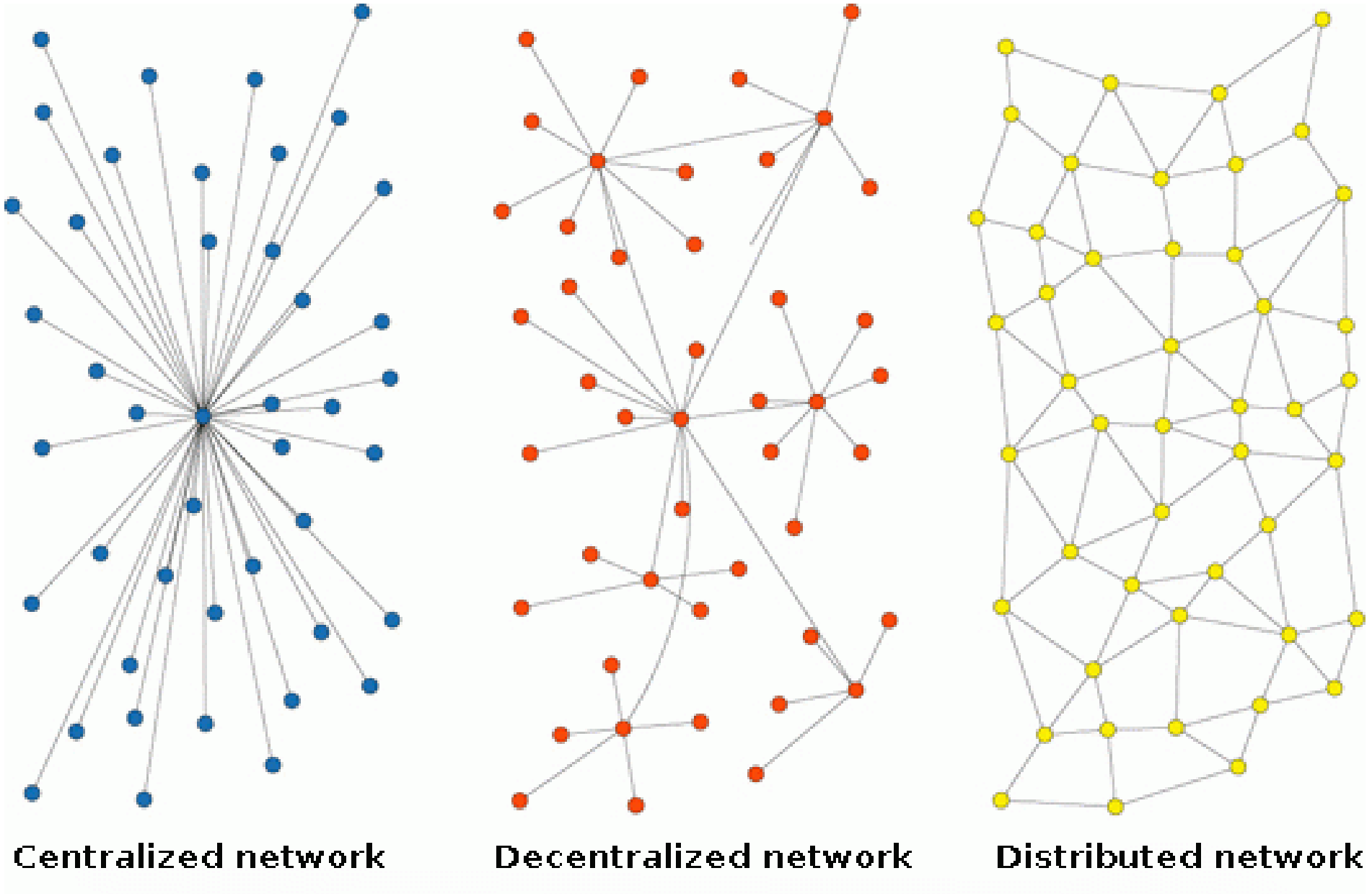
ESG Traceability

blockchain perspective

10 November 2021
Erik.VanIngen@fao.org (FAO Office of Innovation) for the UNECE Meeting on Environmental, Social and Governance Traceability of Sustainable Value Chains in the Circular Economy


