

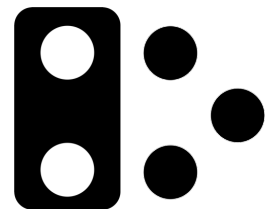
Blockchain for a Circular Digital Built Environment

DiCE Lab Seminar – Digitalisation for a Circular Built Environment – 21 September 2023 @TU Delft

Dr. Jens Hunhevicz
Urban Energy Systems Lab @ EMPA
Circular Engineering for Architecture @ ETH Zurich

cea
Circular Engineering
for Architecture

 **Empa**
Materials Science and Technology



Jens Hunhevicz

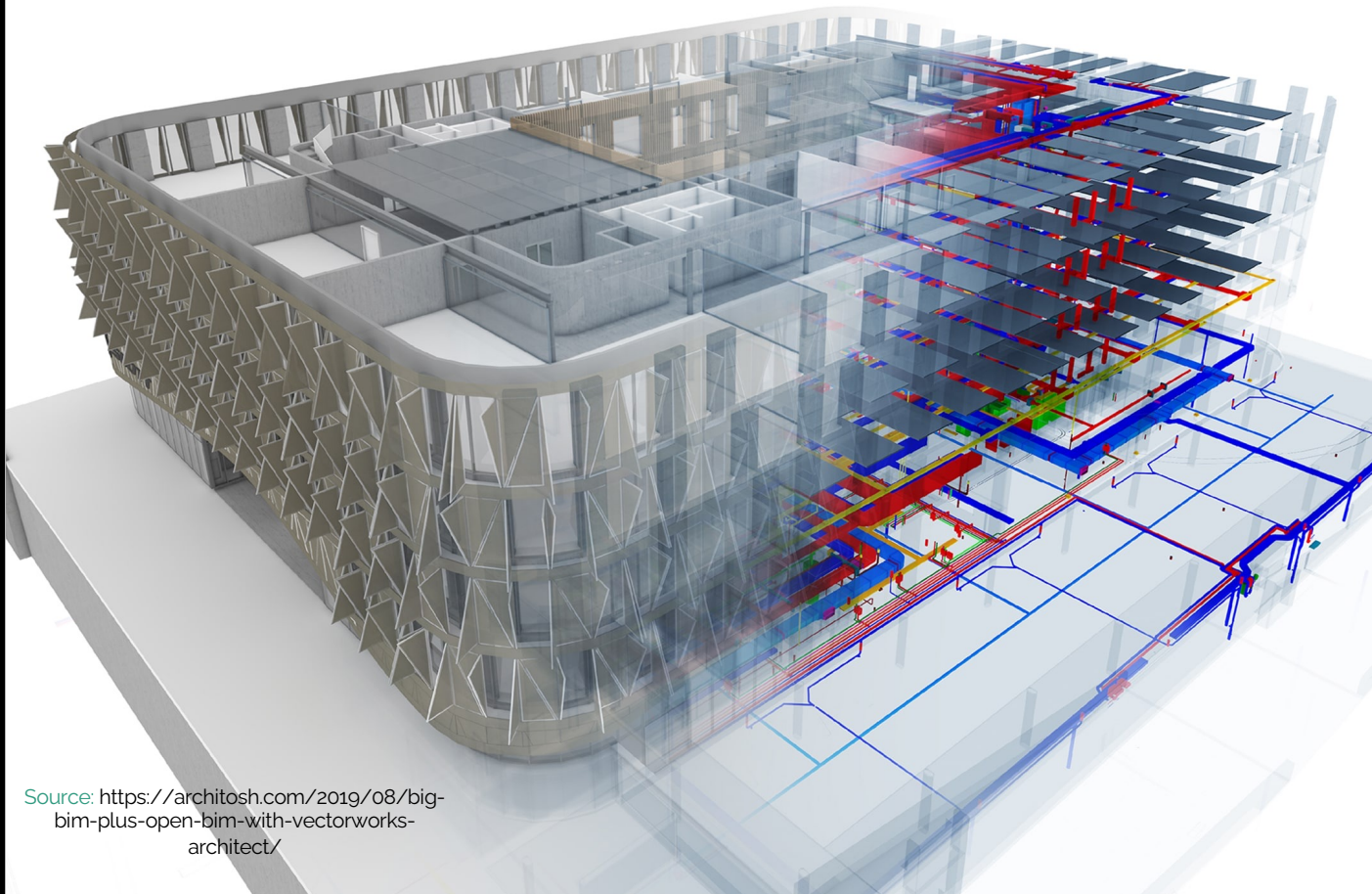
Currently Postdoc at EMPA UES Lab and ETH cea Lab

