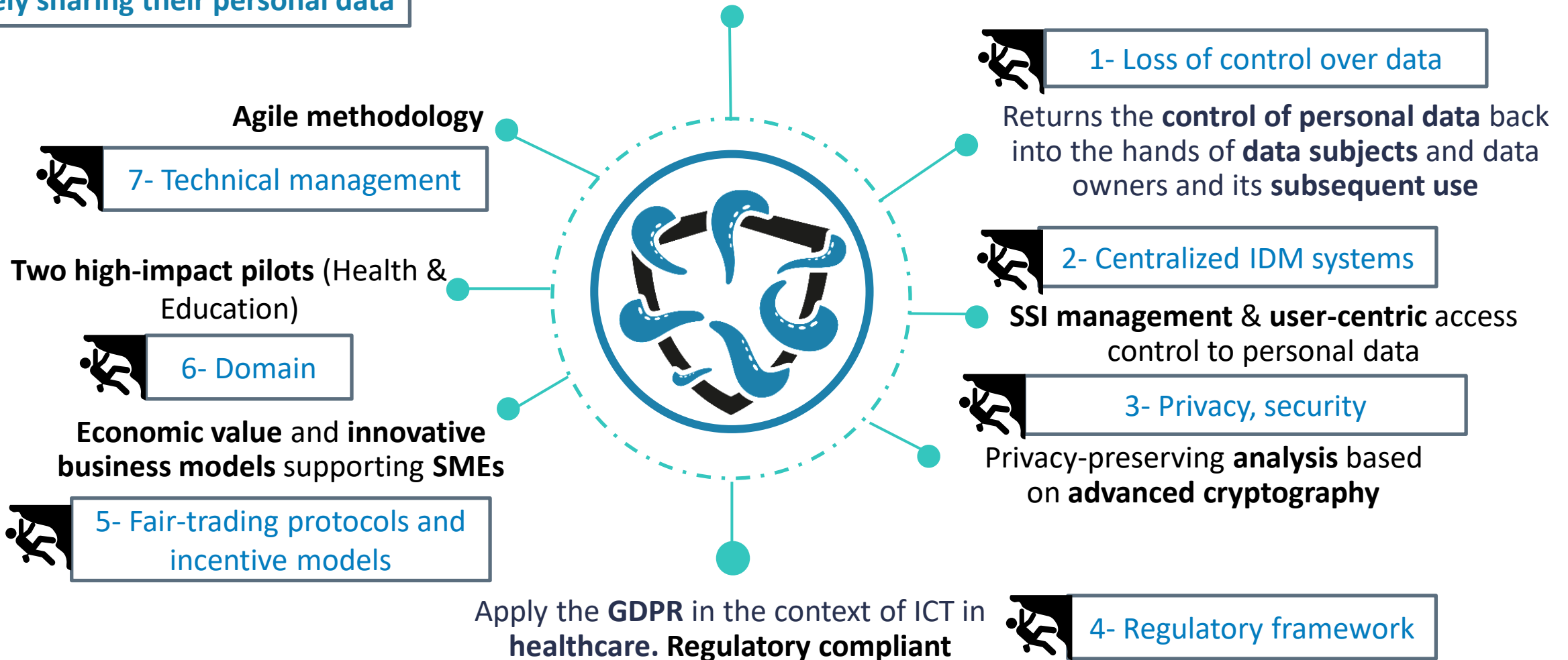
- Marketplace

- **KRAKEN** develops a trusted and secure personal data platform with state-of-the-art privacy aware analytics methods, guarantying metadata privacy and query privacy, **returning the control of personal data back to users**
- KRAKEN aims at empowering personal data sharing and trading leveraging on three main pillars: **SSI, Marketplace, Cryptographic tools**

