Blockchain NG

Using cryptography to improve usability of the blockchain

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Overview

- **Introduction**
  - Who is C4DT
  - DEDIS and Blockchains
  - OmniLedger
- Use-case presentation
  - Secret key recovery
  - Auditing blockchains
- Hands-on training

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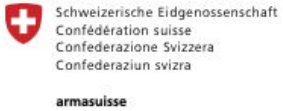
Partners 2019



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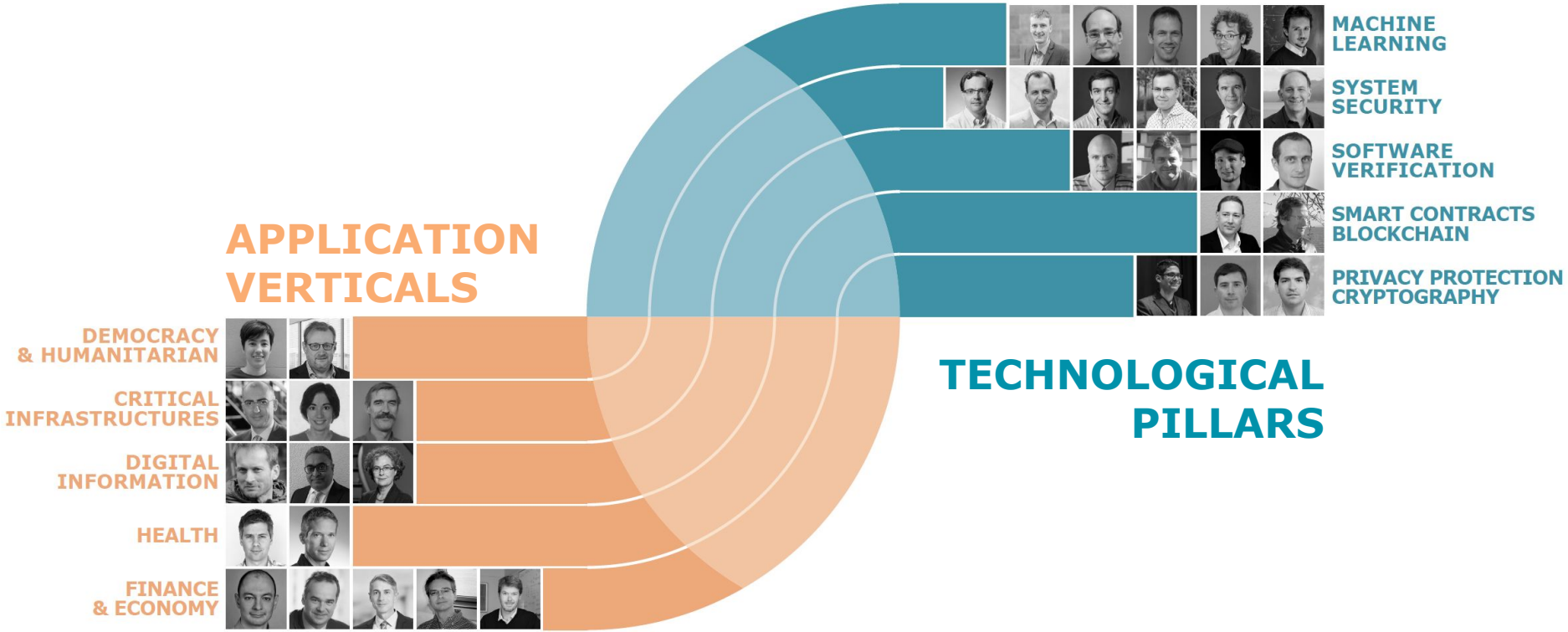
More than 30 laboratories involved



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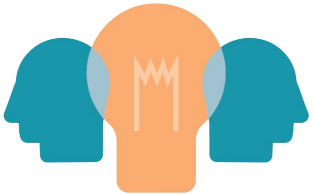
C4DT structure - 4 domains

