

Sponsored session

KRAKEN.

User engagement with privacy- preserving data sharing platforms: challenges and opportunities

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<https://ebdvf.eu> 

Introduction to the Workshop Objectives

This workshop will address current challenges and opportunities in designing privacy preserving data sharing platforms:

- Leveraging on the Self-Sovereign Identity paradigm
- Cryptographic methods supporting privacy preserving analytics
- Providing a marketplace for Health and Education data sharing
- Evaluating initial user engagement and adoption

Agenda

- Presentation of the main pillars of the KRAKEN project
 - The Crypto methods and tools for privacy preserving analytics
 - The Marketplace for personal data sharing
 - The Self-Sovereign Identity paradigm for data sharing
- Presentation of the KRAKEN evaluation results in 2021
- Group discussion on main challenges and opportunities
- Activities to improve user engagement
- Activities to engage infrastructure/computation providers
- Wrap-up



Sebastian Ramacher



Davide Zaccagnini



Angel Palomares



Silvia Gabrielli

Main pillars of KRAKEN



Sebastian Ramacher

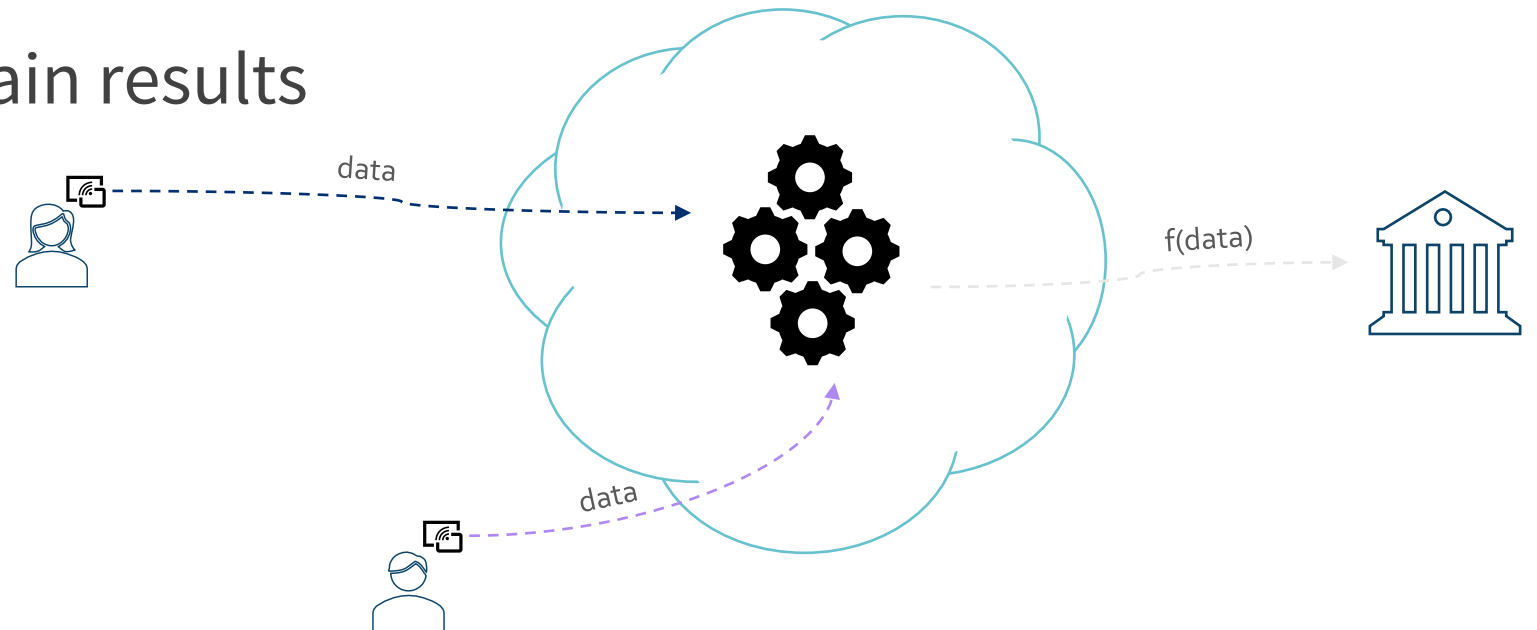
Scientist at AIT Austrian Institute of Technology

Working on cryptography

CRYPTOGRAPHIC PILLAR

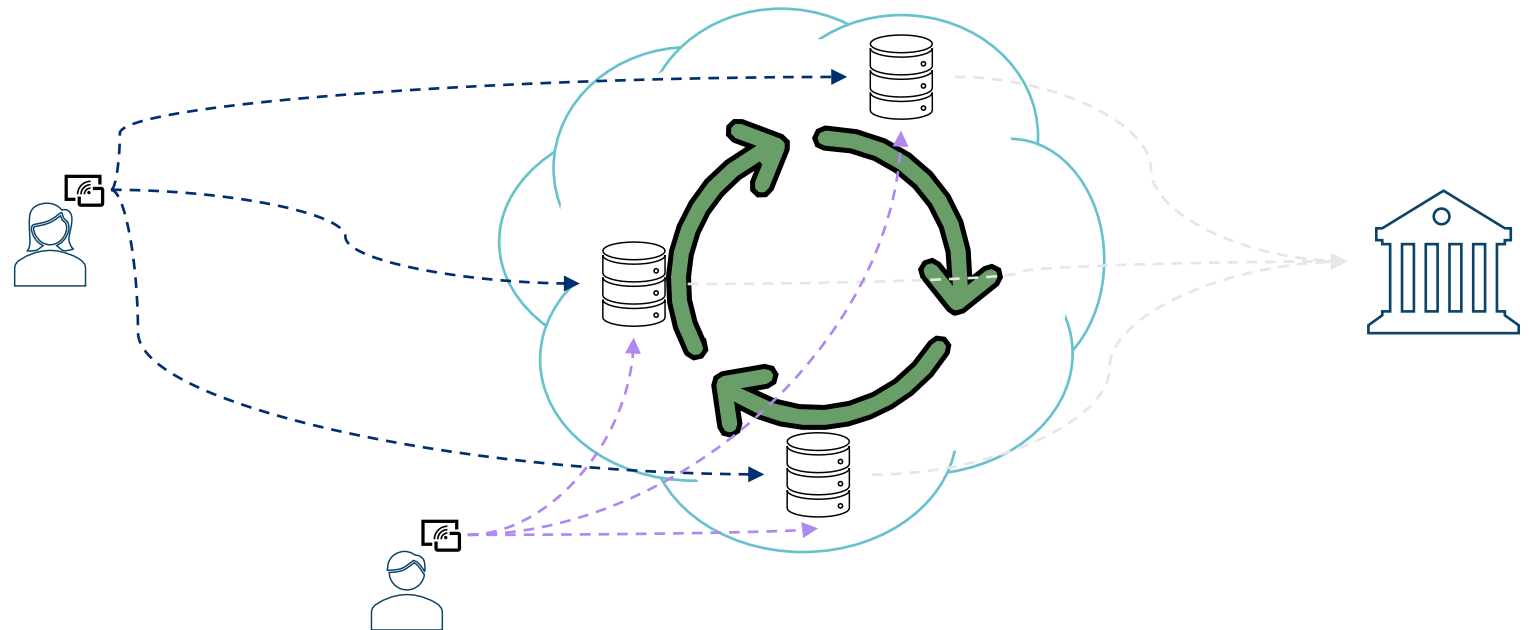
Motivation

- Data sets available from multiple users / sellers
- Combine these data sets and sell combined statistics
- Buyer should only obtain results
- Privacy-by-design