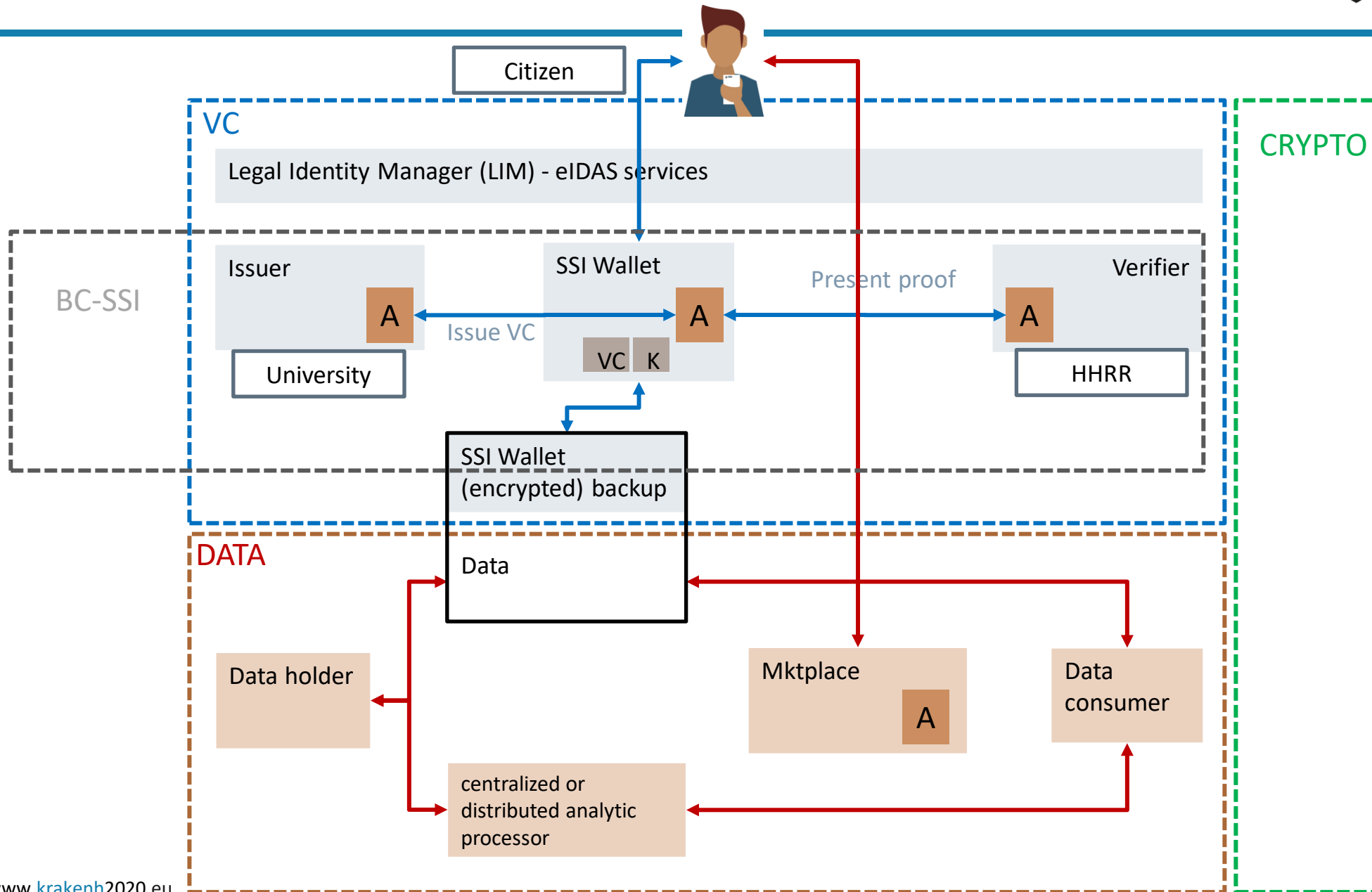


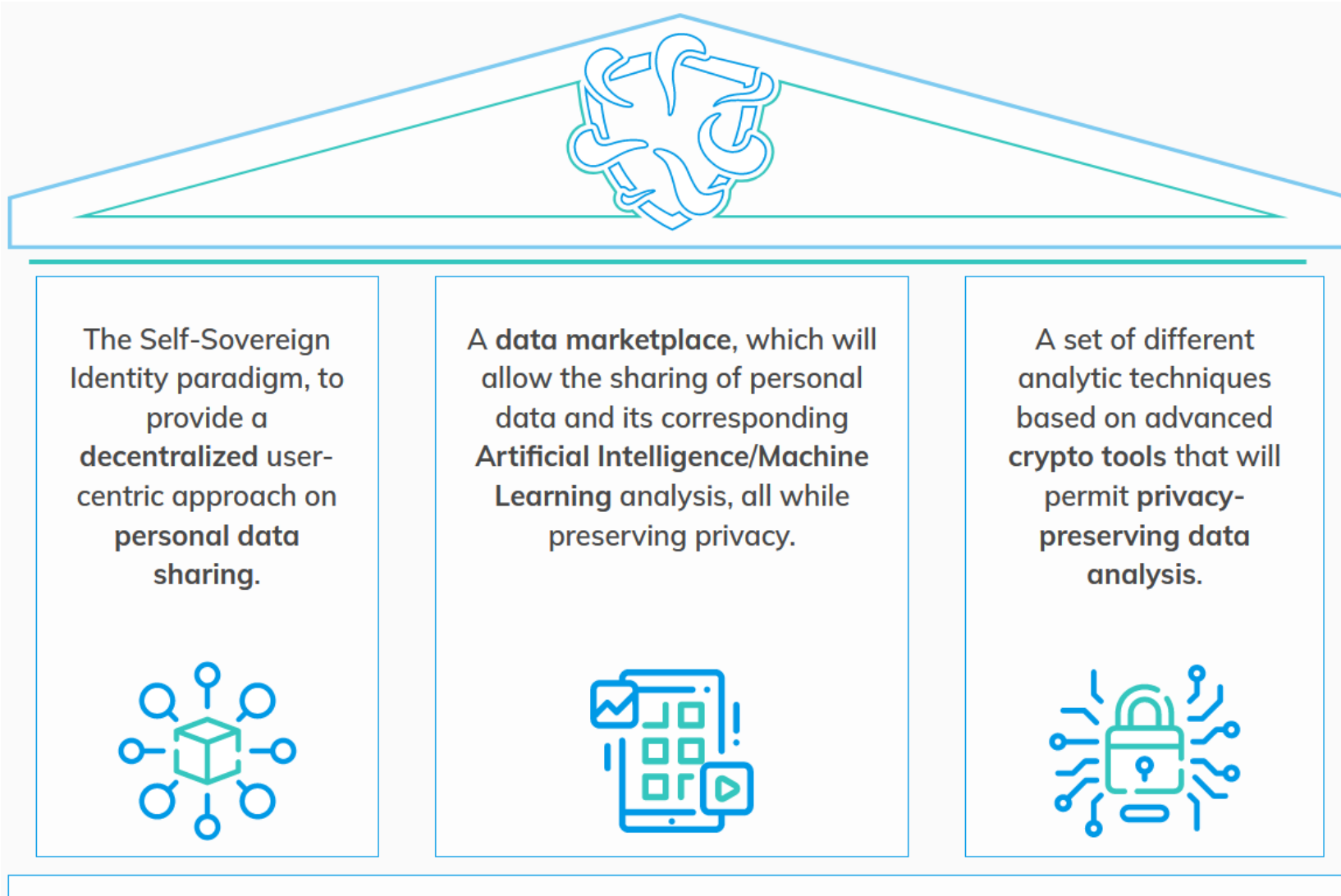
Removing obstacles which prevent citizen's controlling and widely sharing their personal data

Highly trusted and secure yet scalable and efficient personal data sharing and analysis platform