ETH, 2022 Doctorate on blockchain in construction under the supervision of Daniel Hall

ETH, 2017 MSc in Civil Engineering (Construction Management and Geotechnical Engineering)



Blockchain for a Circular Digital Built Environment Motivation



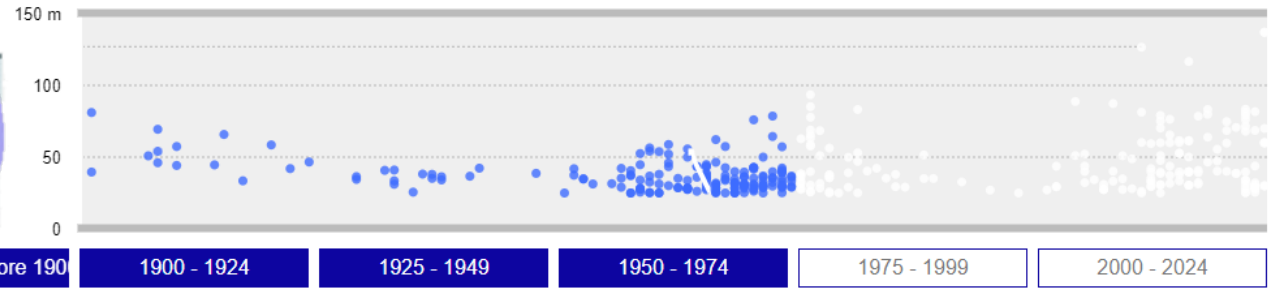
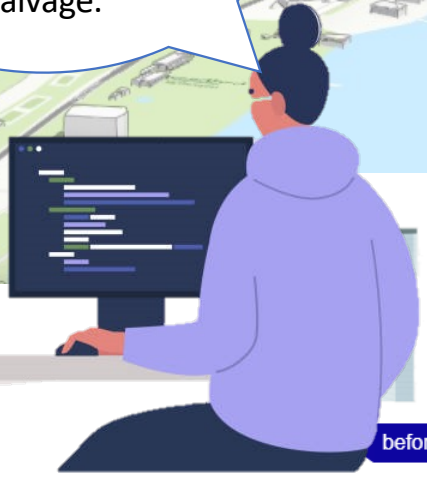
Source: <https://architosh.com/2019/08/big-bim-plus-open-bim-with-vectorworks-architect/>

More and more data is being generated that can be useful in the transition to a circular economy.



Can we get 30 tons of structural steel from end-of-life structures for a project commencing in 2024?

Yes! Here are few buildings nearing their end-of-life which has the materials you could salvage.



Circularity of Built Assets and Products
=!
Circularity of their Data

Blockchain for a Circular Digital Built Environment

Blockchain and Its Connection to Circular Economy

Time Stamping, Storage, Access

Data must be available and trusted.

Incentives, Decentralized
Marketplaces, Machine Agents

Data must be made available,
maintained, and updated.

Categories based on: Hunhevicz, Jens, Catherine de Wolf (2023 Forthcoming). "Blockchain for a Circular Digital Built Environment.

Blockchain for a Circular Digital Built Environment

Track and Trace (Time Stamping + Storage)

usBIM.blockchain

File registrato e verificato! Puoi scaricare il certificato in formato pdf e l'attestazione definitiva. Quest'ultima può servire per verificare la registrazione sulla blockchain usando strumenti di terze parti.

File
CC_ARC_IFC_FacilityManagement.ifc

Nome e cognome
Mario Rossi

Email
mario.rossi@acca.it

Impronta del file (SHA256)
3CF5F2C03D503B72468DF7882A0C3090932A62951D2CC4E211672A32A30FECF6

Marca temporale
Wednesday, 28 October 2020, 23:57:53

Blocco blockchain (Height)
654598

CERTIFICATO ATTESTAZIONE

ACCA SOFTWARE

ATTESTATO DI REGISTRAZIONE

usBIM.blockchain

bitcoin

File information

File name: CC_ARC_IFC_FacilityManagement.ifc
Name: Mario Rossi
e-mail: mario.rossi@acca.it
Hash file: 3CF5F2C03D503B72468DF7882A0C3090932A62951D2CC4E211672A32A30FECF6