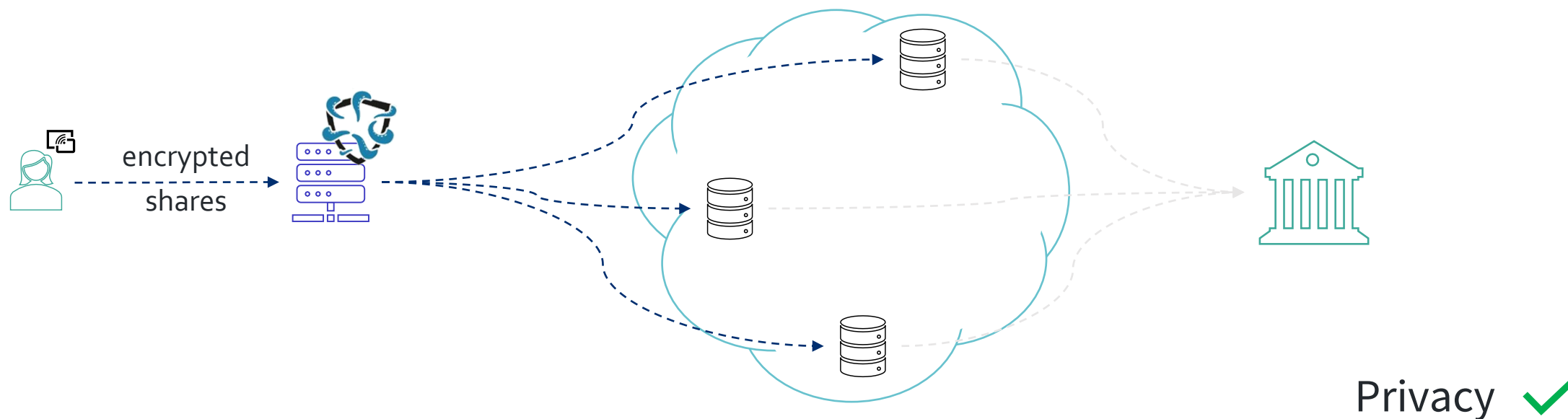


Secure Multi-party Computation

- Protocols for jointly computing on data
- Parties keep their input data private

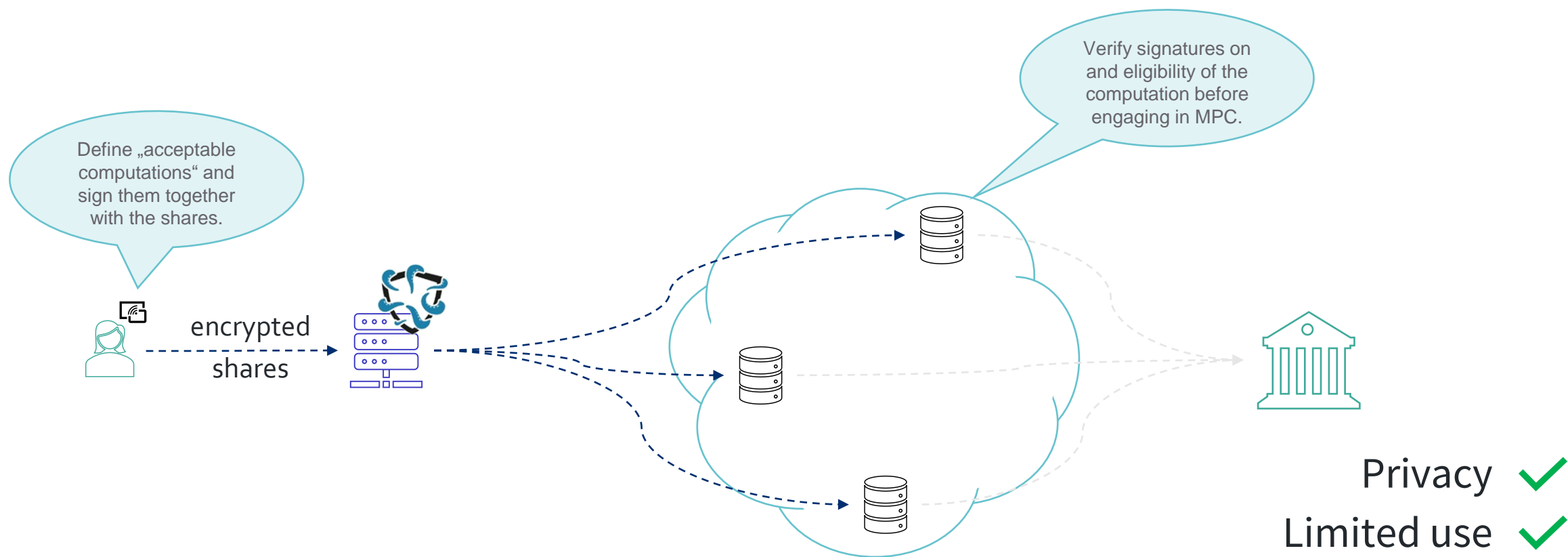


A Marketplace Architecture



But... I want to restrict the computations my data is used for!