# ARCHITECTURE OVERVIEW



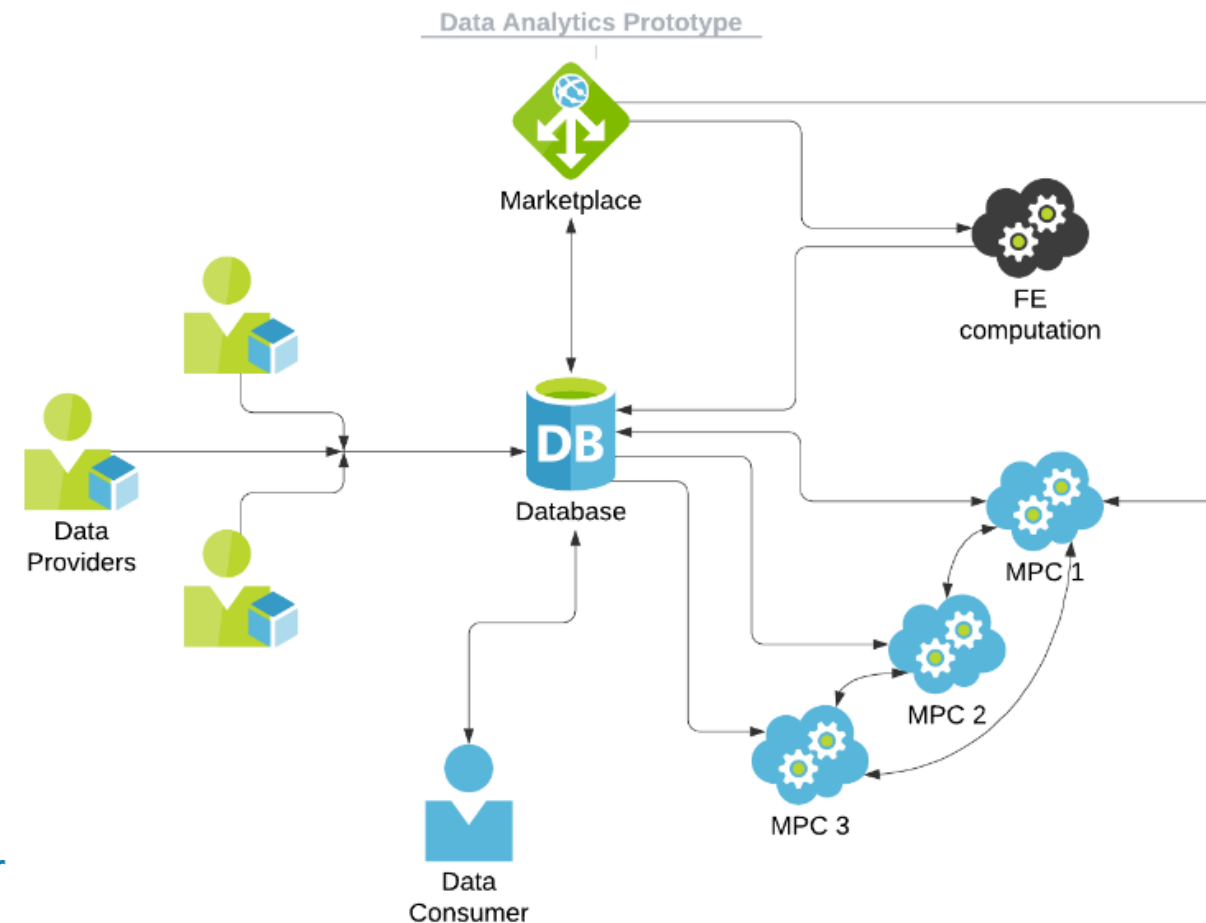




- Use of Self-Sovereign Identity providing a **decentralized user-centric** approach on personal data sharing.
- Compatibility with multiple distributed ledger-based technologies → Analysis of different available ledgers.
- Based on SSI we use **Verifiable Credential** including the user consent for sharing data
- Verifiable Credentials with different **level of assurance** for accessing the services the platform provides.

- Cryptographic tools for **end-to-end secure data-sharing** capabilities
  - Primitives that inherently support delegation of access rights
  - **Proxy re-encryption** (build on top of CREDENTIAL platform)
  - Attributed-based encryption, functional encryption (for access control)
  - Also consider forward-secrecy, post-quantum security
- Authenticity of data analytics and confidentiality of privacy-sensitive data
  - **Secure multiparty computation (SMPC)** and **functional encryption (FE)**
  - Mechanisms for secure clustering, aggregation, and statistical evaluations of sensitive data
- Provision of suitable **cryptographic framework for KRAKEN SSI system**
  - Tools to enhance privacy aspects of SSI system
  - Techniques to efficiently prove statements w.r.t. SSI attributes. Data minimization. **ZNP**

- Applicable for
  - Analytics on highly privacy-sensitive data (run an MPC node at the data producer)
  - Data-Analytics-as-a-Service (cloud provider offers computation power as a service via the Marketplace)
  - Data aggregation, many more
- Data confidentiality
  - Data is confidential w.r.t. to data processors
  - Data consumer obtains result of analytics only
  - Middleman (e.g. Marketplace) doesn't see data nor result
- Data integrity
  - Data processors can verify data integrity
  - Data producer anonymity via group signatures (or other privacy-preserving signatures)
  - Potential research direction: Authenticity of computation via SNARKs



- Act as an open and **decentralised exchange for data, securely connecting providers and consumers** of high-quality datasets and data streams and leveraging a blockchain network to enforce the business and legal logic behind data transactions.
- Leverage the **Streamr Network** for the **delivery of data streams in real-time** between individual citizen and institutional/organisational data providers and interested data consumers.
- Through the use of this P2P pub-sub network, the KRAKEN marketplace will have access to an open, neutral and scalable data streams pipeline.
- **Users** of the KRAKEN marketplace will also be **able to monetize** and package Batch datasets, or static records or files, **as Data Products**.

- A biomedical and wellbeing data marketplace connecting data providers
  - Individual citizens, Healthcare organizations
- Sharing medical and data streams from mobile apps and wearable devices with data consumers (academic research centres, health-tech companies, insurers, public authorities, wellbeing services providers) in exchange for economic value, in full compliance with the GDPR.
- The platform will leverage existing blockchain data infrastructures:
  - MyHealthMyData (MHMD); Streamr: decentralized P2P pub-sub system for transfer of data streams
- 4 Use Cases (sell, buy, monetize and Data Analytics aaS)

## DATA PRODUCERS

Individuals, hospitals, data unions, app providers, patient associations, etc.



## DATA BUYERS

Research centers, AI developers, insurance companies, device manufacturers, etc.

