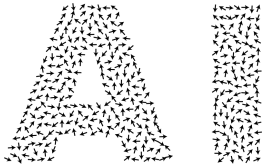
Micro-credentials, Blockchain & Artificial Intelligence: Education for All

Image: AUA



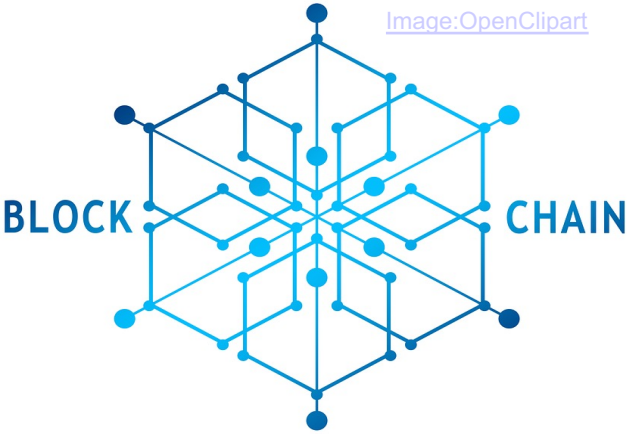
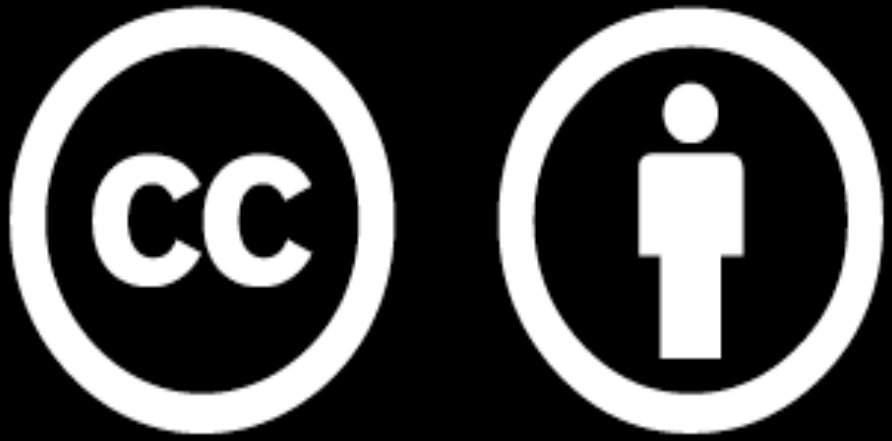


Image:OpenClipart

Rory McGreal
UNESCO/ICDE Chair in OER
Athabasca University
CIDER September 2024



The Challenge for the 21st Century

2025 + 98 million new student

4 universit **(30k students)**

How to educate ALL these learners?

& IDP Australia

Education for ALL

05/24/15

United Nations
Educational, Scientific and
Cultural Organization

UNESCO Chair in
Open Educational Resources

Athabasca University
The future of learning.

What are Micro-credentials?

- ADCs (Alternative Digital Credentials)
- Badges
- Mini-degrees
- Nano-degrees
- Micro certificates

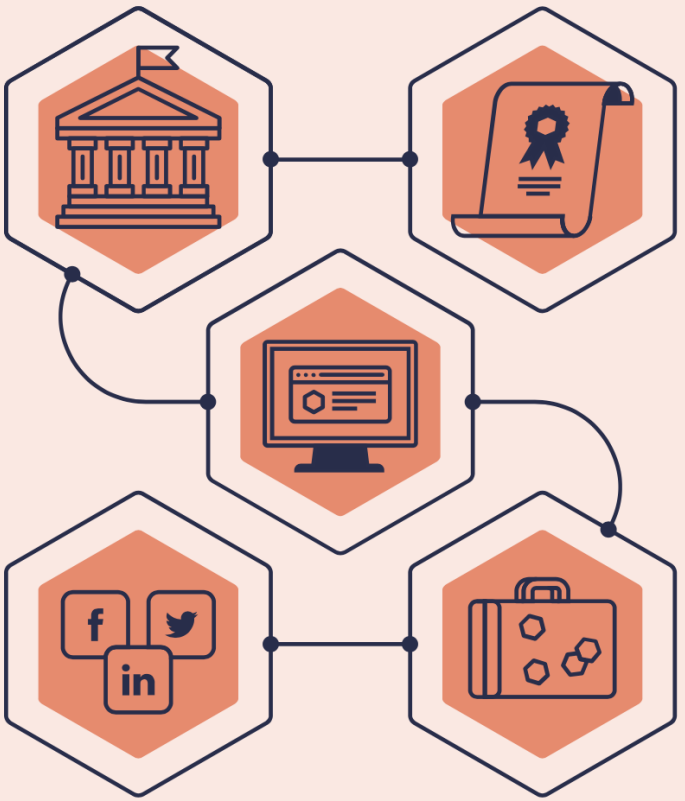


Image: Badgr.com

Micro-credentials are for CREDIT

Image: Illinois Worknet

if not

They are not Credentials

Credentials Rethink: Why

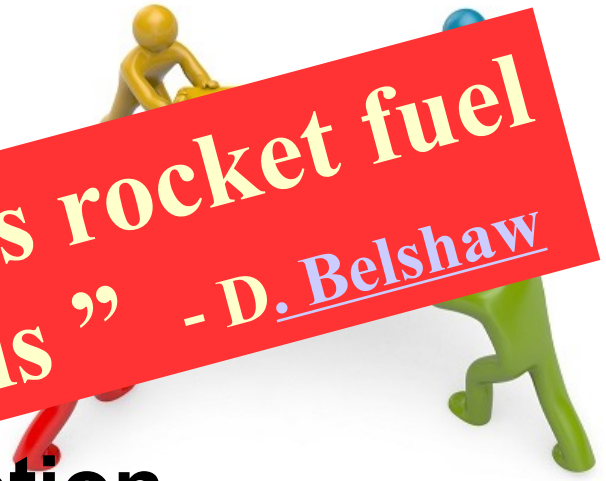
DEMANDS:

Employers: qualified workers

Students: more job

Em **t/promotion**

ents: economic balance



"blockchain plus badges equals rocket fuel for verified, trusted credentials" - D. Belshaw

Image: Vey Willetts

Certification (Transcripts)

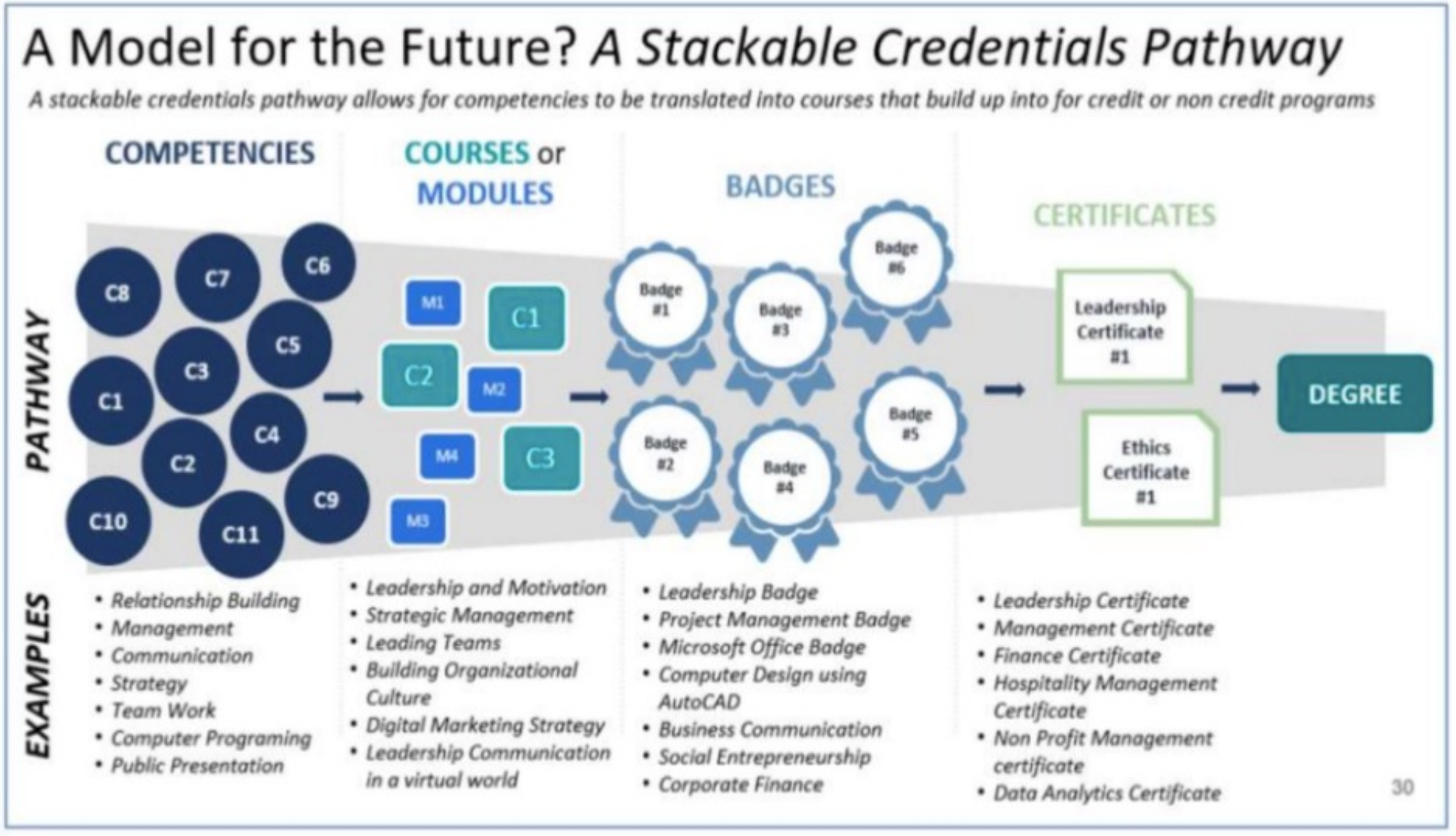
- Present systems are cumbersome & inefficient
- Inability to provide a certificate is serious
- Digital systems can help