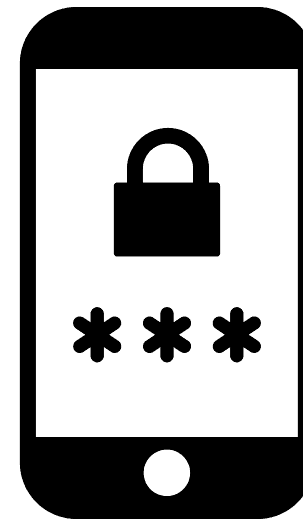
A Marketplace Architecture



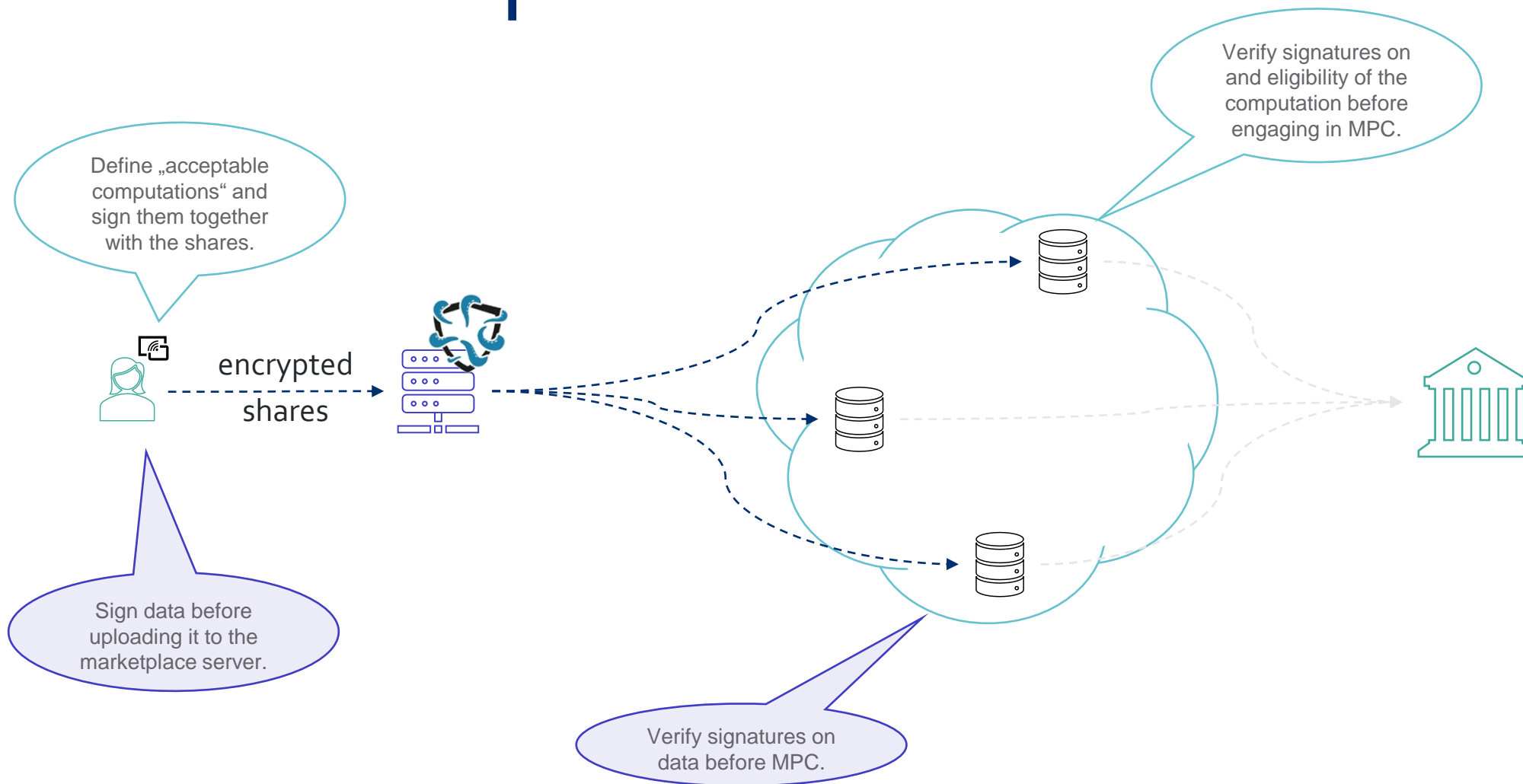
But... are there any authenticity guarantees?

Zero-Knowledge Proofs

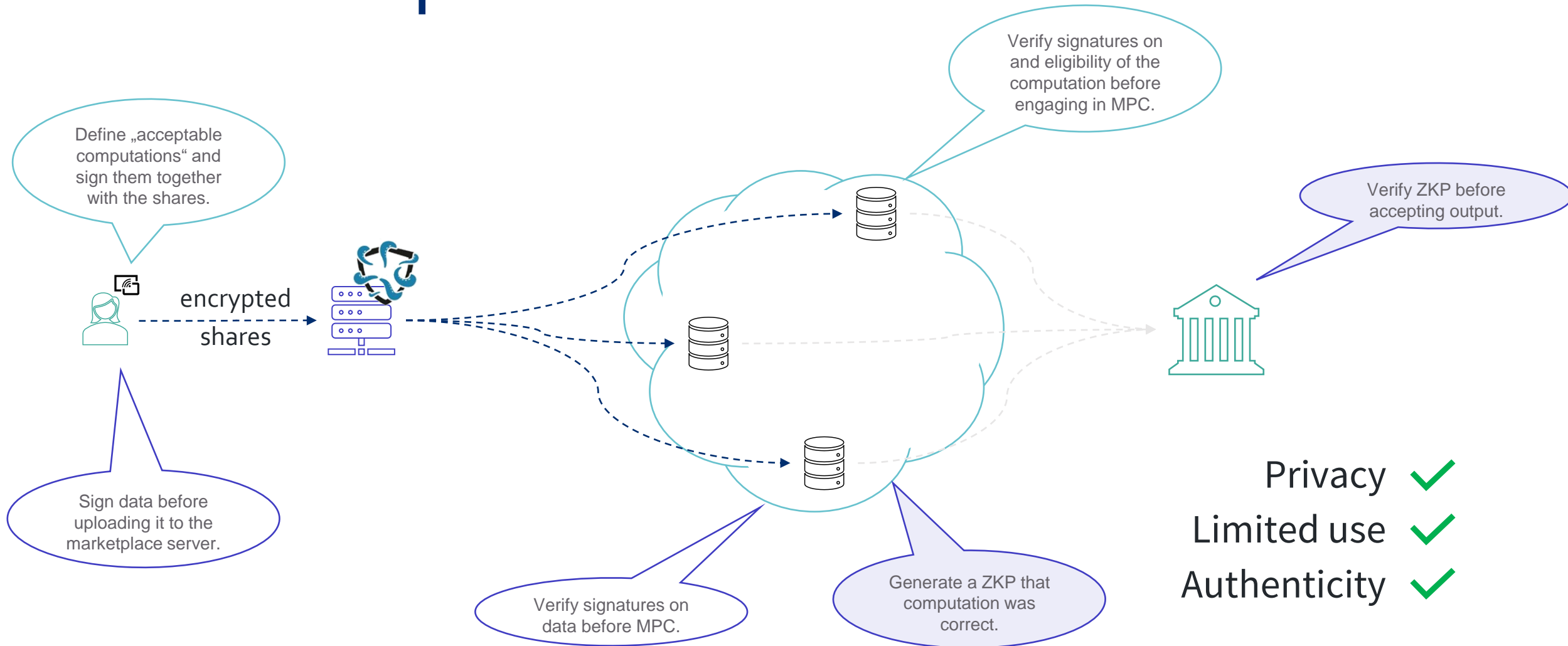
- Allows to prove knowledge of a certain piece of information **without revealing it.**



A Marketplace Architecture



A Marketplace Architecture






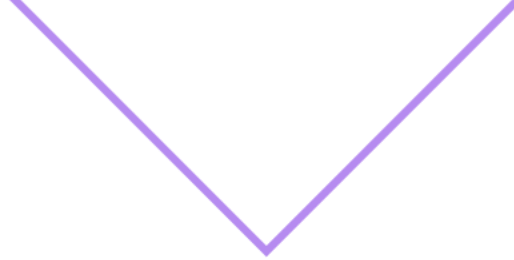

Davide Zaccagnini, MD

Managing Director, Lynkeus

MARKETPLACE PILLAR




The data ecosystem is broken, working only for the big players.




Hospitals, schools, universities control patient data but, under legal and ethical pressure, they realise only a fraction of its value.

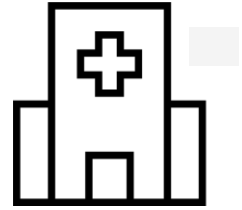
Patients and students legally own data but have no way of controlling them and no incentive to do it.



IT Companies control data flows, effectively regulating data access along with hospitals.



Kraken
de-risks data
monetization
and activates
data-driven
innovation.