Transaction information

Blockchain type: bitcoin
Certified hash: 3CF5F2C03D503B72468DF7882A0C3090932A62951D2CC4E211672A32A30FECF6
Block height: 654598
Timestamp: Wednesday, 28 October 2020, 05:17:34

Ensure transparency and certify model data | usBIM.blockchain

THE CONVERSATION
Academic rigour, journalistic flair

How blockchain is strengthening tuna traceability to combat illegal fishing

Published: January 21, 2018 8.15pm CET

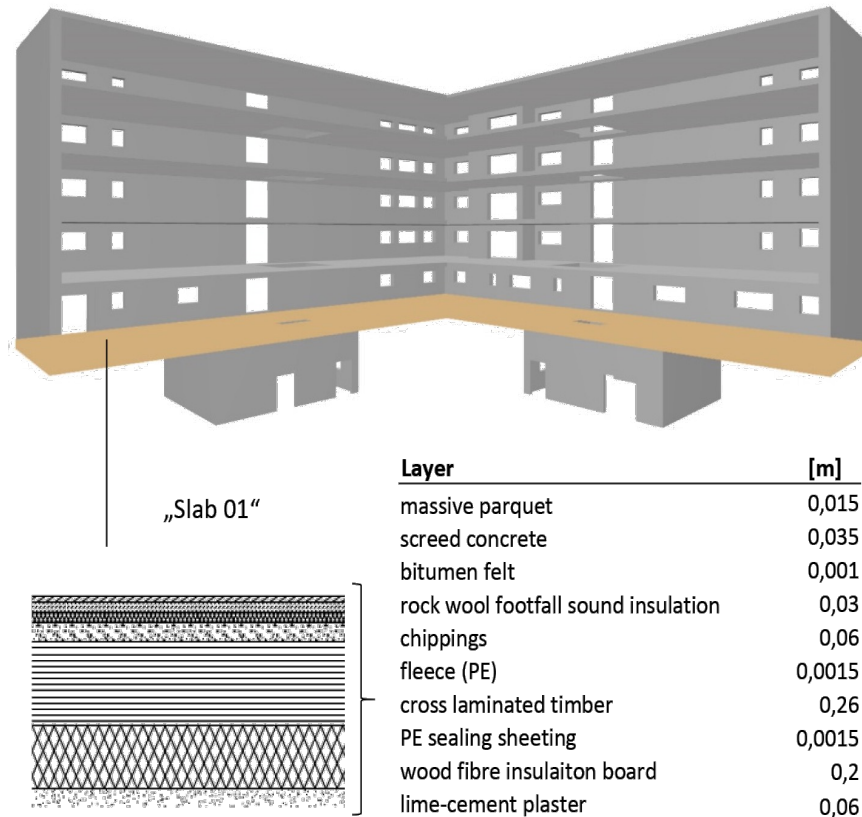
For the global tuna industry, which has historically struggled with illegal and environmentally dubious fishing practices, the use of blockchain could be a turning point. WWF

Email 1k
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In a significant development for global fisheries, blockchain technology is now being used to improve tuna traceability to help stop illegal and unsustainable fishing practices in the Pacific Islands tuna industry.