"the death knell for the embossed transcript" - D. Planko

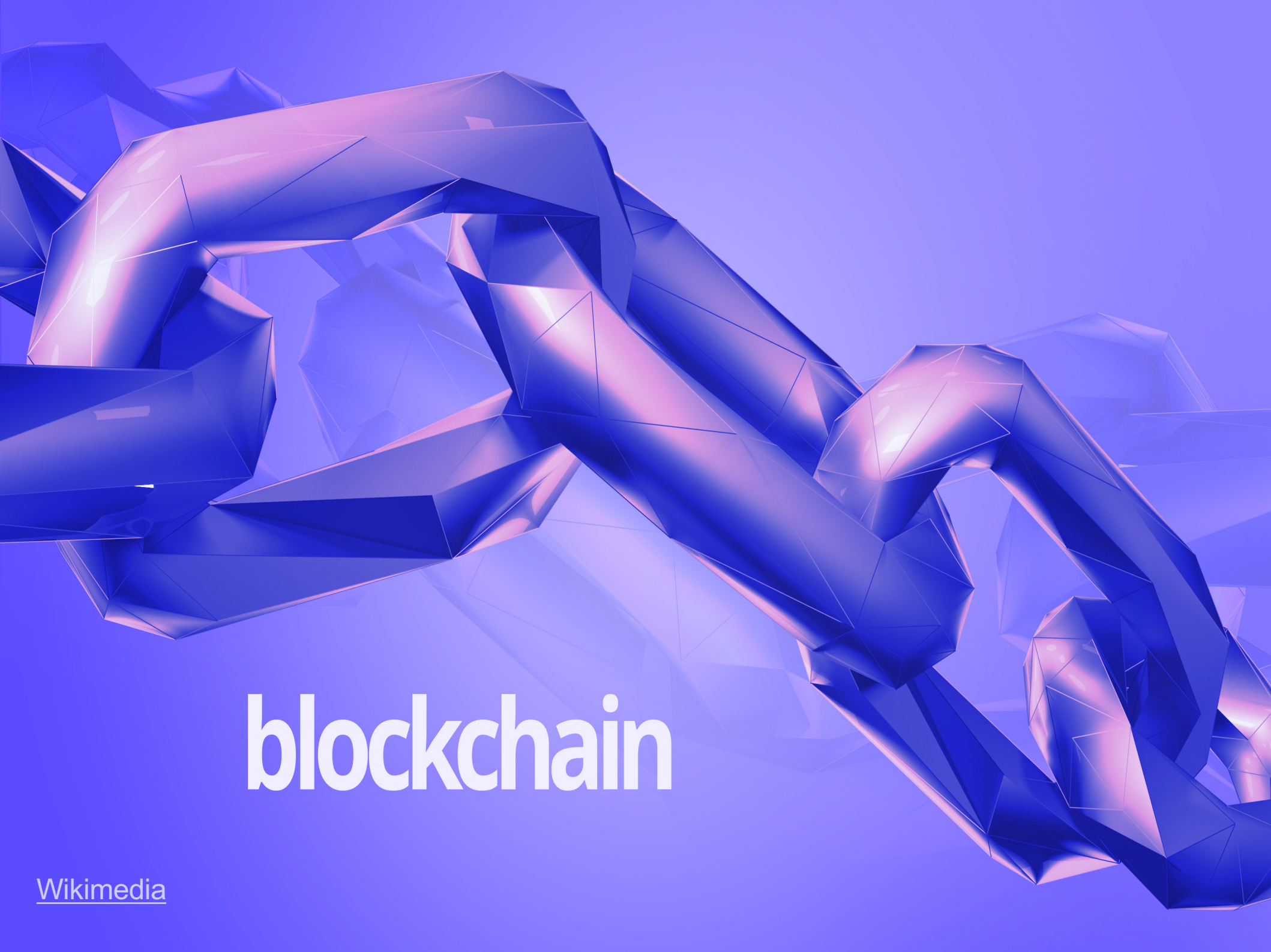
Nazaré, J., Duffy, K. H., & Schmidt, J. P. (2016)

Image: Certificates

Stackable Credentials



Jim Fong, UPCEA, "Faster Forward to a New Economy and Implications for Higher Education." Presentation, August 6, 2020



Wikimedia

Blockchain Explained

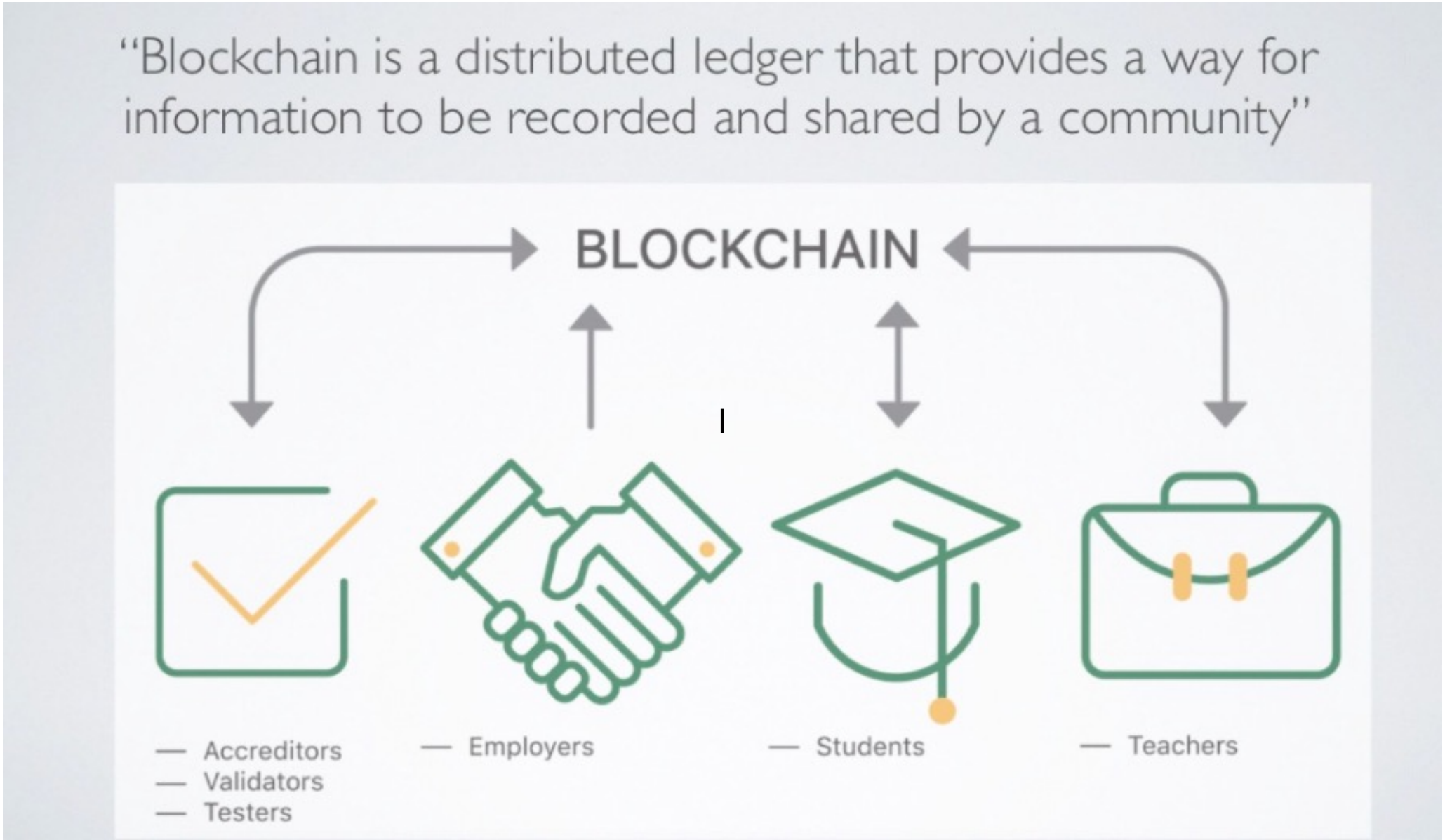
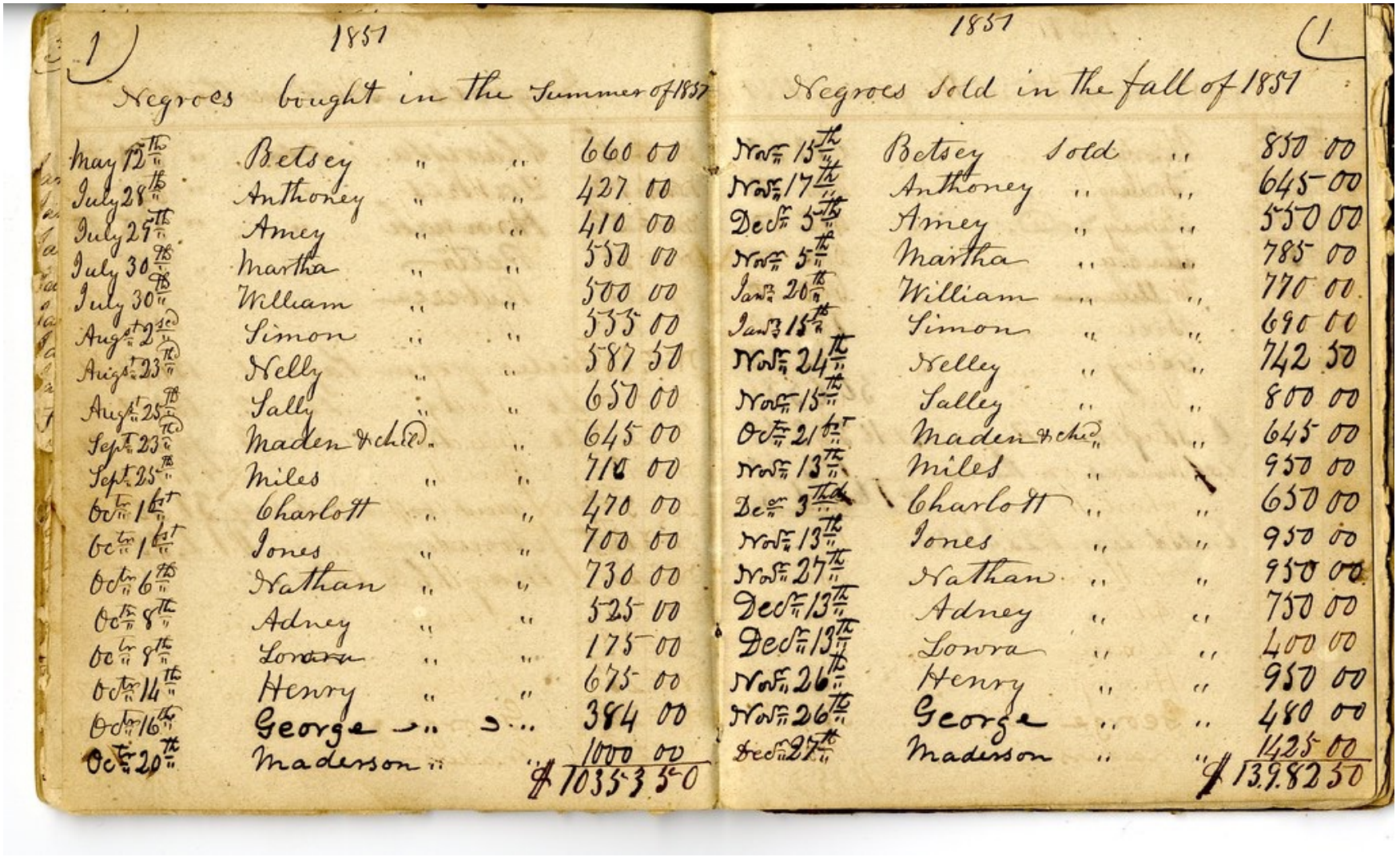