FACTORY

Software

Sandbox

Support

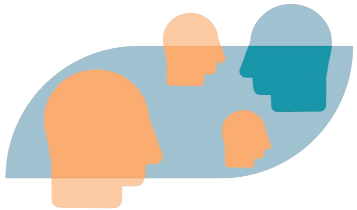


ACADEMY

Interface

Education

Experts



EMBASSY

Community

Events

Workgroups

AGENCY

Projects

Interface

Coordination

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FACTORY - Overview

DEDICATED TEAM OF DEVELOPERS

- EPFL Labs - research
- Factory - refinement
- Partners - integration

DEMONSTRA-TORS

- Easy Access to Components
- Training on chosen technology

SOFTWARE REPOSITORY

- Privacy Protection
- Decentralized Systems
- Software Verification
- Machine Learning

DEVELOPMENT SUPPORT

- Best practices
- Regular meetings
- Training
- List of requirements

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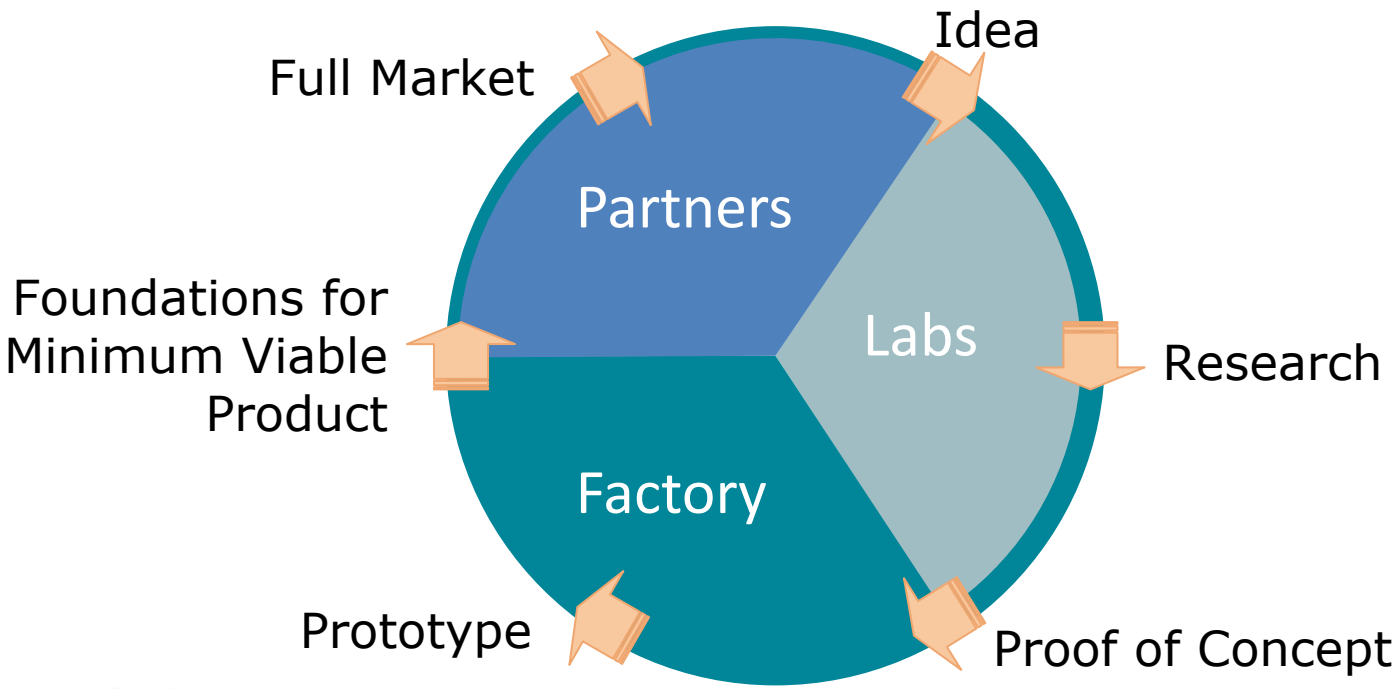
FACTORY - Software Lifecycle



Trainings

Factory hands-on training

- Short - half a day
- On one library from Factory
- Tech-transfer
- Proof-of-concept searcher

Academy training

- One-week courses
- Modular approach: full or module
- Flagship course: Foundations of ICT for Decision Makers
  - Fundamentals of ICT
  - Data protection and privacy
  - Cybersecurity and Digital Trust
  - Towards artificial intelligence
- Coming soon:
  - Advanced courses (building on foundation course modules)
  - Senior Executive trainings