The World Wildlife Fund (WWF) in Australia, Fiji and New Zealand, in

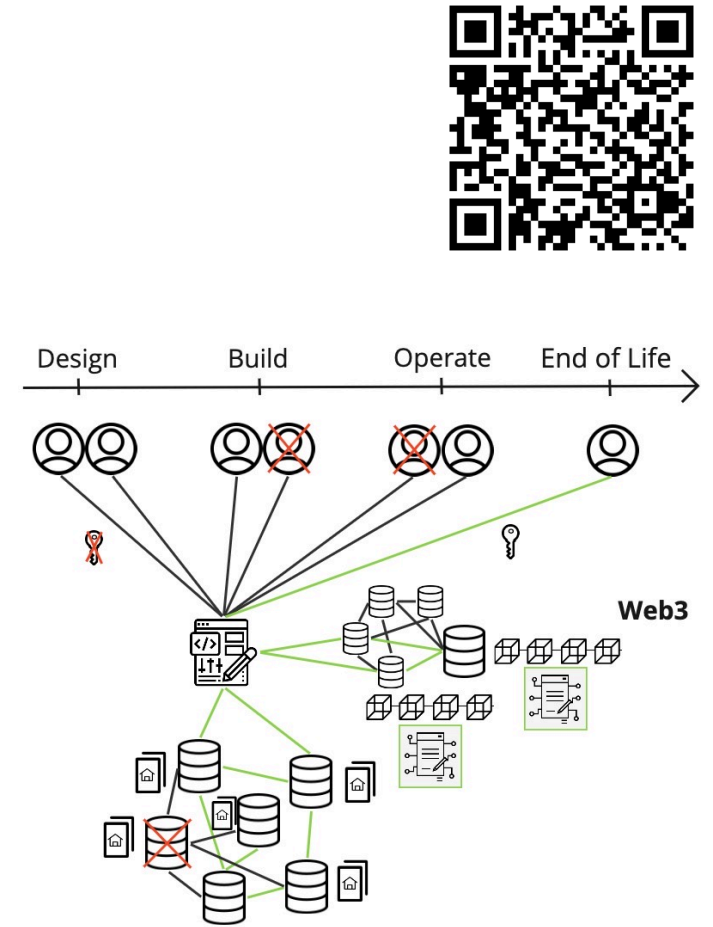
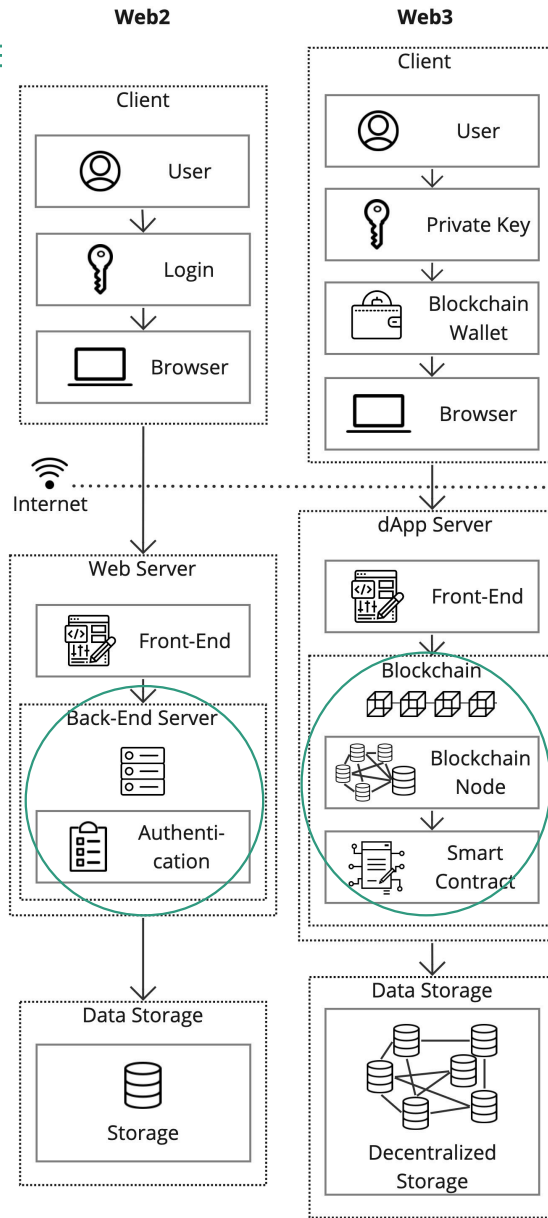
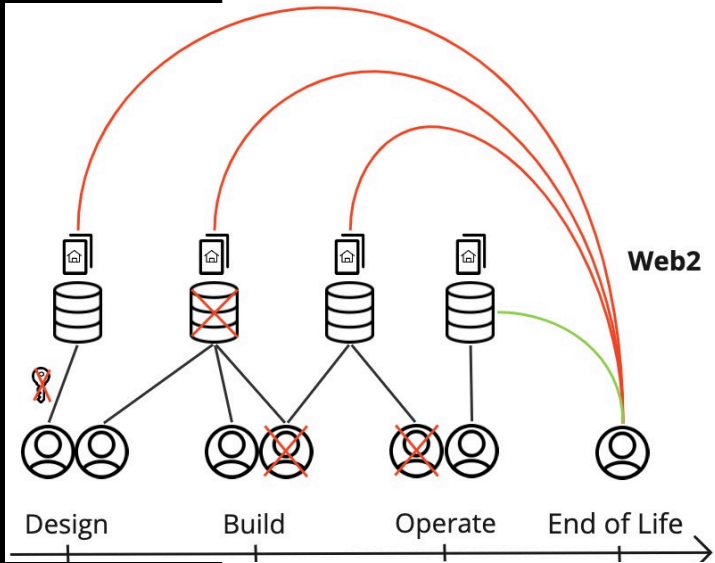
Blockchain for a Circular Digital Built Environment Track and Trace for Material Passports