Image: HongSoo Kim

A Ledger



1851

1

Negroes bought in the Summer of 1851

May 12th	Betsey	" "	660 00
July 28th	Anthoney	" "	427 00
July 29th	Amey	" "	410 00
July 30th	Martha	" "	550 00
July 30th	William	" "	500 00
Augst 2nd	Simon	" "	535 00
Augst 23th	Nelly	" "	587 50
Augst 25th	Sally	" "	650 00
Sept 23d	Maden & child	"	645 00
Sept 25th	Miles	" "	710 00
Octr 1st	Charlott	" "	470 00
Octr 1st	Jones	" "	700 00
Octr 6th	Nathan	" "	730 00
Octr 8th	Adney	" "	525 00
Octr 8th	Lowra	" "	175 00
Octr 14th	Henry	" "	675 00
Octr 16th	George	" "	384 00
Octr 20th	Maderson	" "	1000 00
			$ 1035 35 0

1851

1

Negroes sold in the fall of 1851

Novr 15th	Betsey	Sold "	850 00
Novr 17th	Anthoney	" "	645 00
Decr 5th	Amey	" "	550 00
Novr 5th	Martha	" "	785 00
Janr 20th	William	" "	770 00
Janr 15th	Simon	" "	690 00
Novr 24th	Nelley	" "	742 50
Novr 15th	Salley	" "	800 00
Octr 21st	Maden & child	"	645 00
Novr 13th	Miles	"	950 00
Decr 3th	Charlott	" "	650 00
Novr 13th	Jones	" "	950 00
Novr 27th	Nathan	" "	950 00
Decr 13th	Adney	" "	750 00
Decr 13th	Lowra	" "	400 00
Novr 26th	Henry	" "	950 00
Novr 26th	George	" "	480 00
Decr 27th	Maderson	" "	1425 00
			$ 1398 250