Hospitals & Universities

Monetize data without fear of liabilities

Use new data to improve internal efficiency and quality of care

Become drivers of biomedical innovation

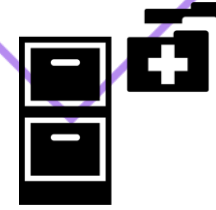


Patients and Students

Passively earn from 3rd party uses of their data

Empowered to use data for causes they care for

Gain greater control over their health data

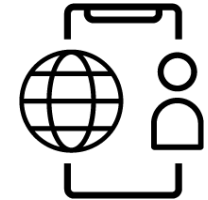


IT companies

Integrate in their products and offer secure & ethical monetisation tools

Share in the value generated by patient data

Automate data access procedures, reducing cost and liabilities



Data users

Access previously unreachable data at lower costs

Set their data strategies directly with data holders and on reliable data pipelines

Accelerate innovation while lowering R&D costs

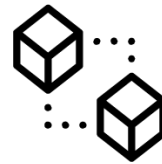
A secure and private data discovery, computation and monetisation platform



Mobile apps collect permissions from patients and institutions to monetise their data.



SMPC allows secure and private analytics on federated datasets for more accurate and robust statistics and AI development.



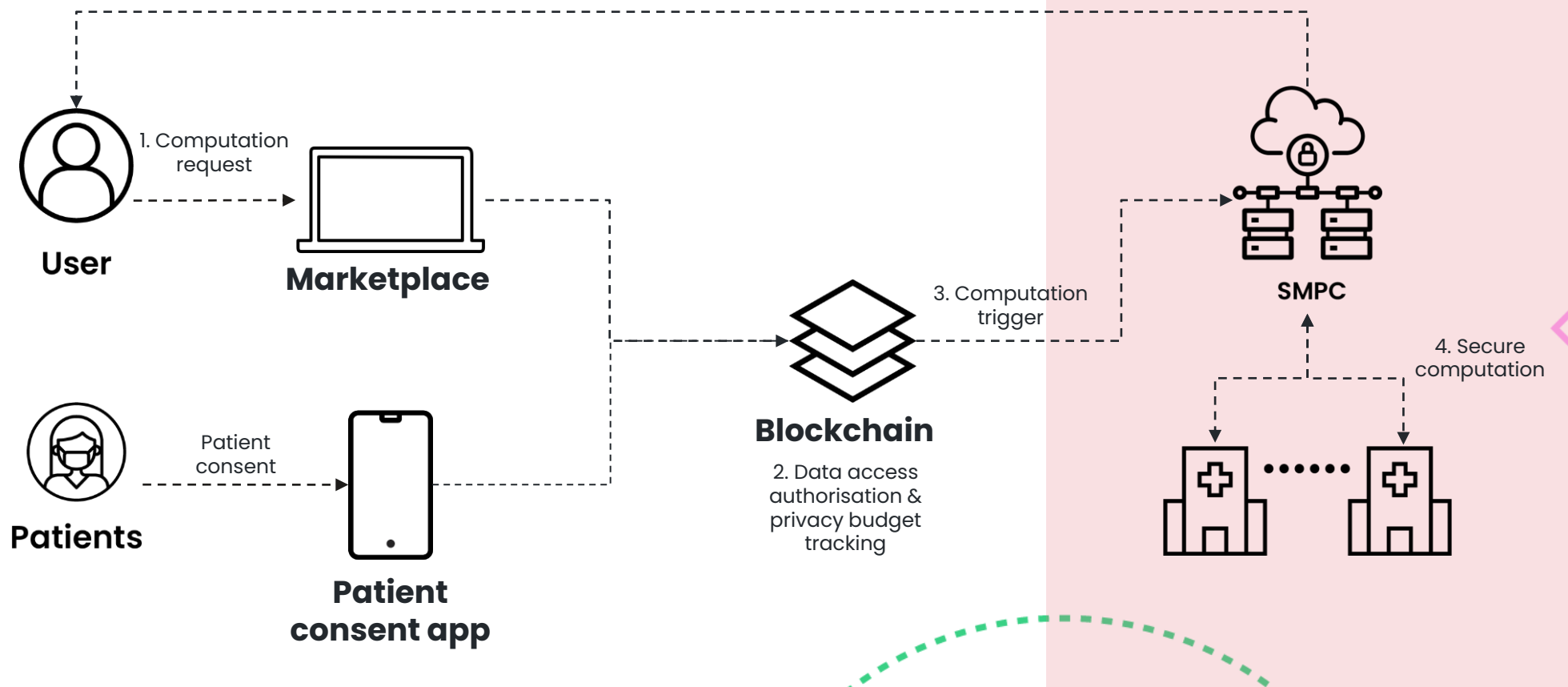
Blockchain enforces data access policies, tracks data provenance, data utilization and privacy risks.



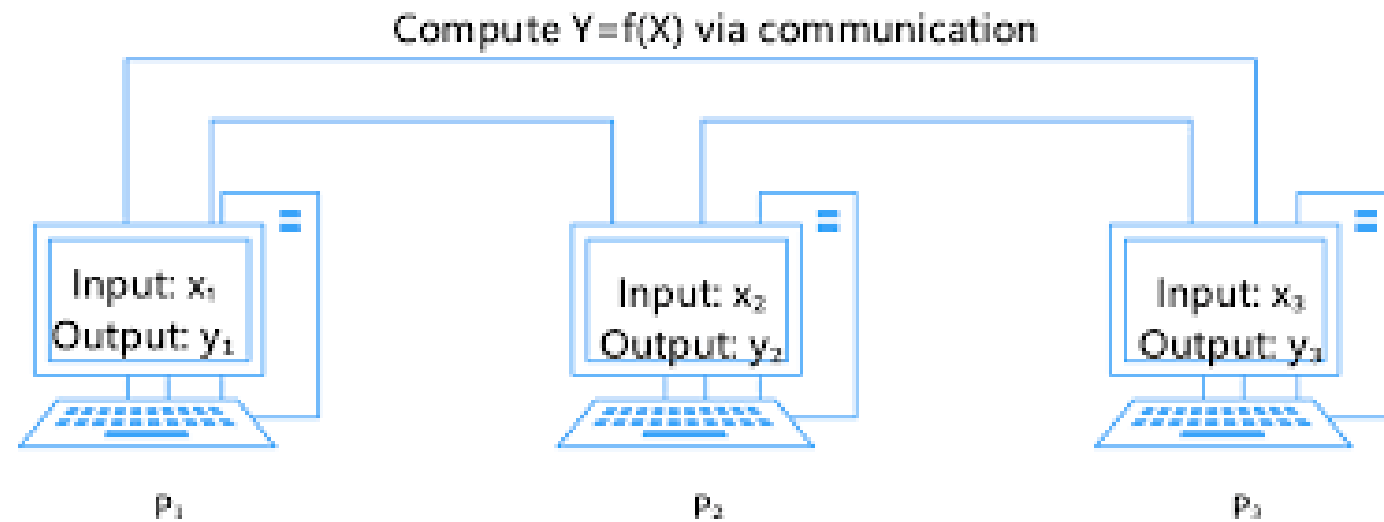
The marketplace enables discovery of valuable data assets and payments to use them.