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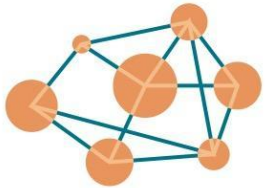
DEDIS and Blockchains

Prof. Bryan Ford works on scalable, decentralized, self-organizing systems. Publications in top-tier conferences on cryptography and security



Blockchains are part of these systems

Other systems include evoting, eID, cryptography

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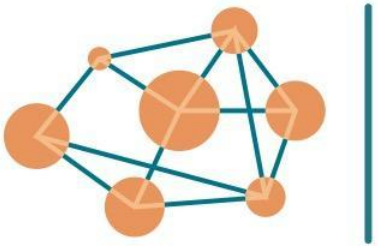
OmniLedger



OMNILEDGER

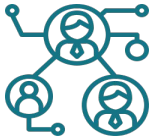
Use next generation blockchains to build trust between partners

OmniLedger: Fast by using latest research in scalable blockchain technology

Calypso: Data hiding with advanced access control mechanisms

Proof of Personhood: Improve trust through highly decentralized infrastructure

Versatility by running code from other blockchains



Tested and integrated in various prototypes with industrial partners

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- **Use-case presentation**
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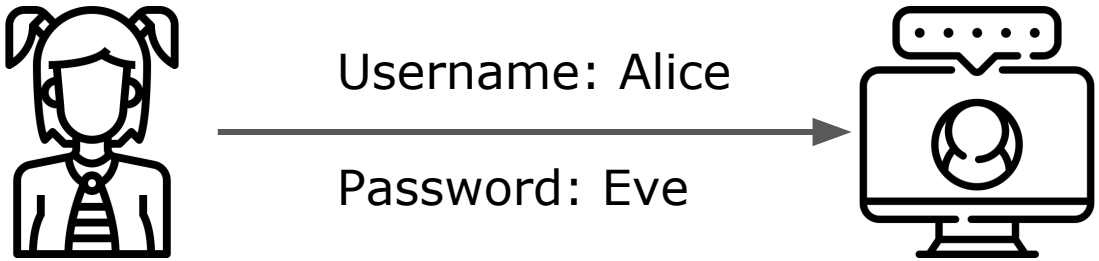
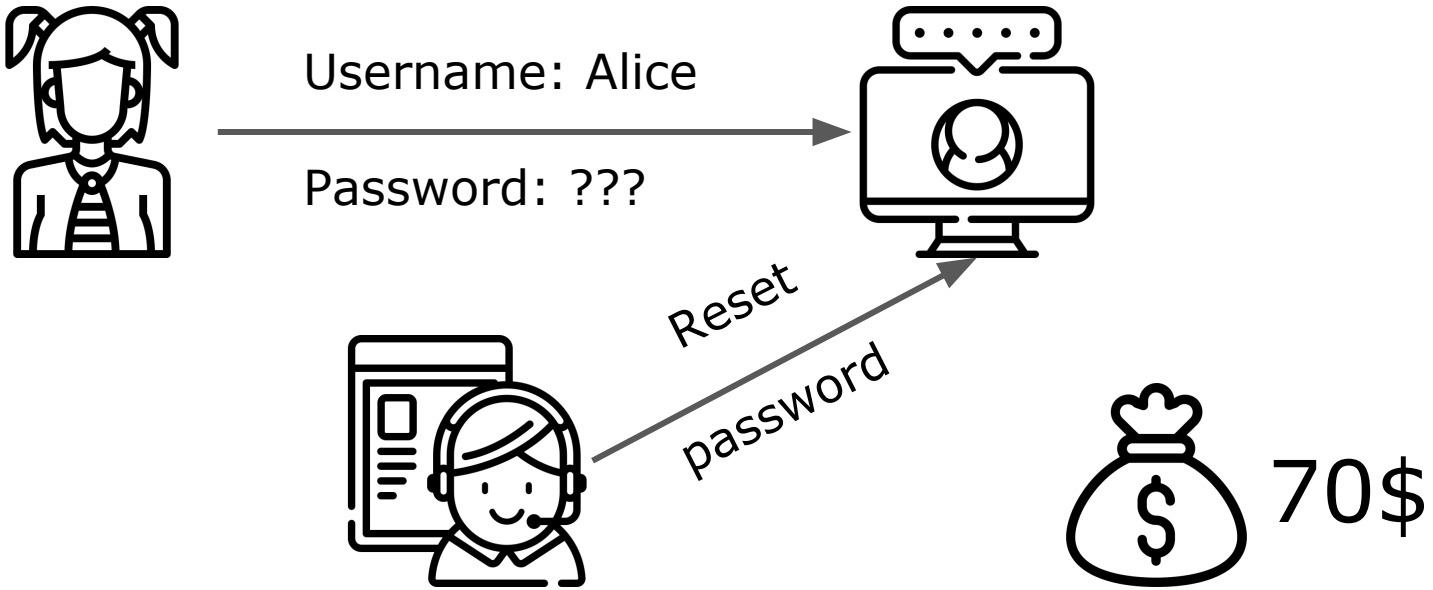
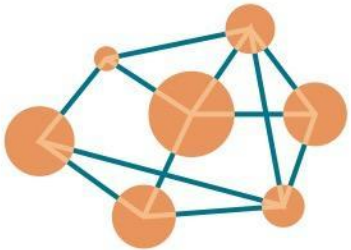
Secret Key Recovery - Password