Distributed Ledger

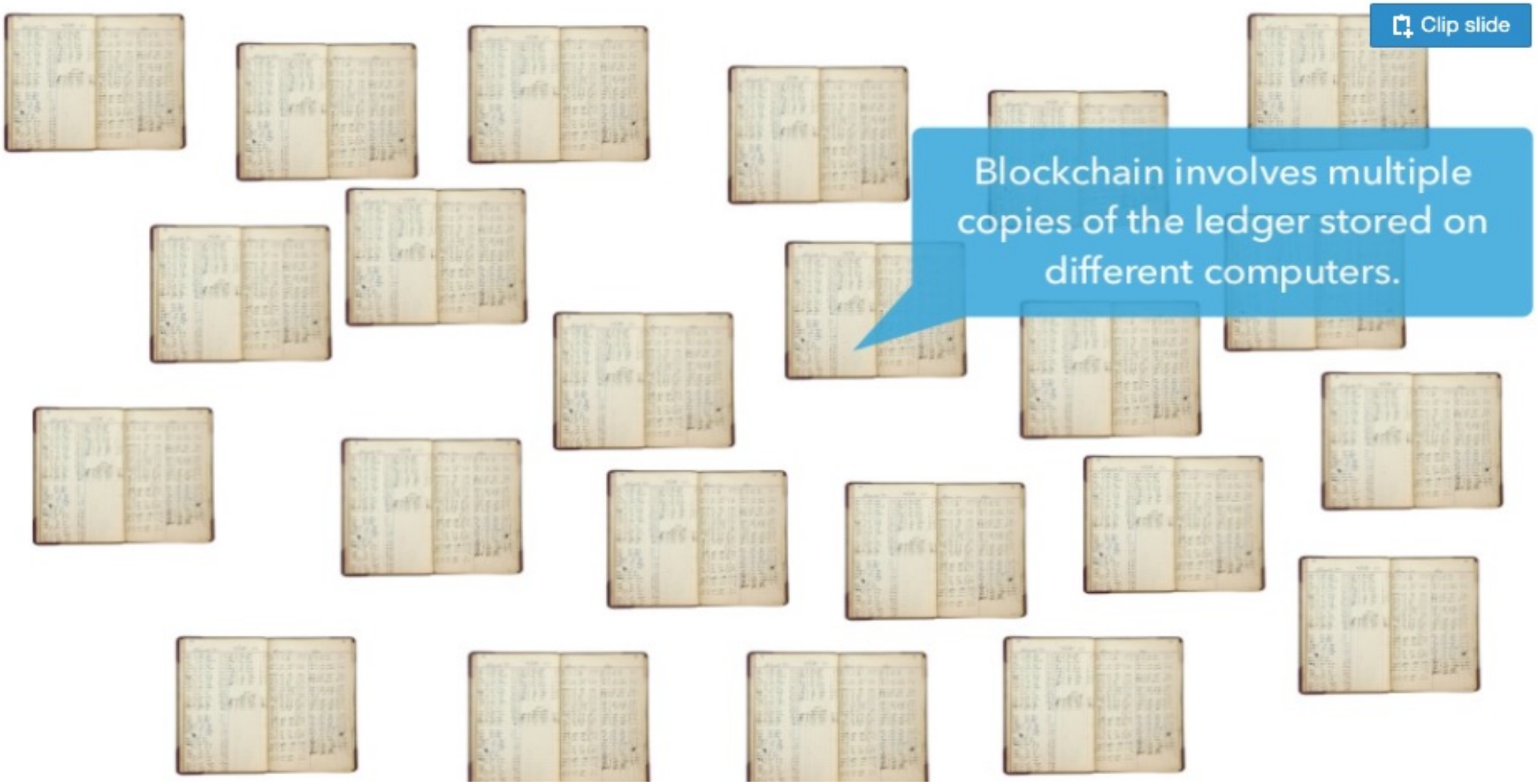


Image: John Brock

Bitcoin

Etherium

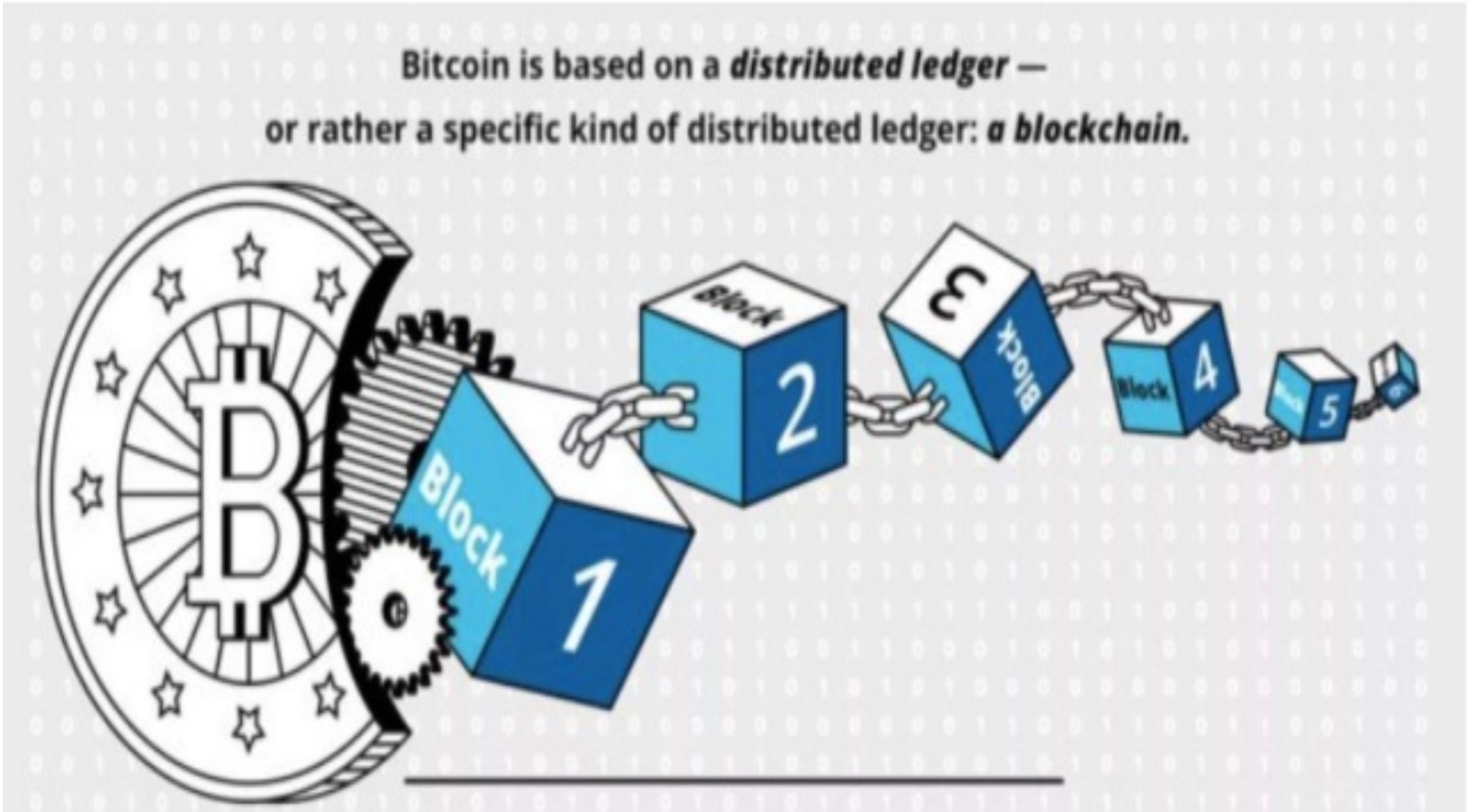
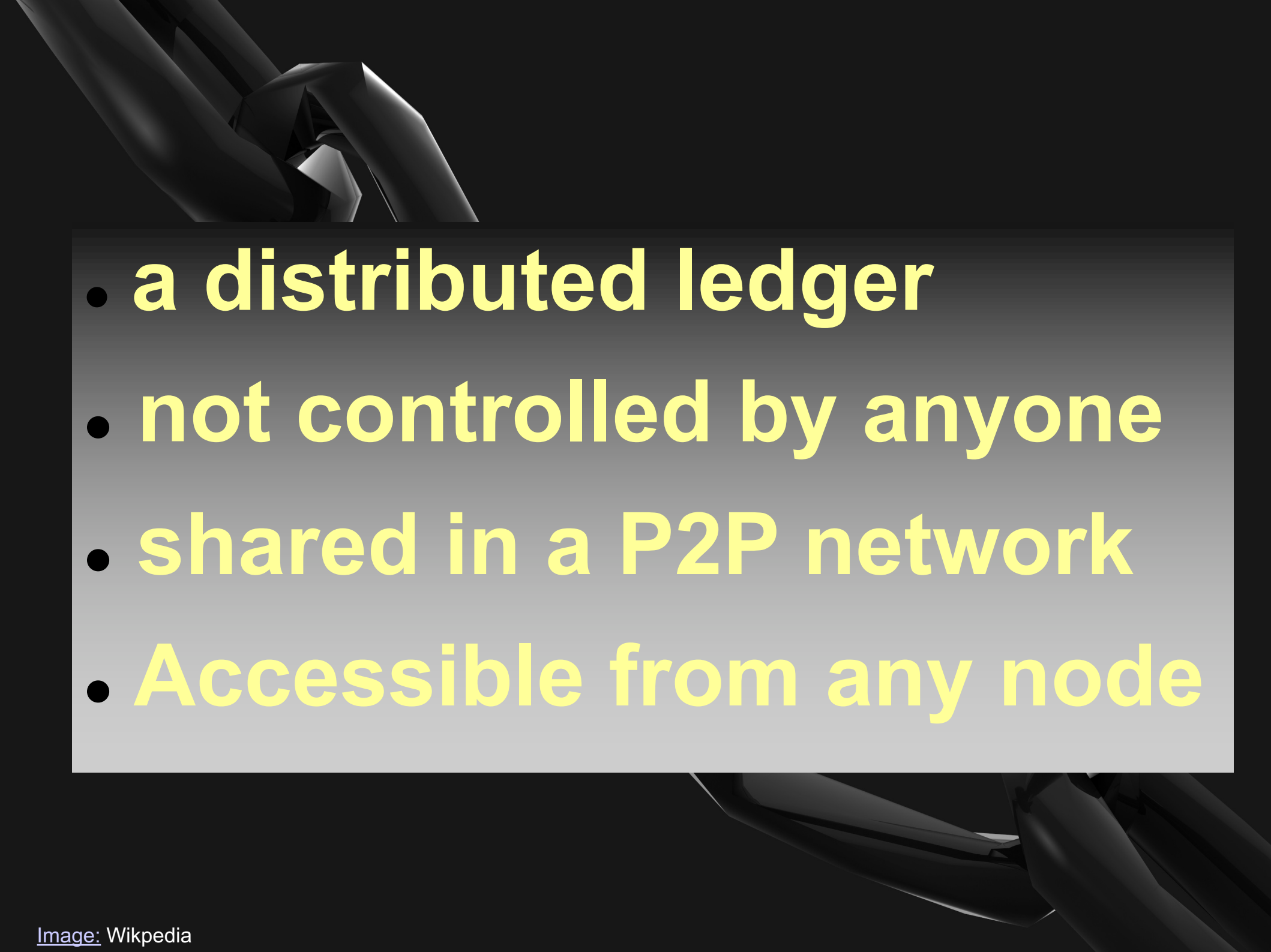


Image: Bitcoinik



- a distributed ledger
- not controlled by anyone
- shared in a P2P network
- Accessible from any node

Image: Wikpedia

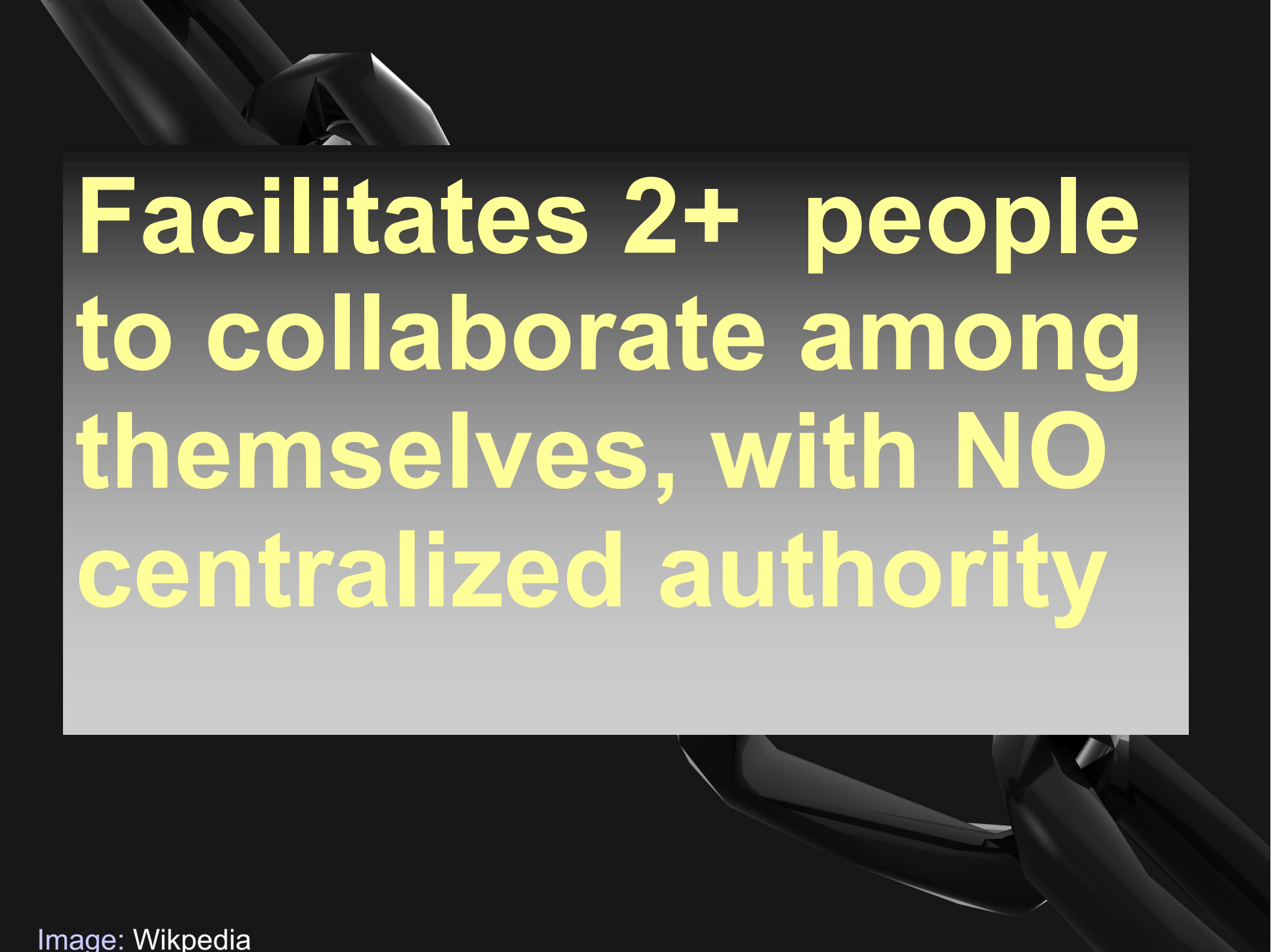


Image: Wikpedia

- Records validated in blocks
- Each new block contai
hash of previou
creating
- A
th