- Data marketplace connecting data providers
  - Students
- Sharing grades, certifications, enrolment status, qualifications, courses with data consumers (recruitment agencies, training organizations) in exchange for economic value, in full compliance with the GDPR.
- Use of a dedicated LinkedIn page as recruitment company
- 3 UCs where produce academic data, purchase/access data, processing academic data

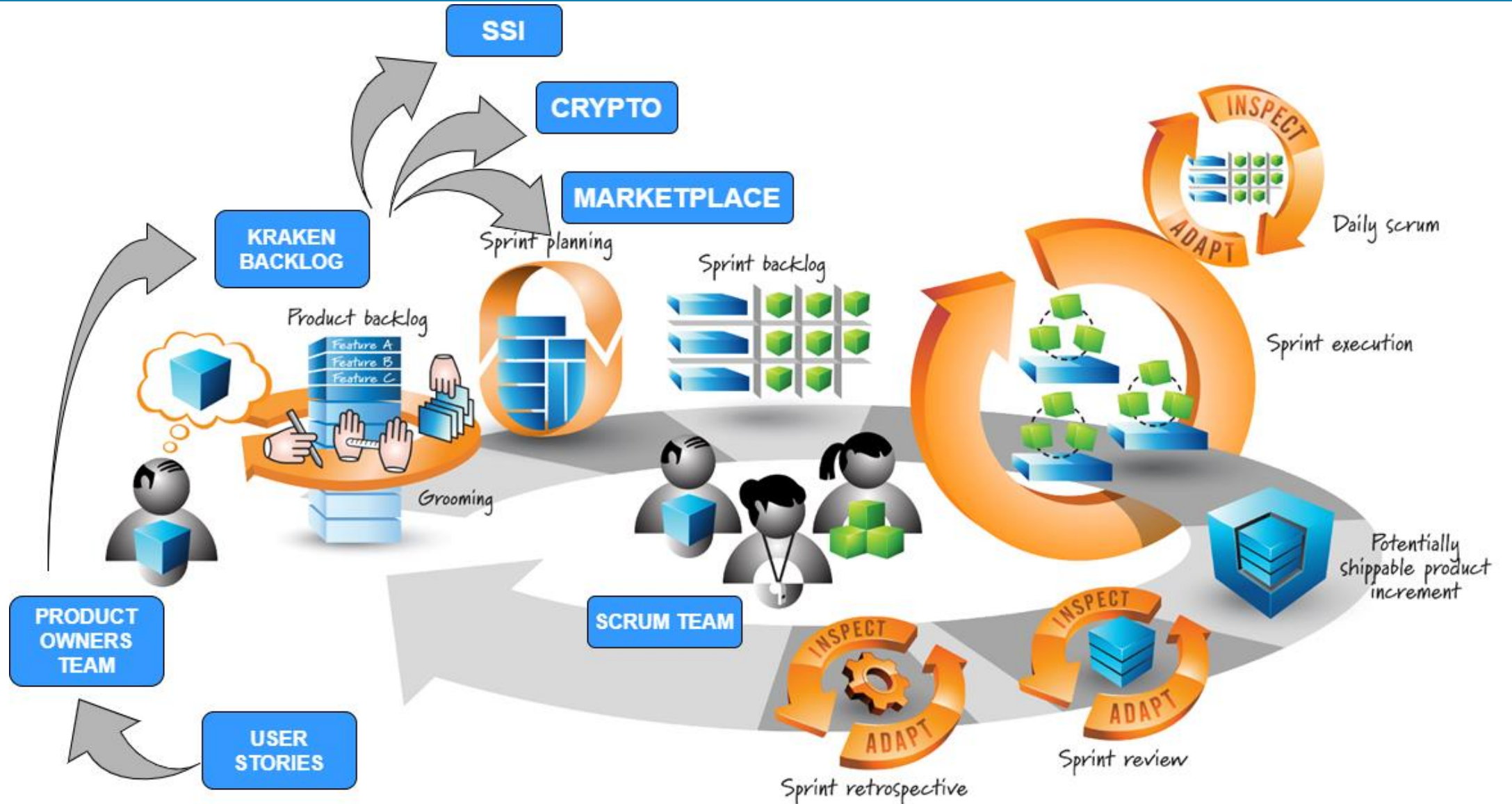
## DATA OWNERS

Students to trade their academic records in a **privacy-preserving** way



## DATA BUYERS

Recruitment agencies to acquire this data and process it, keeping the **student's privacy** intact.





*Thank you for your attention !*

<< Juan Carlos Pérez Baun >>

<< [juan.perezba@atos.net](mailto:juan.perezba@atos.net) >>



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