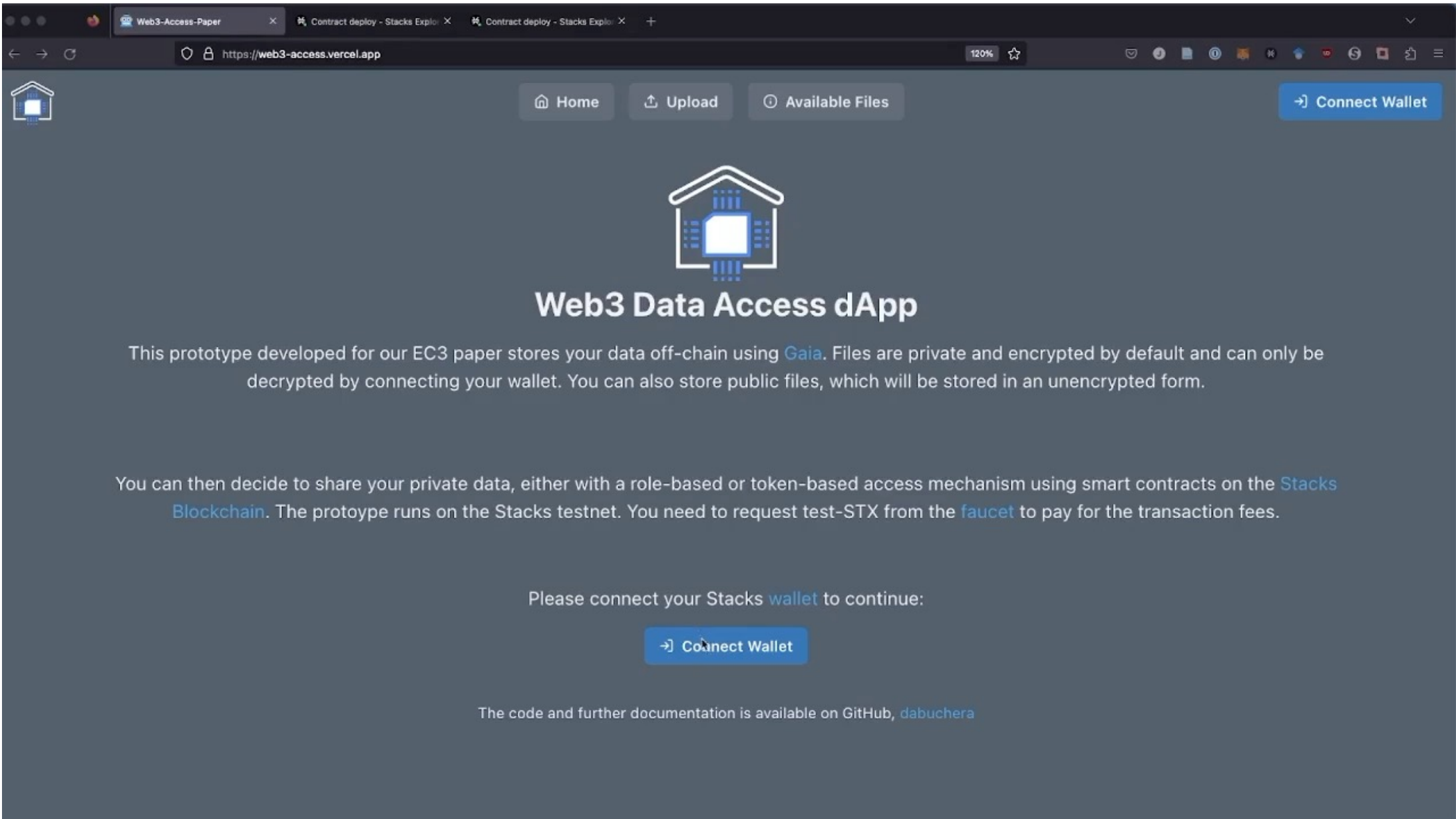


Track and Trace of data of can make data trustworthy to supply chain stakeholders over long time periods.