What happens on the blockchain stays on the blockchain

hash & breaks the chain

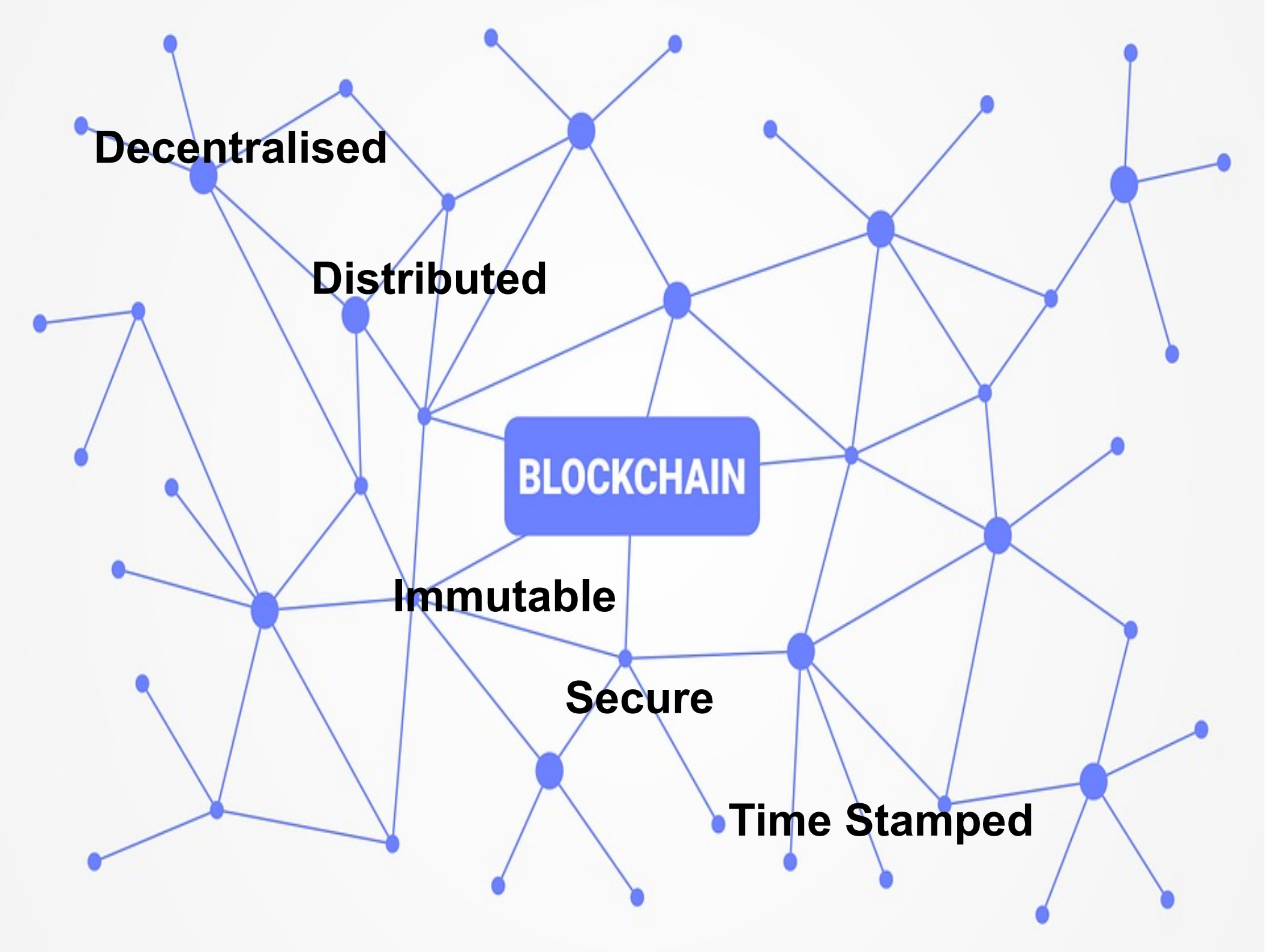
- Jon Brock

786A832913348D9BB6E35ABF60CB451934F58A9E648CA2E28724A04AACEEBB6C\

Im

- Can't be deleted or changed
- Transactions easily traced
- Organized chronologically
- Time-stamped
- NO need for a third party

Image: Wikpedia


Decentralised
Distributed
BLOCKCHAIN
Immutable
Secure
Time Stamped

Certification by Blockchain

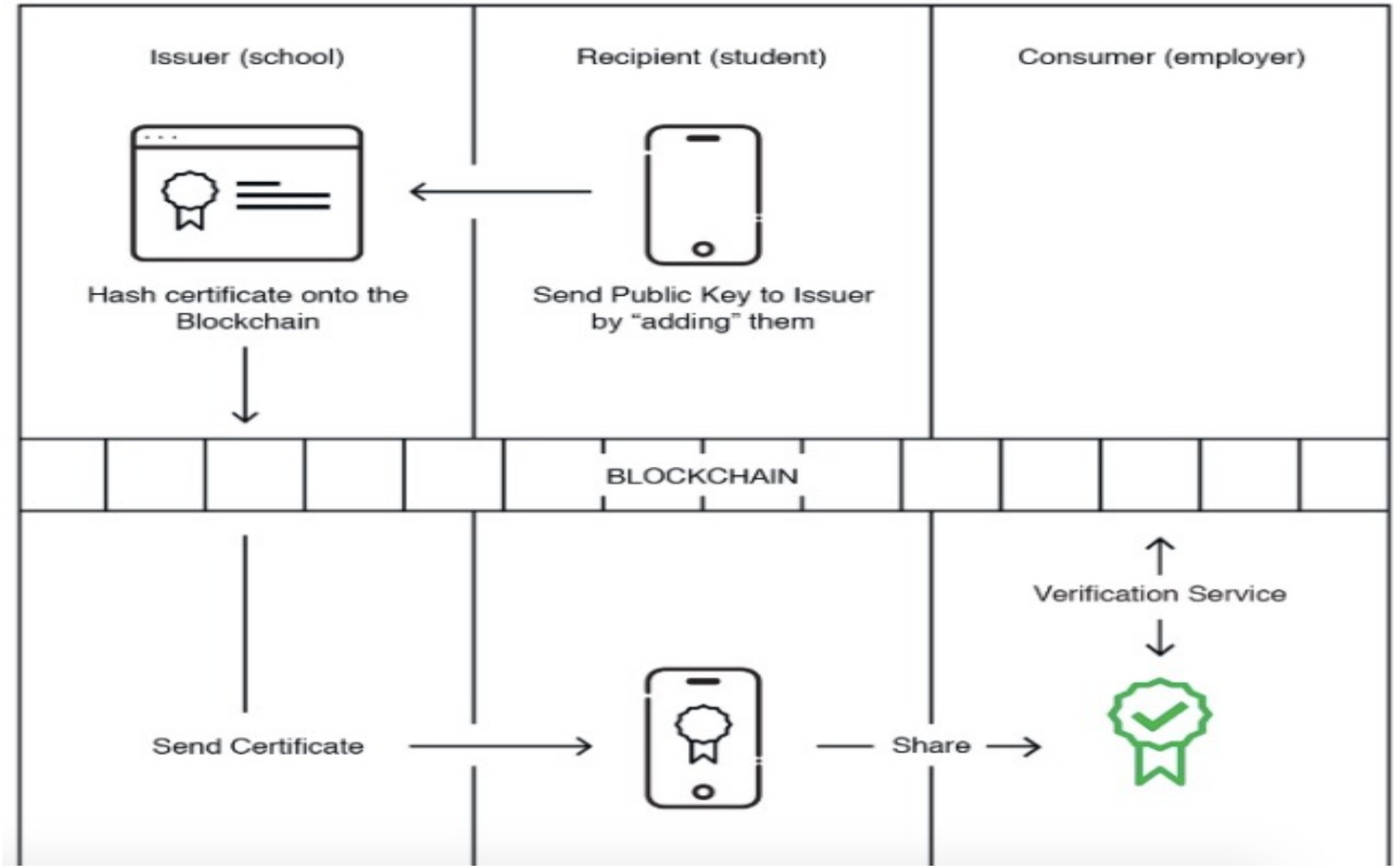
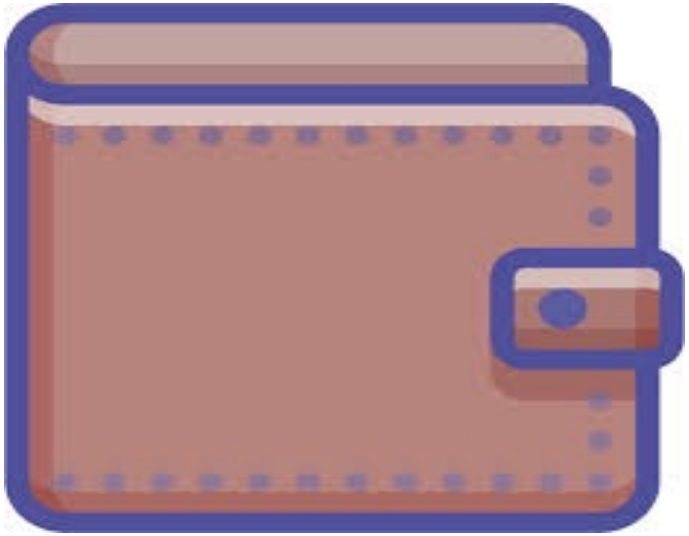


Image: Holotescu

Certification: A Wallet

- For academic credentials (eg. Bitcoin)
- Pre-creating & sharing keys (& destroying them)
- Requires higher level of trust in institution
- Certificate only useful when tied to a person
- Privacy of data is essential



Ownership & Control

- Belongs to the individual not institution
- Preservation
- Validity
- Reliability