Centralized network
Decentralized network
Distributed network

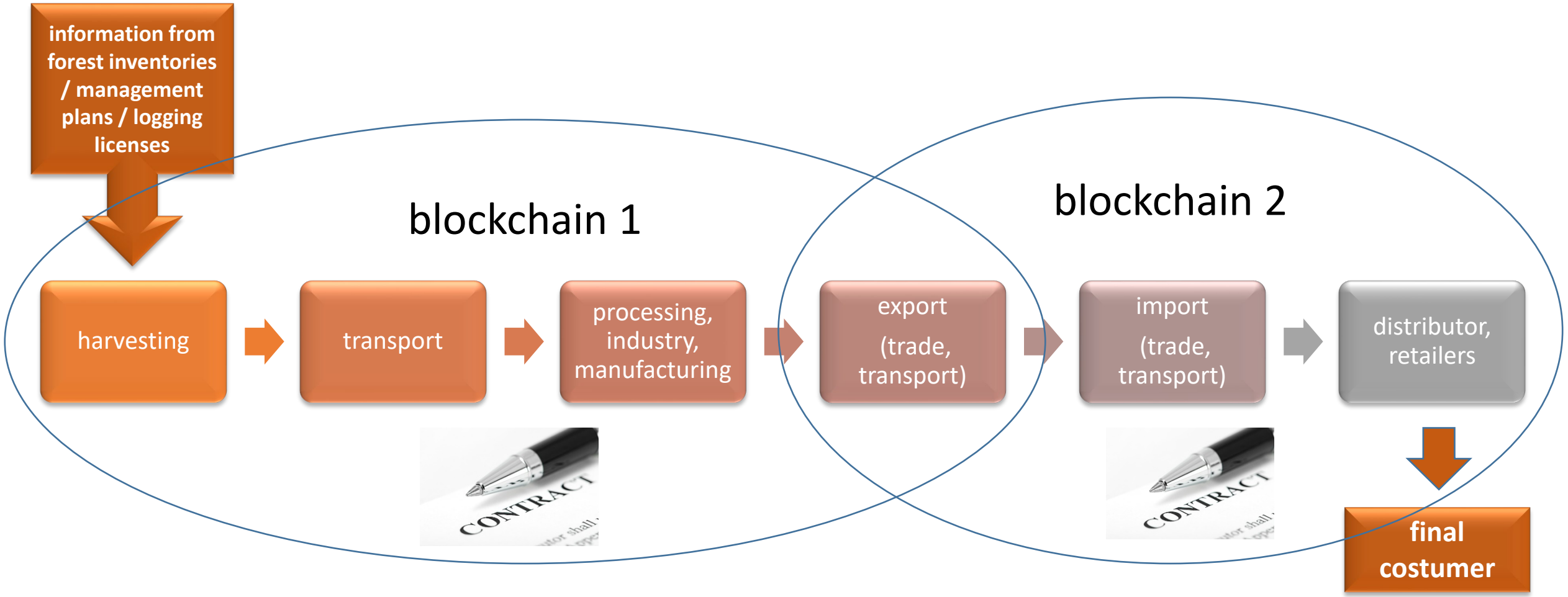
capabilities *(disruptive)*

- immutable transactions
- decentral
- smart contract
- consensus algorithm
- tokens *(including **Non-Fungible Tokens**)*