Secret Key Recovery - Password



Secret Key Recovery - Blockchain



Blockchains process transactions

Transactions are protected by a secret key

No central administration

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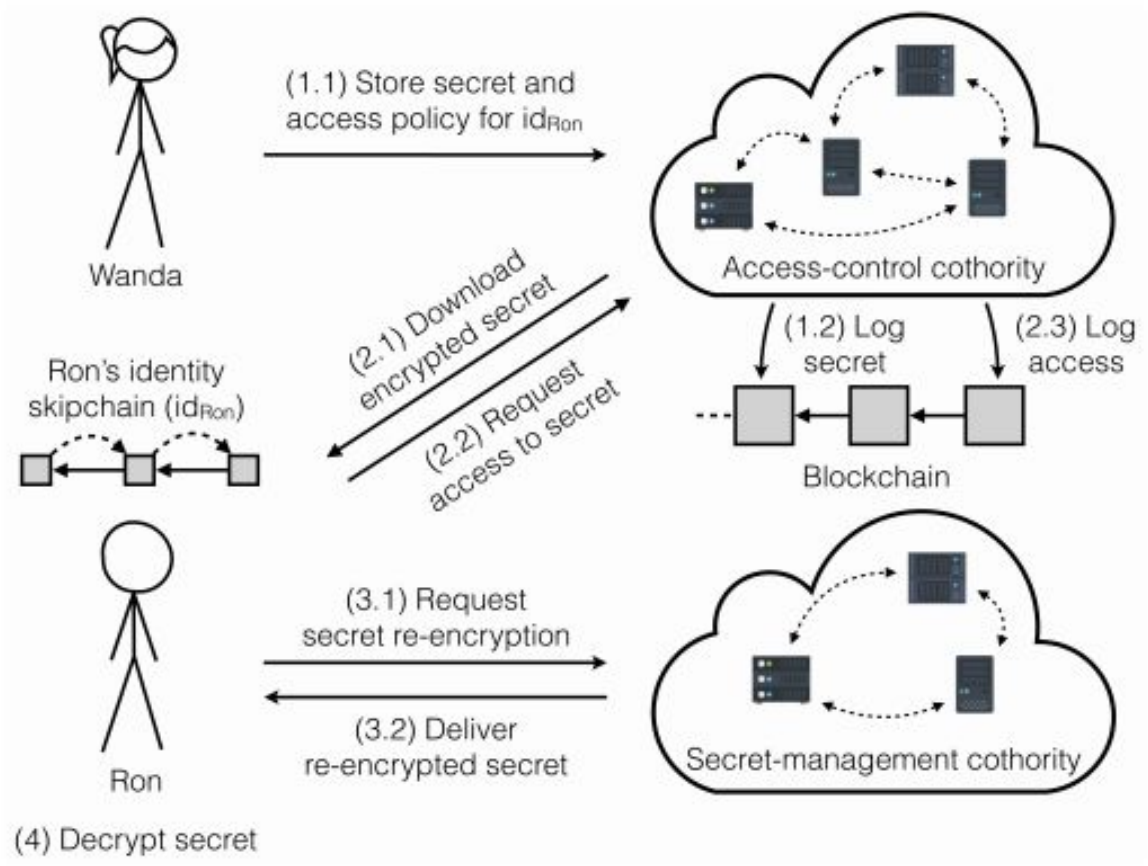
Calypso