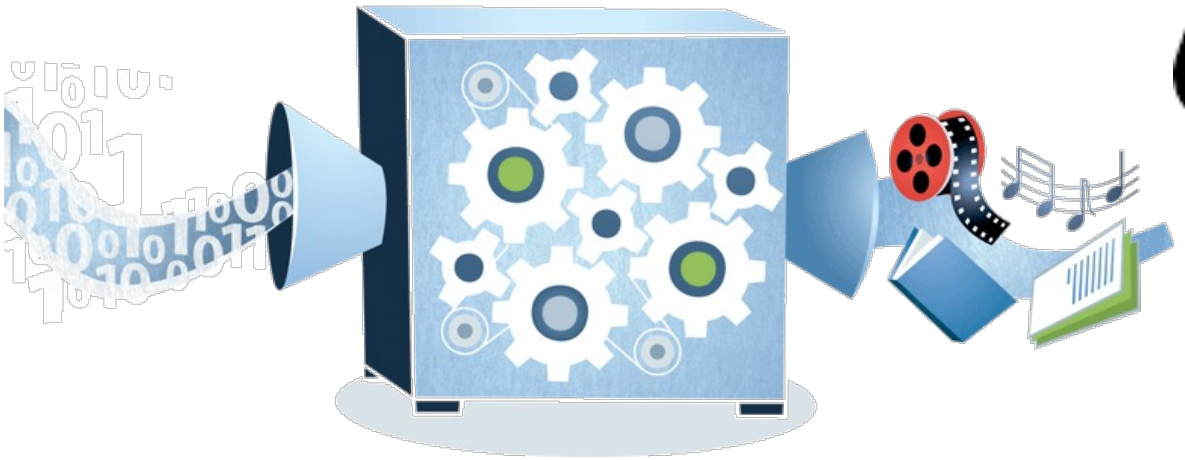


Image:Wikimedia

Blockchain Problems

- Big system – unexpected failures
- Why change a system that works?
- Encryption is permanent (Keys can be forgotten)

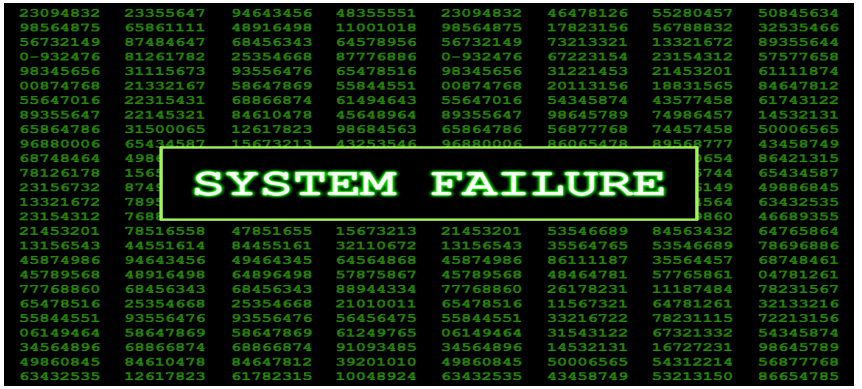


Image: TrendMicro

Blockchain Problems

Persistence

- Fake content
- Illegal content
- Unwanted content
- Leaked personal data

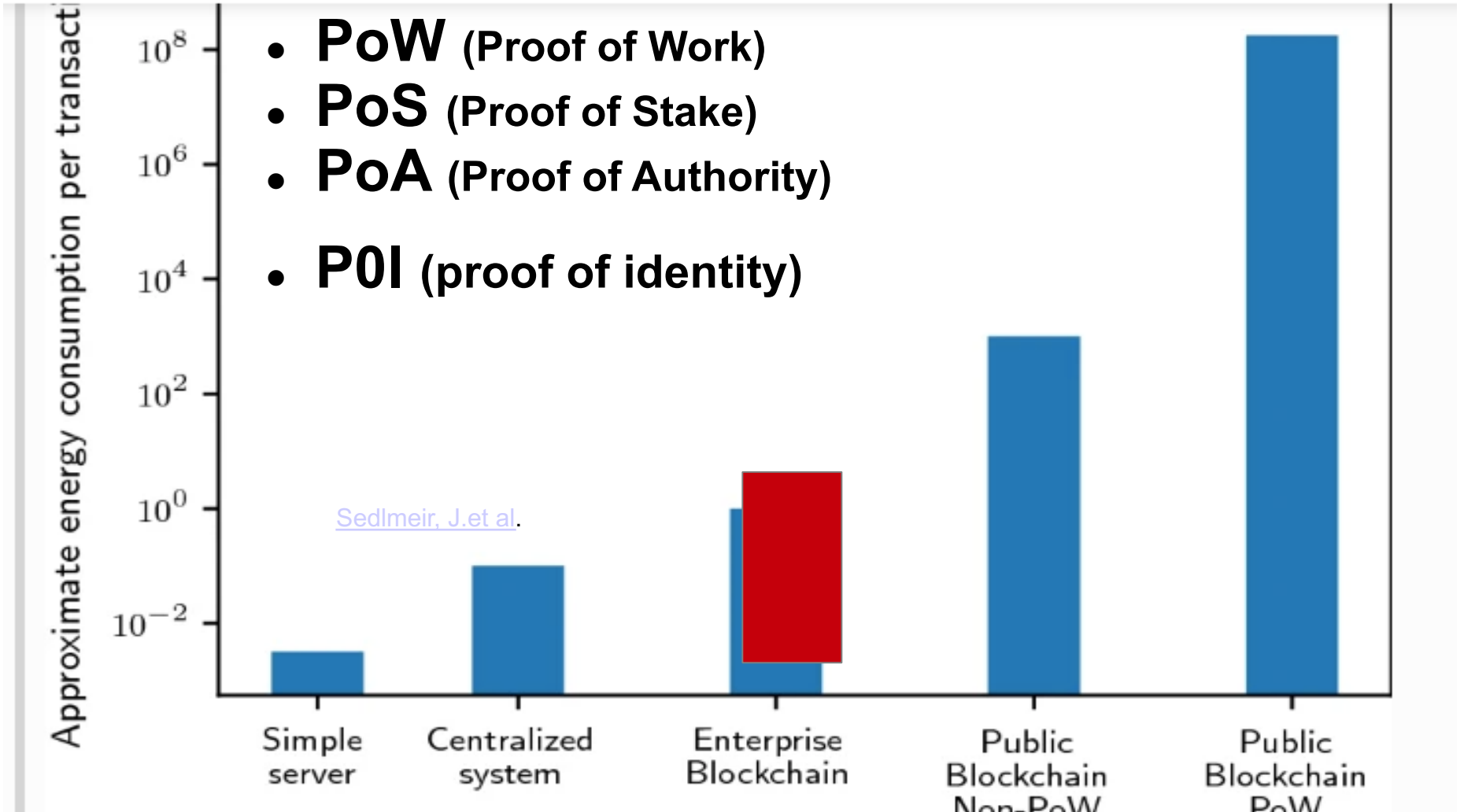
Image: DSG

Blockchain Problems?

- Network maintenance costs
- Transaction speed
- Storage
- Regulatory intervention
- No useful apps
- Hacking

Blockchain Problem
Energy Use

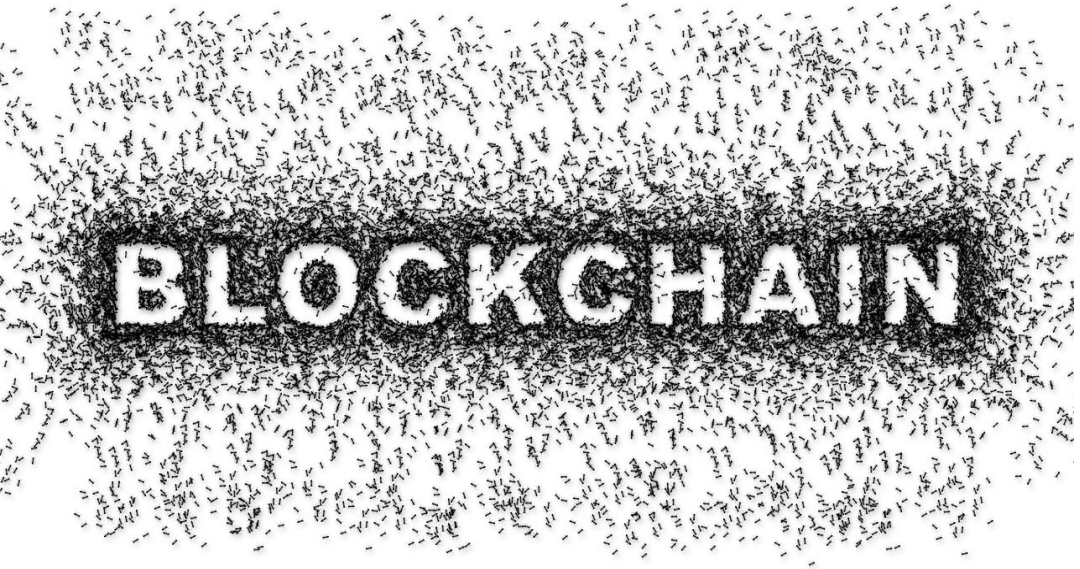
The Energy Consumption of Blockchain Technology: Beyond Myth



- **PoW** (Proof of Work)
- **PoS** (Proof of Stake)
- **PoA** (Proof of Authority)
- **P0I** (proof of identity)

Access & Affordability

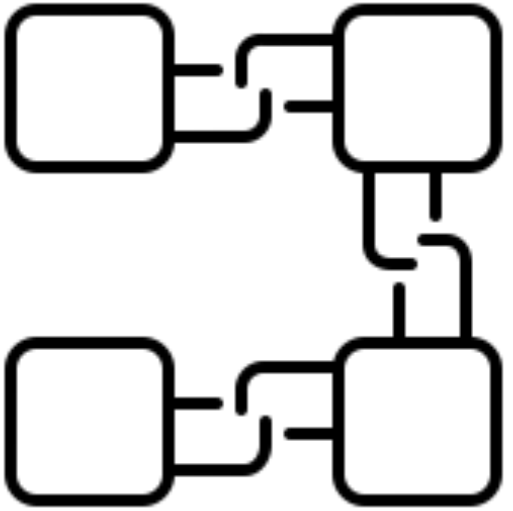
- **Needs to be inexpensive when it is needed by the learner**