5. Send results
OR
Data
download

How it works


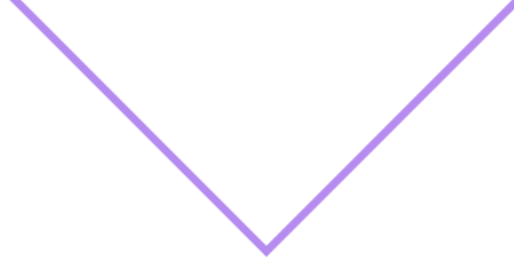




Secure Multi-Party Computation (SMPC)





Blockchain-Based Permissioning

- Stores legally binding data access policies and preferences set by people and organizations under national and international laws.
 - Grants/denies access to data assets based on policies and preferences.
 - Tracks number and types of distributed queries to each SMPC node, by user and processor checking users' "privacy budgets" for full audit trail.
- 
- 
- 
- Tracks data provenance for data quality assurance providing tamper-proof evidence on the origins and history of data, trustworthiness and legal compliance with intended data uses.
 - Orchestrates network events such as analytics and data asset creation.
- 

Publish and trade access to personal data in compliance with the GDPR

Use KRAKEN's data marketplace to discover, secure, protect and monetise data

Select market sector

Education

Health and wellness

Search with keyword(s)

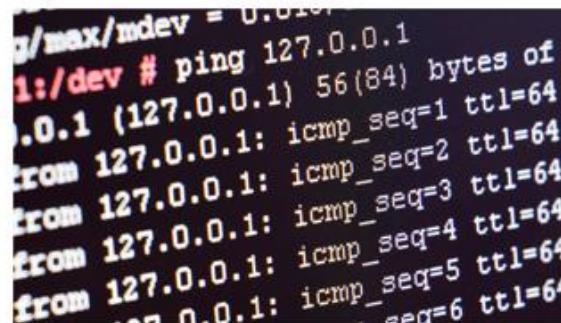


Citizens lifestyle dataset

Citizen's Health app

Data for download

124.00 \$DATA / year



Operating systems course grades

Nicole Tesla

Data for download

243.00 \$DATA / year



Blood glucose levels research database

Health data Inc.

Data for download

Request access



Citizens health data analytics

Citizen's Health app

Privacy preserving analytics

100.00 \$DATA / year



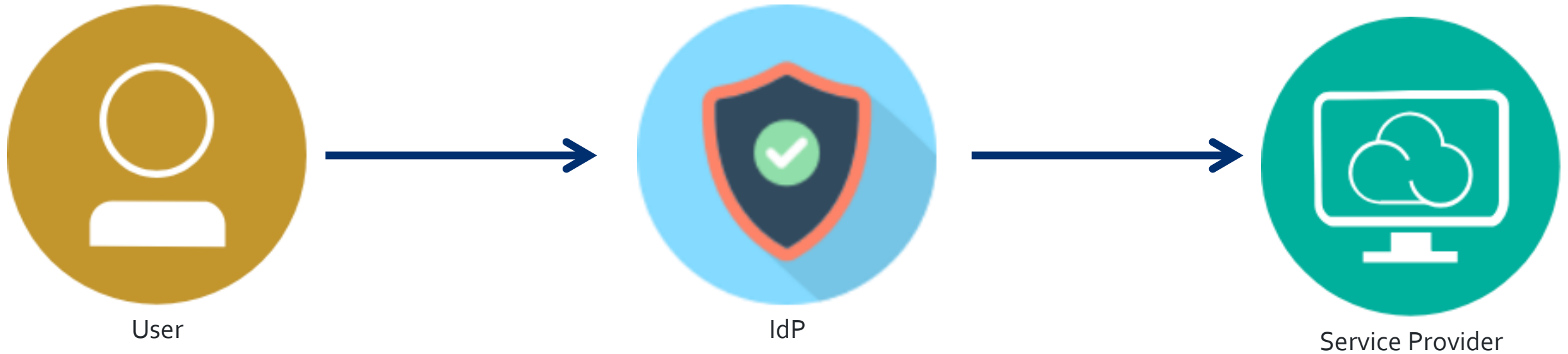
Angel Palomares

Cybersecurity and Data Protection Senior Expert

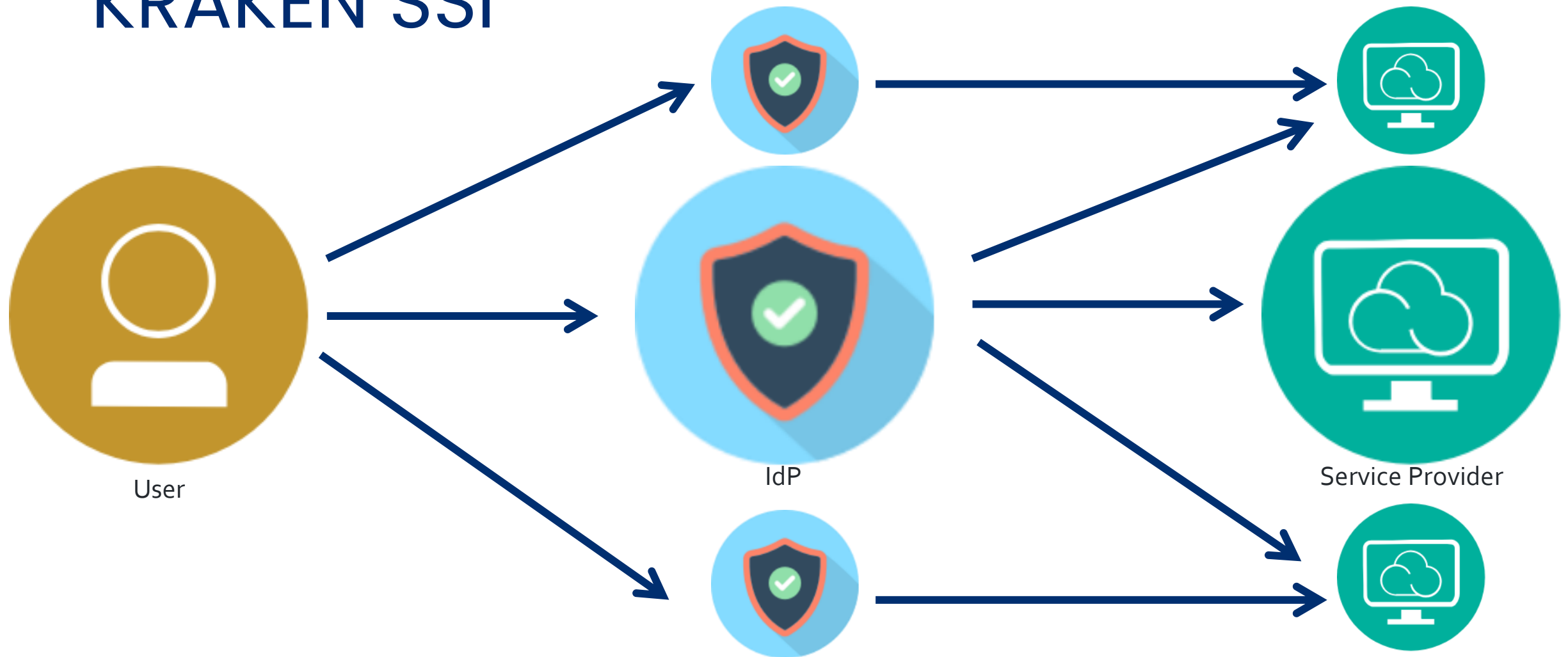
Atos ARI Blockchain, Identity & Privacy UNIT