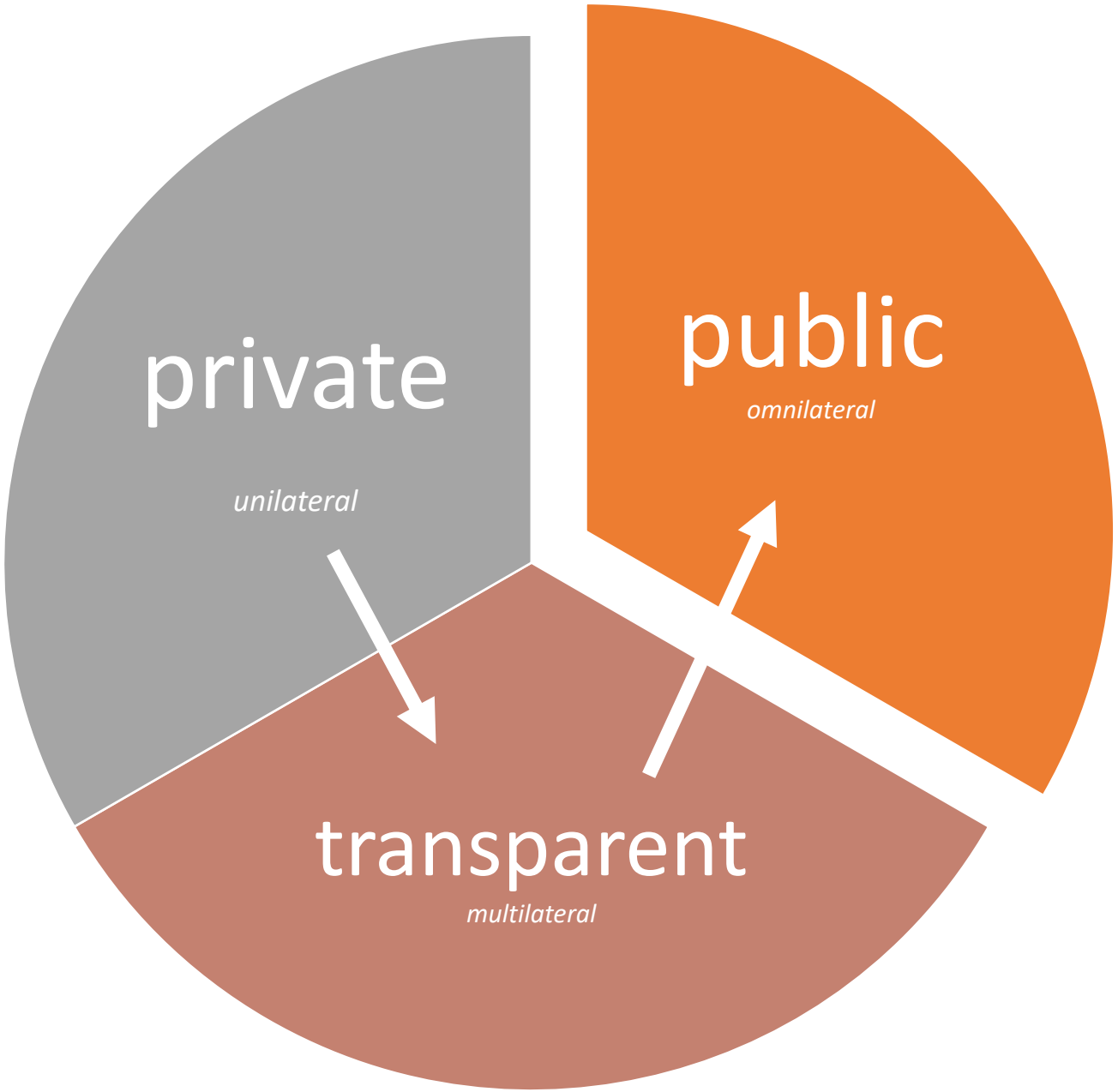
benefits

- transparency
- trust
- traceability
- consensus
- accountability
- disintermediation

blockchain possible supply value chain scenarios

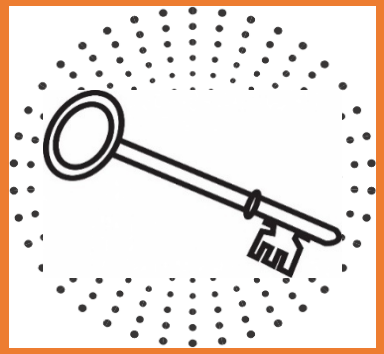


- *forestry geared example*
- *one or more blockchain smart contracts*
- *many other scenarios are possible, including local*



not all data in blockchain is necessarily public!