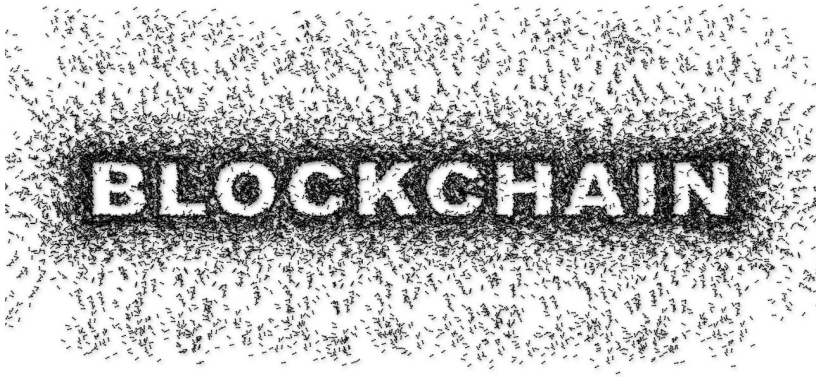


- **Solves centralization issue**

(it's distributed)

- **Network of trusted entitities**
- **(gatekeeping nodes)**
- **Access to content with public key**
- **Verification/validation based on quality**





Open Educational Resources

OER Distributed Management Platform

1. User management
2. Resource creation
3. Resource management
4. Copyright management
5. Virtual Currency exchange
6. Learning certification management

- Li & Yang

Image: FinancesOnline

Certification Learner Control

- Should learners be able to choose what history they share with others?
- Different narratives different purposes?
- Highlight or hide different experiences?
- Prior Learning Assessment & Recognition

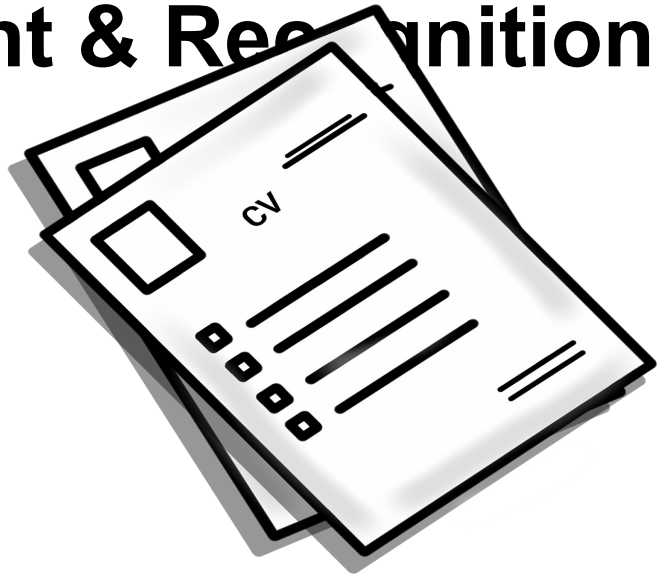
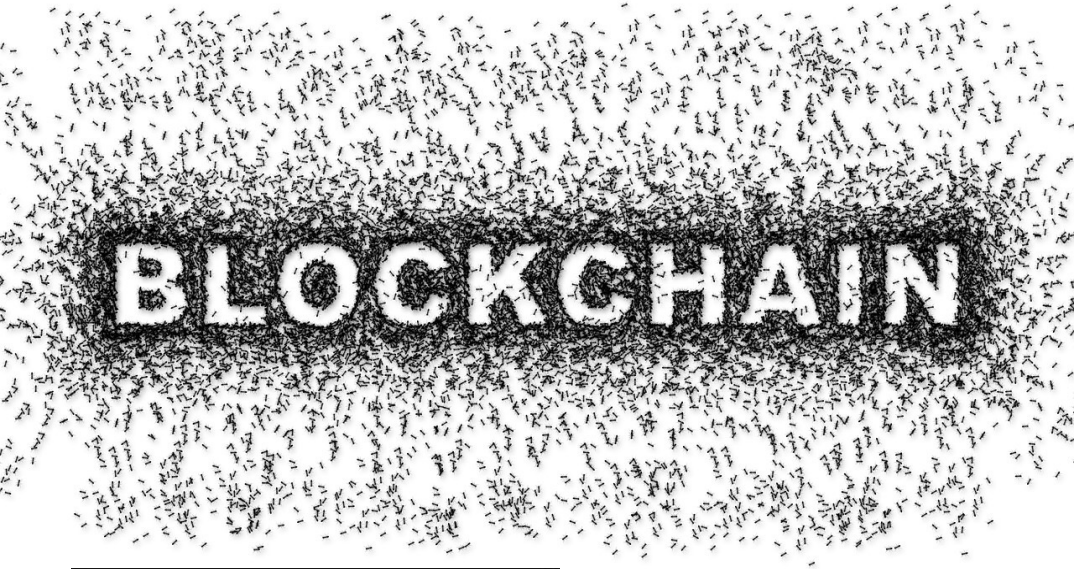


Image:NeedPix



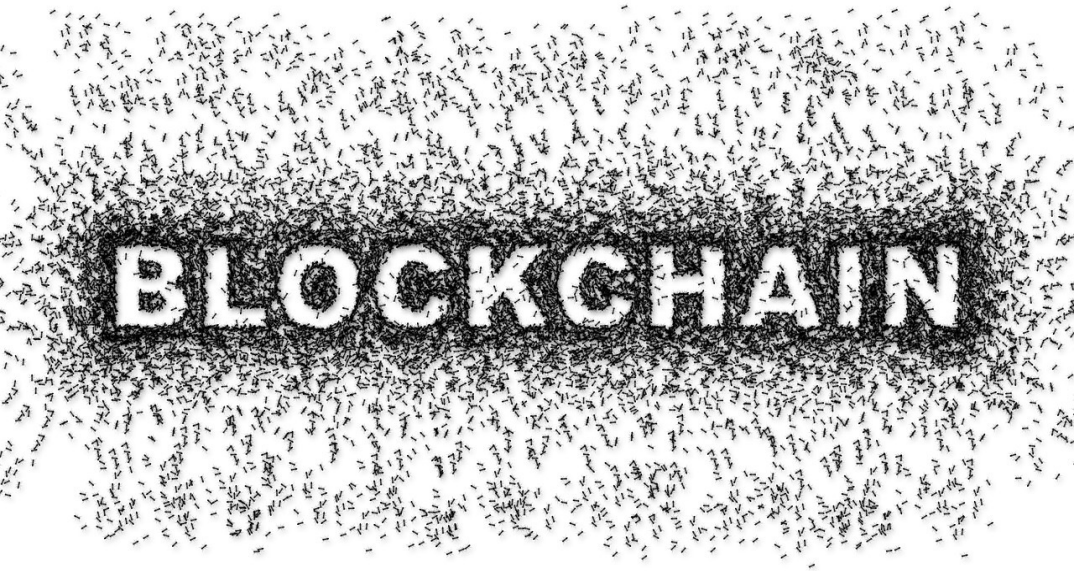
Problem for learners

.

What happens if a student wants or needs a 'fresh start'?

- gains afforded by the immutability of the data are undermined by problems which are left unresolvable because of that same immutability Watters (2016)

Image: facebook



Disrupting & Democratising Education

- **Awarding qualifications**
- **Licensing & accreditation**
- **Management of student records**
- **IP management/payments**
- **Permanent distributed record of institutional output & reputation**

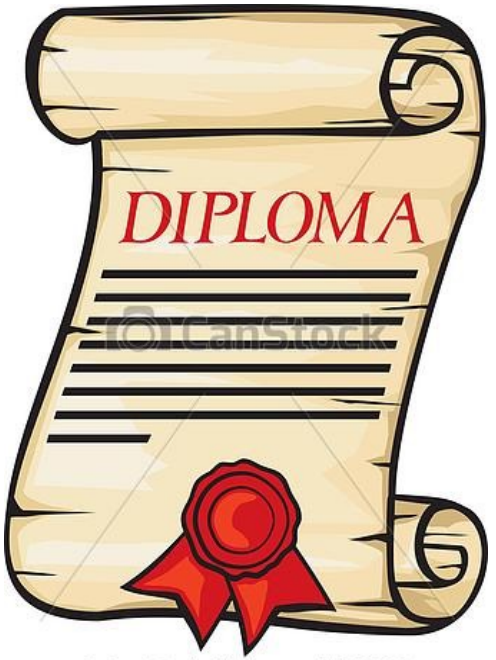
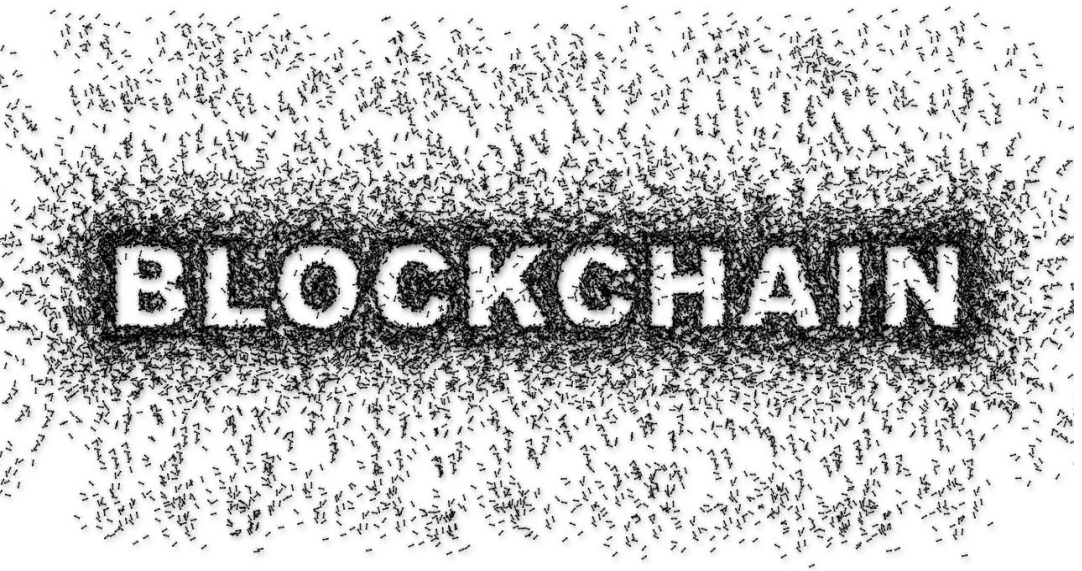