SELF-SOVEREIGN IDENTITY PILLAR

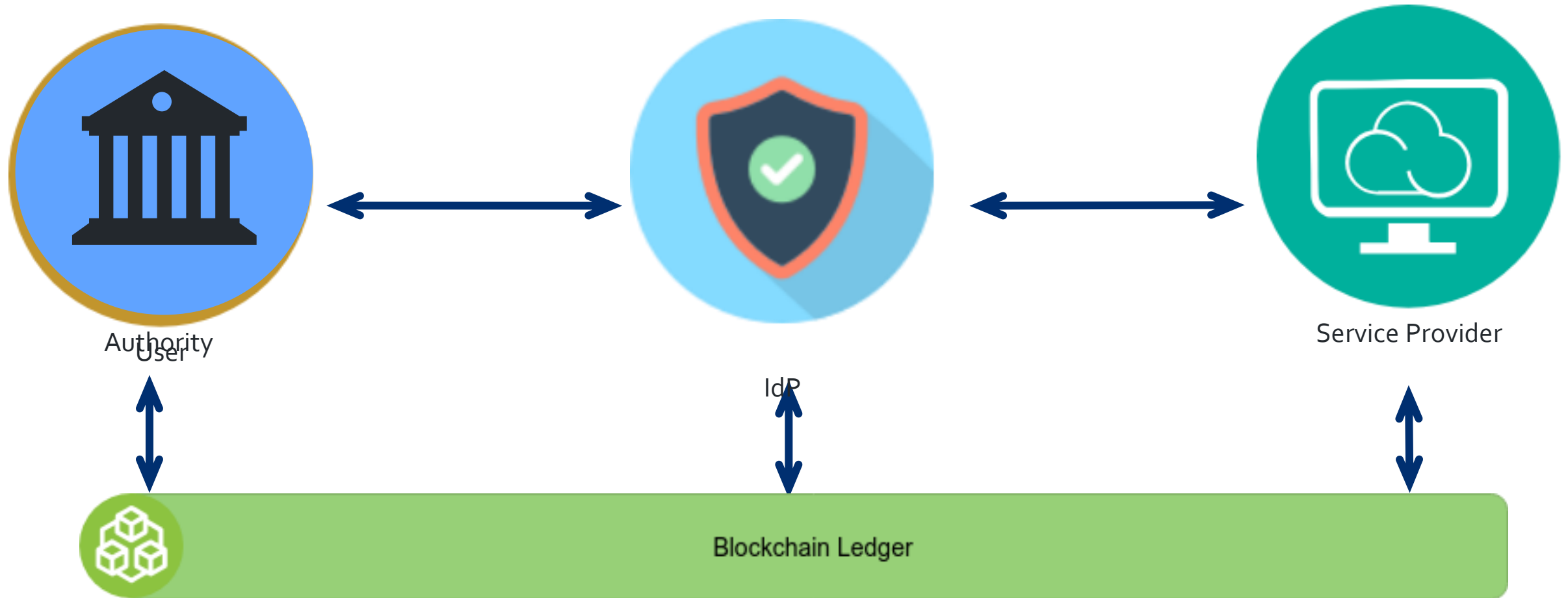
Typical approach



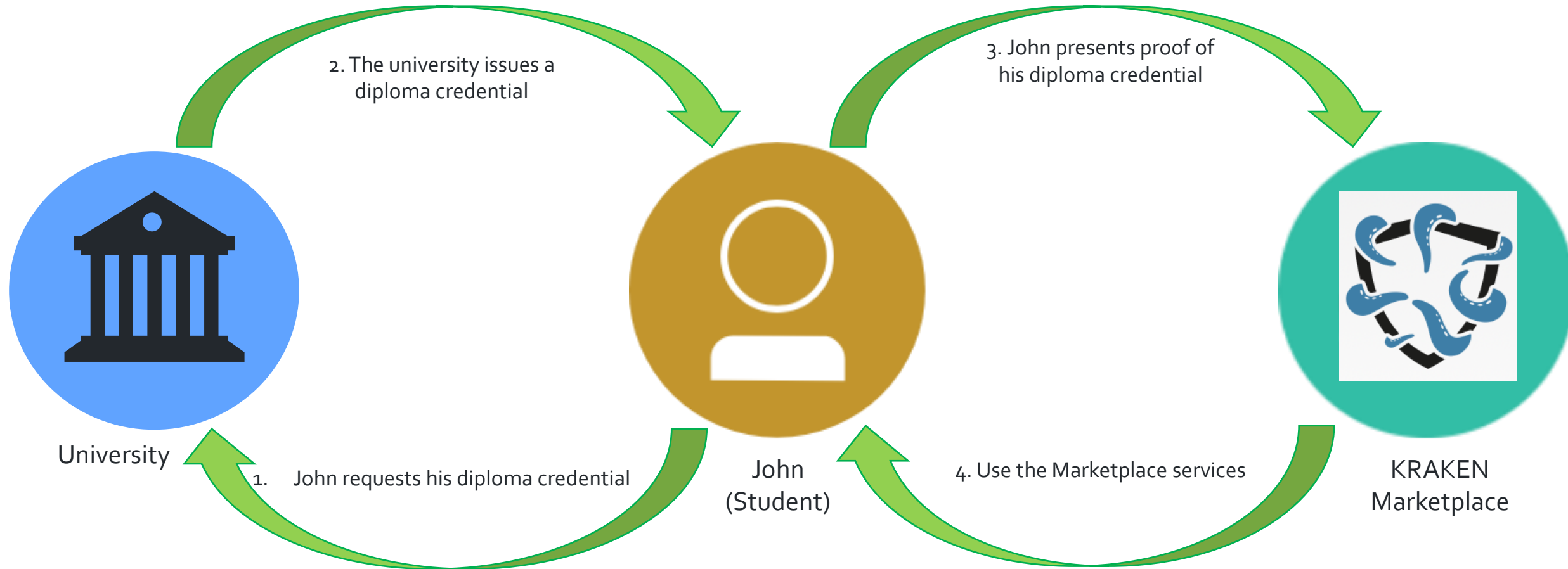
KRAKEN SSI



KRAKEN SSI

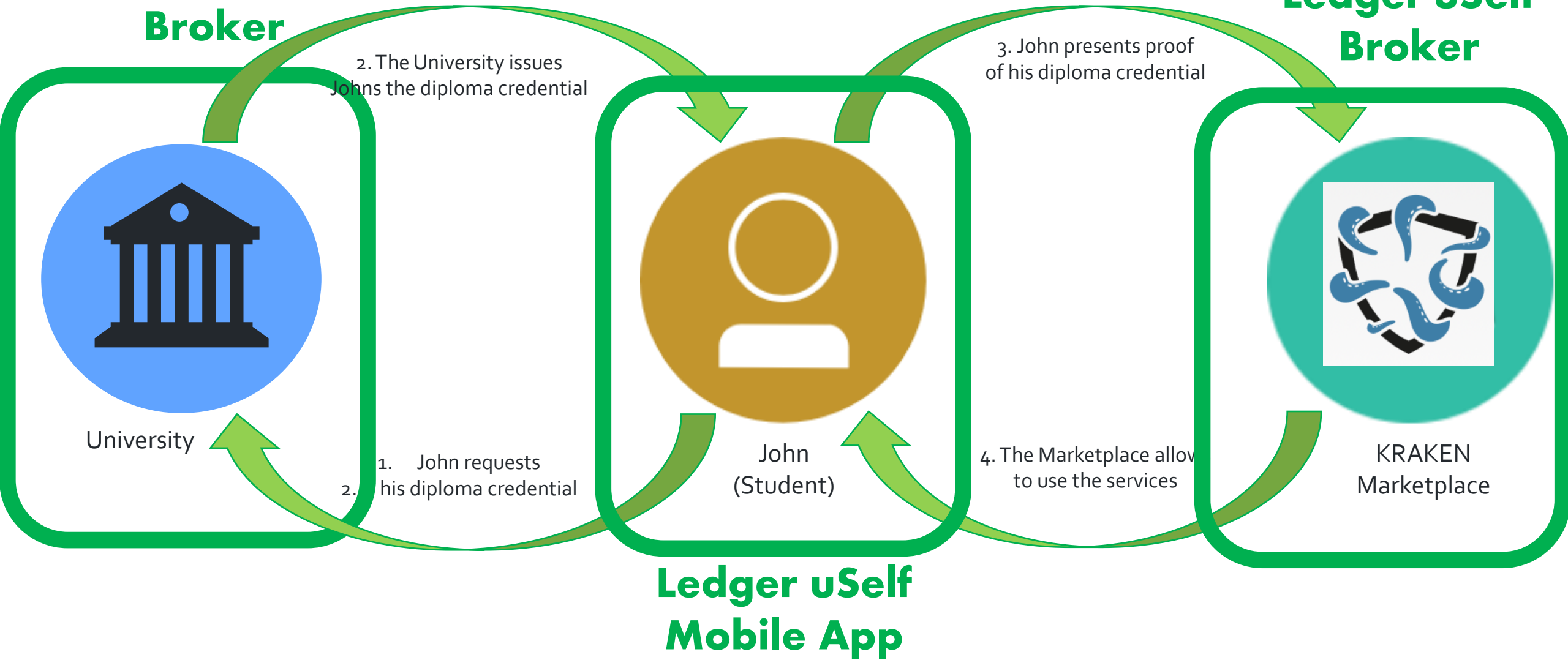


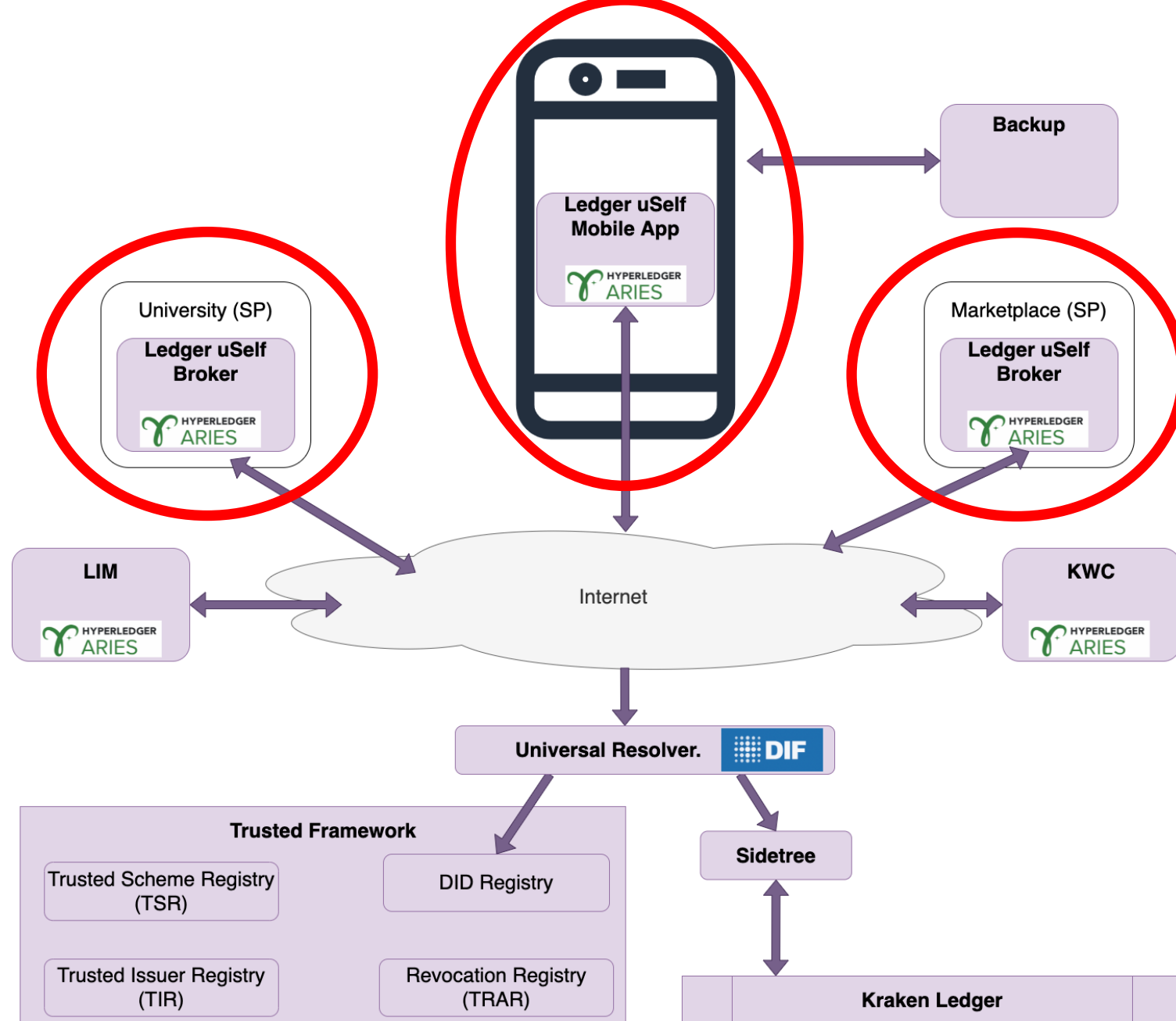
KRAKEN SSI



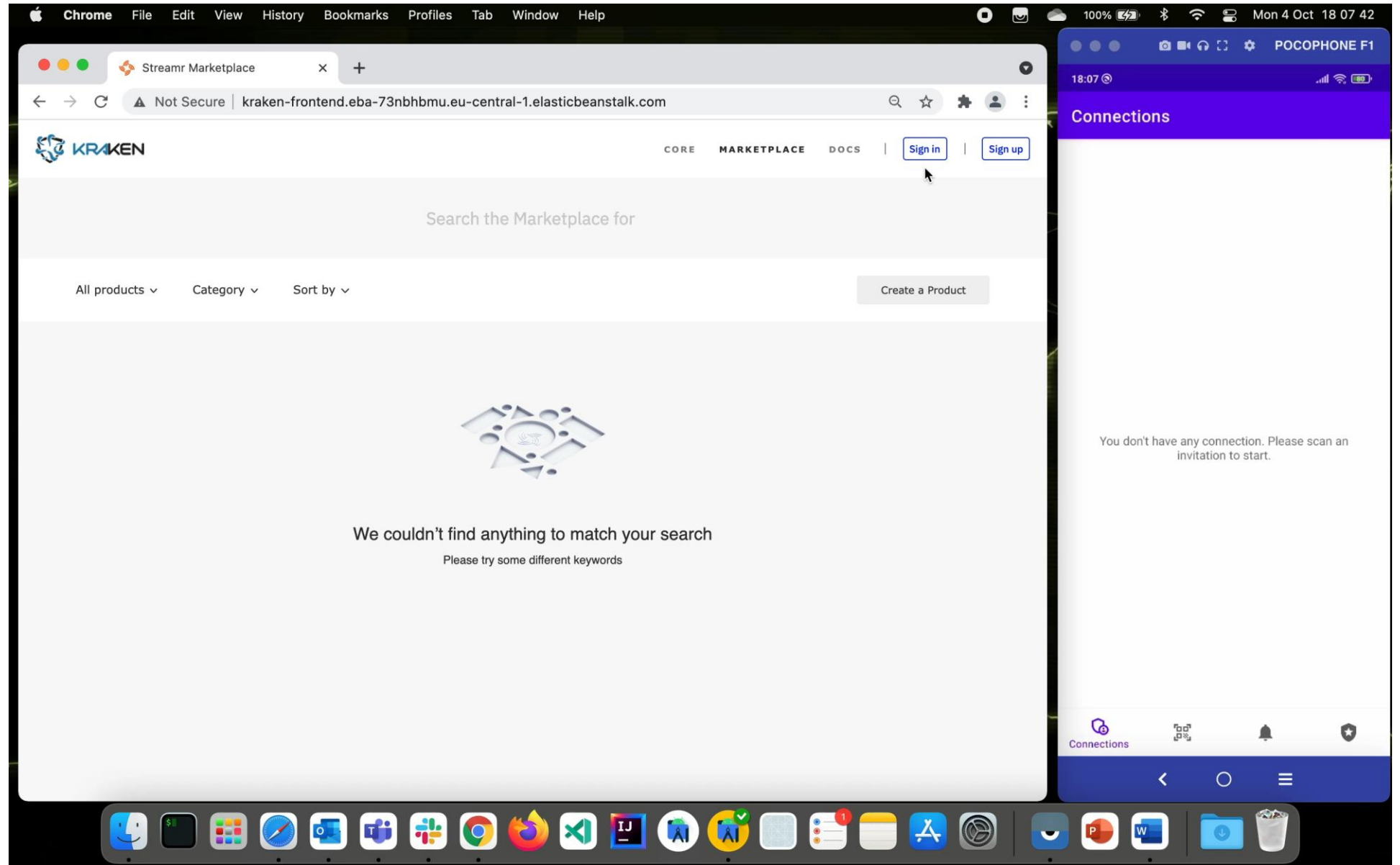
KRAKEN SSI

Ledger uSelf Broker





Demo





Silvia Gabrielli

Senior researcher at Fondazione Bruno Kessler, Italy

Working on the design of Digital Health solutions

KRAKEN EVALUATION RESULTS IN 2021

Evaluation aims & procedure

- Multi-dimensional evaluation of KRAKEN first prototype
 - Usability assessment based on SUS questionnaire
 - Investigation of users expectations, preferences, concerns with the KRAKEN platform affecting future system adoption
- Procedural protocol
 - Participants recruitment: Health pilot eval. (12 users), Edu pilot eval. (3 users)
 - Signed consent forms
 - Users provided with short video tutorials, instructions to access the platform, list of relevant tasks
 - SUS online form completed by participants after using the prototype
 - Participants involved in 3 workshops for Health pilot, 1 workshop for Edu pilot (duration: 1 Hour)

Participants characteristics

- Health pilot:
 - 12 persons (6 men, 6 women)
 - Age group 35-54 (66.7%), 18-34 (16.7), 55-64 (16.7%)
 - 3 researchers, 2 Big Data for Health experts, 2 legal experts, 1 blockchain expert, 2 managers of companies providing digital health solutions, 5 PM of public health solutions
- Education pilot:
 - 3 students (2 women, 1 men)
 - Age group: 18-34
 - Enrolled at the TUGraz, computer science background

Usability results

- Health pilot:
 - Average SUS score (0-100) **51.87** (SD 23.67)
- Edu pilot:
 - Average SUS score (0-100) **55** (SD 10.89)

Grade: **D** Adjective: **OK / Fair** Marginal acceptance

Users expectations, preferences, concerns

Health pilot

- Trust and interest in the KRAKEN platform for sharing data products
 - 58% expressed trust and interest in the platform, in providing or consuming data products
 - 42% had some concerns regarding privacy, security and quality of data sharing.