Key Data Element (KDE)



data input required to successfully trace a product and/or its ingredients through all relevant events

KDE synonyms:

- information element
- data attribute
- data point

draft Key Data Element (KDE) themes for sustainability

plant protection
(agrochemicals, etc.)

biodiversity

labor
(child labor, labor conditions, slavery)

climate
(mitigation, adaptation, footprint)

forestry
(degradation, unregistered trading, deforestation)

gender

land
(use, rights, ownership, etc.)

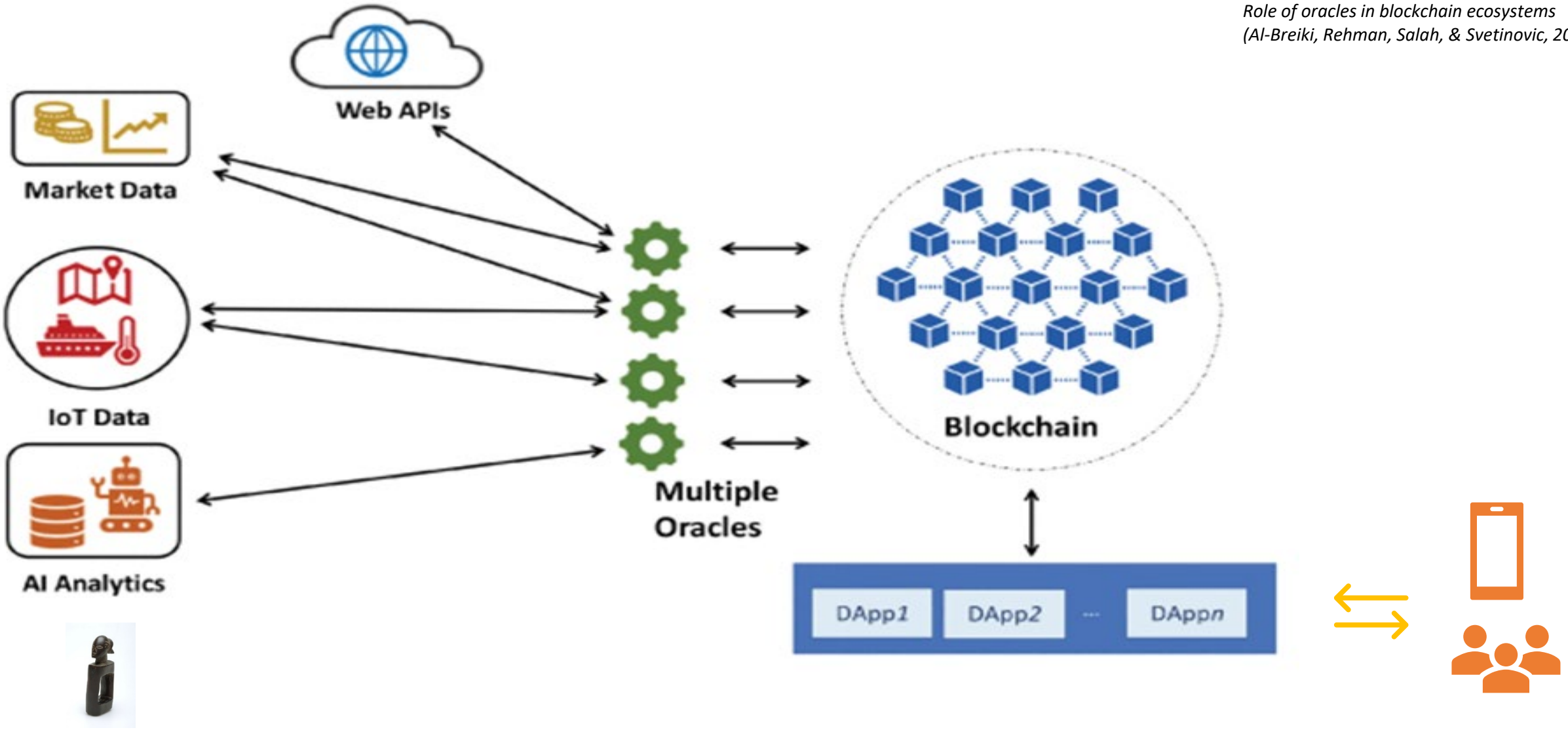
value distribution
(living income, etc.)

water
(productivity, tenure)

food
(nutrition, healthy diets, safety, loss, waste)

agro-inputs
(fertilizer, etc.)