[2018/209 - Verifiable Management of Private Data under Byzantine Failures]



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Use Cases

During the hands-on exercises, we'll look into the following use-cases:

1. Password manager using Calypso
2. Replacing secret keys with delegation
3. Auditing encrypted certificates

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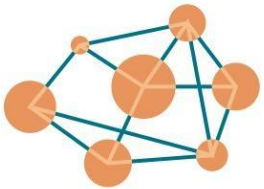
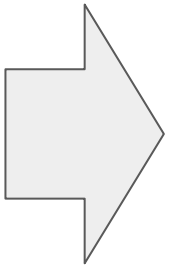
1 - ‘Password’ Manager

Store key encrypted on blockchain



Only the block-chain can decrypt the key



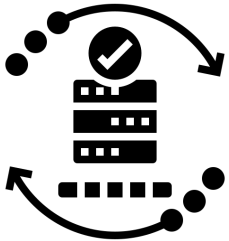
Delegate access to the key

Decryption can be audited

2 - Delegation of Access

Replace the key with a *Delegation*

Full audit of updates and usage



Access can be updated over time

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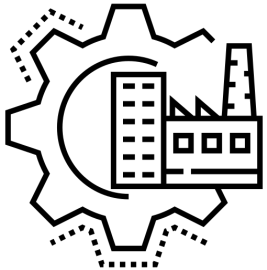
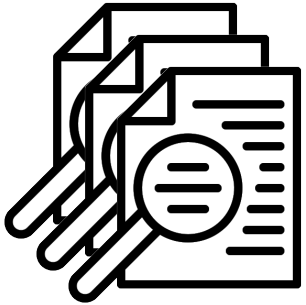
3 - Auditing Encrypted Certificates

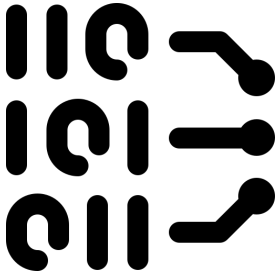


Given product info from Pharma

Attach delegation for audits



Different auditors for different batches



Multi-signatures
Time-based
Location-based

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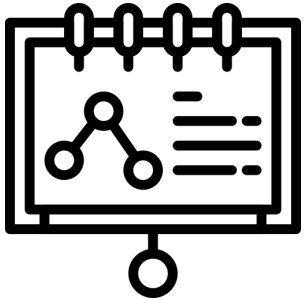
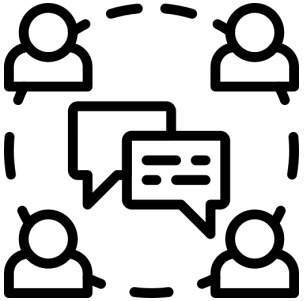
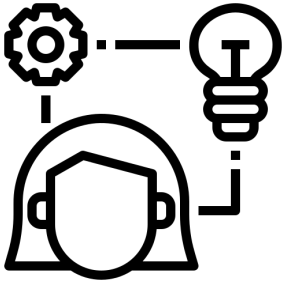
Hands-on training



Explain how it works behind the scenes



Discuss how to integrate in existing systems



Hands-on exercise on topic

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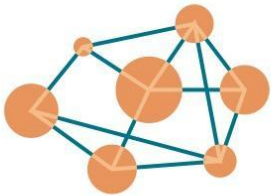

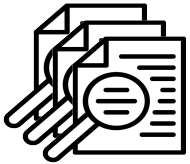

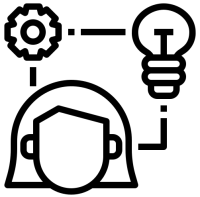

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