KRAKEN should guarantee that the personal data shared are *reliable, accurate*

ensure that usage of the data shared is compliant with the goals and privacy settings stated by the data provider

Users expectations, preferences, concerns

Health pilot

- Privacy preserving analytics and secure authentication method
 - 92% of users interested in using privacy preserving analytics, as an *added value* service
 - Better if customizable analytics, based on latest crypto techniques
 - 66% agree to use SSI mobile app to authenticate, or similar methods (e.g., SPID)

Users expectations, preferences, concerns

Health pilot

- Types of data to share and entities to share data with
 - Most users would share anonymized data products, preferably for research purposes
 - Main factors affecting willingness to share data:
 - Purpose of data usage
 - Control over data sharing, possibility of revoking access to data
 - Ethics reasons (e.g., improvement of healthcare treatments, receiving credits for data sharing)

Users expectations, preferences, concerns

Health pilot

- Compensation for sharing data products
 - 41% would be interested to receive monetary compensation
 - 41% would prefer non-monetary forms of compensation (e.g., access to health services)
 - 92% would find difficult to define a price for a data product to share
 - All participants would appreciate a support from the platform to define/check pricing

Users expectations, preferences, concerns

Health pilot

- Concerns with data protection and privacy ensured by KRAKEN
 - 83% have not clear how KRAKEN can ensure protection and privacy of data shared
 - 66% think KRAKEN should try to minimize risks as far as possible
 - 50% would prefer to have more information on privacy by design measures adopted, contextual support when taking key decisions in creating or publishing a data product

Users expectations, preferences, concerns

Education pilot

- Trust and interest in the KRAKEN platform for sharing data products
 - 2/3 would trust and have interest for sharing education data
 - KRAKEN platform needs to be easy to use, to provide good UX