Role of oracles in blockchain ecosystems
(Al-Breiki, Rehman, Salah, & Svetinovic, 2020)



FAO sees a great role for governments, the UN, and other trustworthy institutes to start publishing so called ***blockchain oracles*** *and* ***open models***

oracles (examples)

a forest institute

FAO
hand in hand geospatial platform

ministry

value chain

IoT (sensors)

blockchain

Charcoal in Ivory Coast (April 2021) recommendations

- create a multi-stakeholder technical working group
- improve the regulatory framework
- set up a digital and verifiable payment system
- develop an inclusive approach throughout the design process

observations

1. FAO blockchain focus on traceability, now also on tokenization
2. UN can ask the private sector how to help them best to implement sustainability (applied in FAO/UNDP SCALA programme)
3. encouraging dynamics between standards and blockchain
4. from private to public blockchains
5. NFTs
6. climate action - carbon credits (Van Wassenaer et al., 2021) publication
7. tokenization (Vahouny et al., 2021) publication

2022 research and design:

- strengthening sustainable forest management through digital innovation: case of blockchain
- finding blockchain key data elements to combat child labor

thank you

optional slides

voluntary sustainability standards (VSS)

- or: *sustainability certification schemes*
- Fairtrade, Rainforest Alliance, etc.
- tend to operate in niche markets

regulatory standards (RS)

- due diligence legislation
- etc.

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digital auditing *(verifiable compliance)*:

- standards (VSS + RS)
- **consumer protection**
- environmental social governance (ESG)
- FAO codex alimentarius - food code
- OECD Recommendation on Consumer Product Safety
- etc.