Source: Meliha Honic

Blockchain for a Circular Digital Built E Access





Web3 Data Access dApp

This prototype developed for our EC3 paper stores your data off-chain using [Gaia](#). Files are private and encrypted by default and can only be decrypted by connecting your wallet. You can also store public files, which will be stored in an unencrypted form.

You can then decide to share your private data, either with a role-based or token-based access mechanism using smart contracts on the [Stacks Blockchain](#). The prototype runs on the Stacks testnet. You need to request test-STX from the [faucet](#) to pay for the transaction fees.

Please connect your Stacks [wallet](#) to continue:

Connect Wallet

The code and further documentation is available on GitHub, [dabuchera](#)

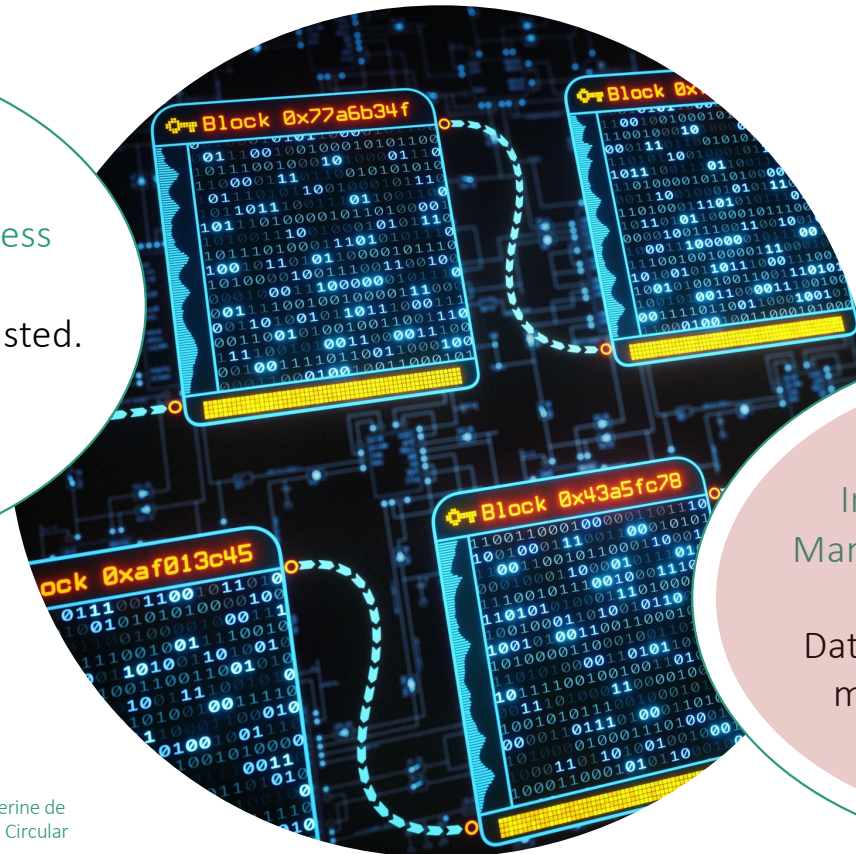
Blockchain for a Circular Digital Built Environment

Blockchain and Its Connection to Circular Economy



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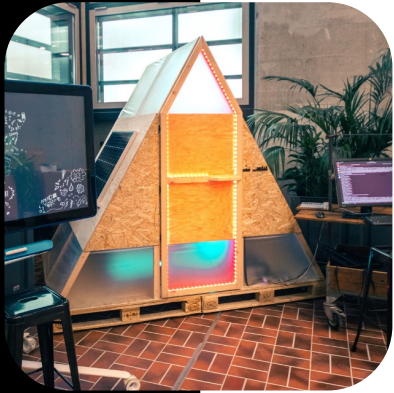


Incentives, Decentralized
Marketplaces, Machine Agents

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Blockchain for a Circular Digital Built Environment
Incentives, Marketplaces, Machine Agents



Data control by the infrastructure.



Performance incentives for circularity.



Marketplaces to exchange and maintain building data.



So, why do we think it is worth researching on blockchain for a circular built environment?

At the very least, it can be an enabler for **more trusted and accessible data** throughout the building lifecycle, as well as **novel digital circular business models** through crypto economic incentives.

Let's keep in touch!

Jens Hunhevicz

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L: <https://linkedin.com/in/jenshunhevicz/>

Questions?