 - Would use the platform when applying for a job, to avoid sending printed documents

Users expectations, preferences, concerns

Education pilot

- Privacy preserving analytics and secure authentication method
 - Most users prefer to read more about the type of privacy preserving analytics offered
 - They agree to use SSI mobile app to authenticate, if made easy-to-use

Users expectations, preferences, concerns

Education pilot

- Types of data to share and entities to share data with
 - Education data: CVs, diplomas (other personal data as well)
 - Happy to share with universities, employers, state agencies/government
 - Not willing to share with private companies, if they have *money-making* purposes

Users expectations, preferences, concerns

Education pilot

- Compensation for sharing data products
 - All participants would prefer non-monetary forms of compensation
 - E.g., free access to educational software licences

Users expectations, preferences, concerns

Education pilot

- Acceptance and concerns with data protection and privacy
 - All participants would not share data with private companies storing data out of Europe
 - Some had concerns on possible change of regulation, discontinuity after project is over
 - Preference for a graduality in system adoption (start by sharing less critical type of data)

Conclusions and next steps

- Many insights collected from participants of both pilots
- Finalization of the platform design by taking into account users' feedback
- Improvement of KRAKEN usability to achieve SUS score 68 or above
- Plan and carry out a second evaluation round involving at least 35 users in 2022
- Deploy the platform with interested stakeholders in the piloting domains
- TWITTER; LinKEDIN info@krakenh2020.eu

QUESTIONS

Challenges and opportunities

USERS and STAKEHOLDERS engagement

Please, participate in our quick survey

Go to www.menti.com and use the following code 8683 5677

Interested in KRAKEN?

 <https://www.linkedin.com/company/kraken-h2020>

 <https://twitter.com/KrakenH2020>

 info@krakenh2020.eu

 <https://www.krakenh2020.eu/>

Thank you!

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