implementing standards is not always straightforward

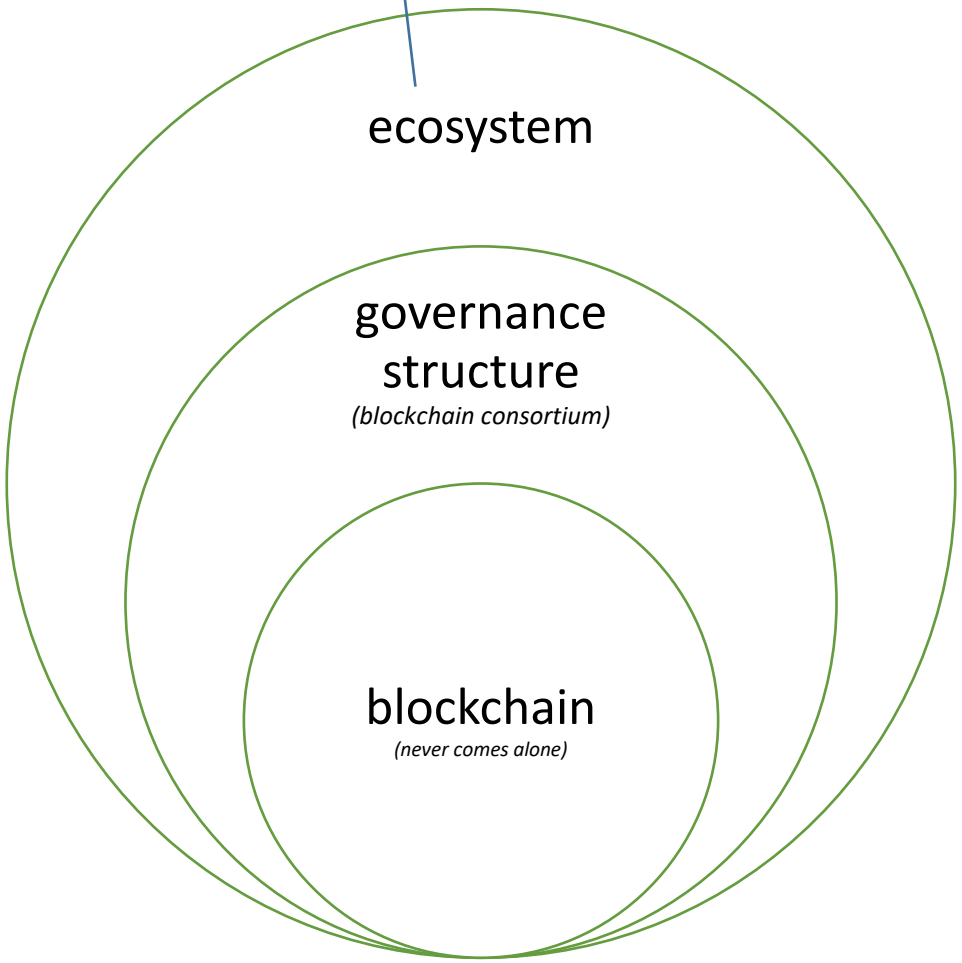
blockchain can decrease related costs

PESTEL (Political, Economic, Social, Technological, Environmental and Legal) framework can be used to identify relevant factors

Challenges

- complexity of the technology
- lack of empirical evidence on the effectiveness and added value
- how to engage or invest in blockchain projects
- how to set the regulatory framework and safeguards without impeding innovation

only here all blockchain benefits (slide 2) apply: transparency, trust, traceability, consensus, accountability, disintermediation



adapted from *Van Wassenaer et al. (2021)*

digital transformation

- connectivity (universal access to digital networks)
- Artificial Intelligence (AI)
- Machine Learning (ML)
- IoT – edge computing
- data pipelines
- data science
- big data
- 5G

FAO data and AI/ML-products

- remote sensing (SEPAL and Collect Earth)
- agricultural stress index system (ASIS)
- forest monitoring (Open Foris Tools)
- ***Hand in Hand geospatial platform***
- water productivity (WaPOR)
- shark species identification
- data lab
- etc.

blockchain never comes alone

Rome call for AI ethics

- Microsoft
- Vatican
- FAO
- IBM

governments, public and private sector

- key data elements (KDE) for sustainability
- voluntary sustainability standards (VSS)
- blockchain as a service (BAAS)
- regulatory standards (RS)
- blockchain oracles

oracle(s)

- *advisory services APIs*
- *sustainability KDE API*
- *DPG*

deployed by
- *FAO HQ*
- *MoA*
- *any other trustworthy entity*

alike HiH

4

2

SaaS

advisory services

yield estimation
seed recommendation
sowing & fertigation timing
soil & nutrient management
pest & disease prediction & diagnostic detection
climate smart ag practices
sustainability services

transactional services

identity
buy & sell
***sustainability** monitoring*

3

blockchain

trust
consensus
traceability
transparency
accountability
disintermediation

sustainability

1

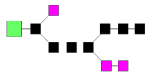
sustainable digital system

farmers, extension agents, input and output agro food industry
+
further downstream food value chain actors (including consumers)

sustainable digital agri-food food system

arrows indicate mainly data flows

reference slides



blockchain

- immutable transactions
- smart contract
- consensus algorithm
- tokens (incl. NFT)

distributed ledger technology (DLT)

- decentral

capabilities *(disruptive)*

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benefits

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FAO blockchain publications

Impact tokenization and innovative financial models for responsible agrifood supply chains (Vahouny et al., **2021**)

Applying blockchain for climate action in agriculture: state of play and outlook (Van Wassenaer et al., **2021**)

Blockchain application in seafood value chains (Blaha, F. & Katafono, **2020**)

E-agriculture in Action: Blockchain for Agriculture Opportunities and challenges (FAO & ITU, **2019**)

Emerging Opportunities for the Application of Blockchain in the Agri-food Industry Agriculture (Tripoli & Schmidhuber, **2018**)

FAO informs ***guidance*** on blockchain for alignment at the international level via the ***International Platform for Digital Food and Agriculture***

FAO demonstrates **leadership** in partnerships

FAO reinforces the **capacity** and digital capabilities of its officers and managers

FAO becomes an '**oracle**' for agri-food systems data

references

Al-Breiki, H., Rehman, M. H. U., Salah, K., & Svetinovic, D. (2020). Trustworthy Blockchain Oracles: Review, Comparison, and Open Research Challenges. *IEEE Access*. https://doi.org/10.1109/ACCESS.2020.2992698

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