Image: Needpix

Image: Clipart Panda



Problems for HEI

- **Can disintermediate inefficient, opaque & hierarchical centralized systems**
- **HEI need not be involved in verification**
- **Informal learning can be verified like formal education**

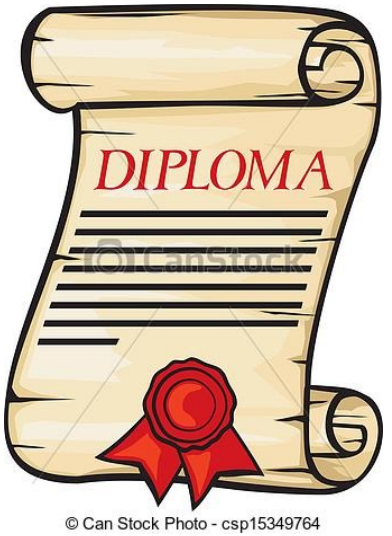


Image: Clipart Panda

BlockChain Certification: Freedom for learners

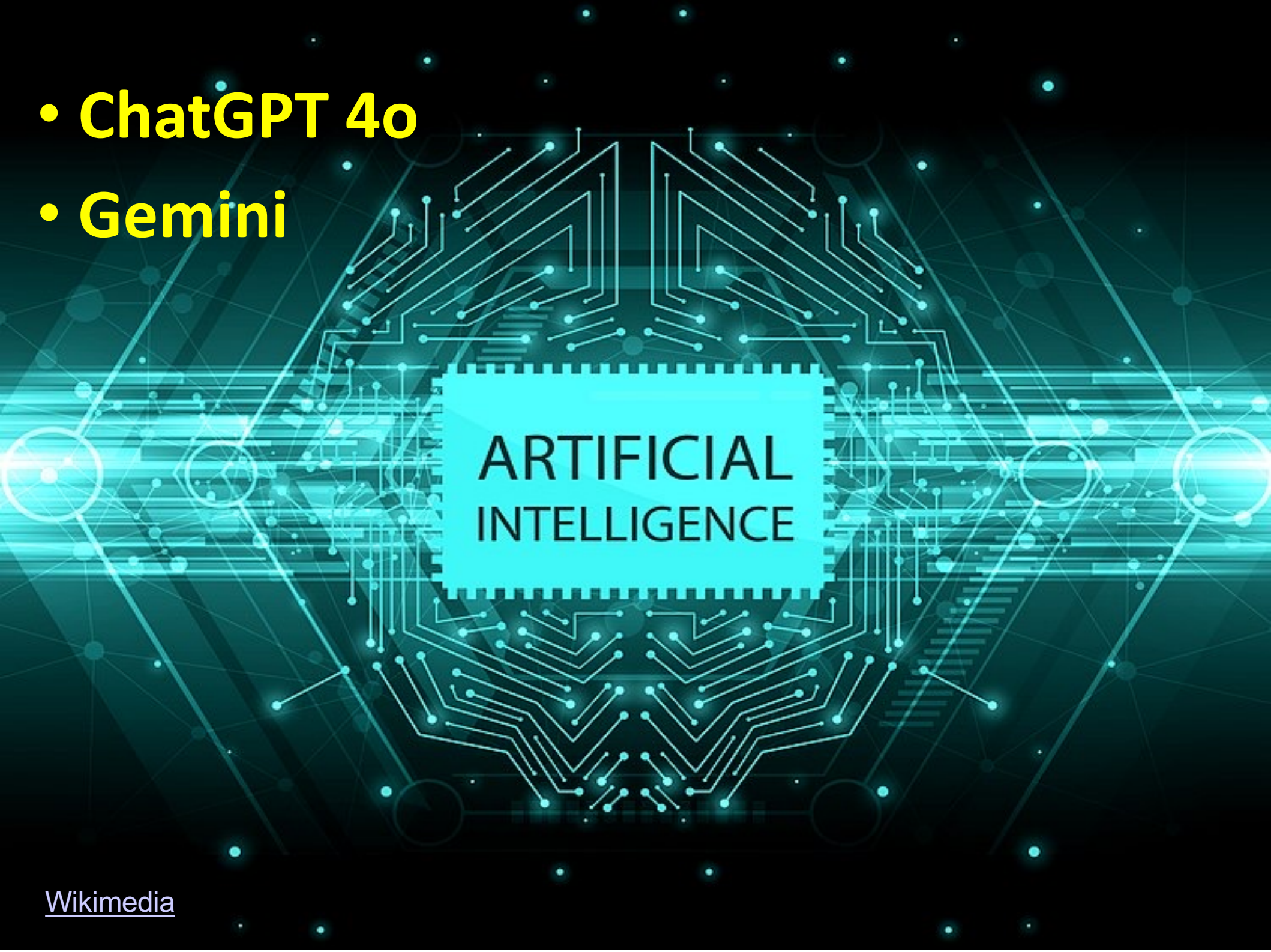
- To enroll in and complete courses at institutions of learners' choice
- To change institutions as they strive to complete a program/programs
- To transfer credits among institutions nationally and internationally.
- To have prior learning assessed & accredited

European Union JRC

"Only if open standards are adopted"

Image: HongSoo Kim

- **ChatGPT 4o**
- **Gemini**



Wikimedia

AI Benefits (Students)

- Equality
- Personalisation
- Inclusivity
- Open

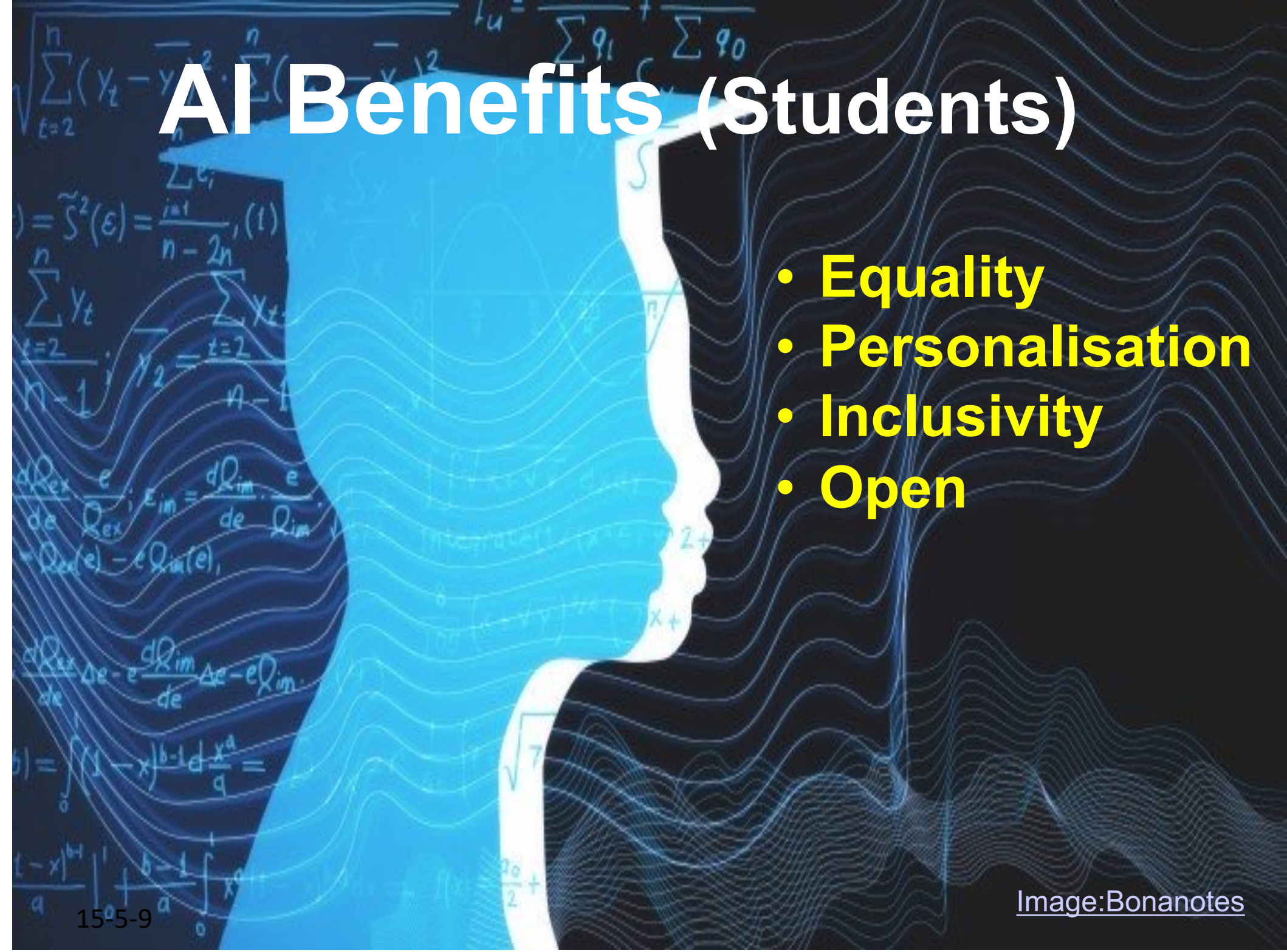


Image:Bonanotes

AI Benefits (Administration)

- Automate/Simplify transactions
- Increase efficiency Digitalisation
- Tracking students
- Consent management
- Security: tampering?

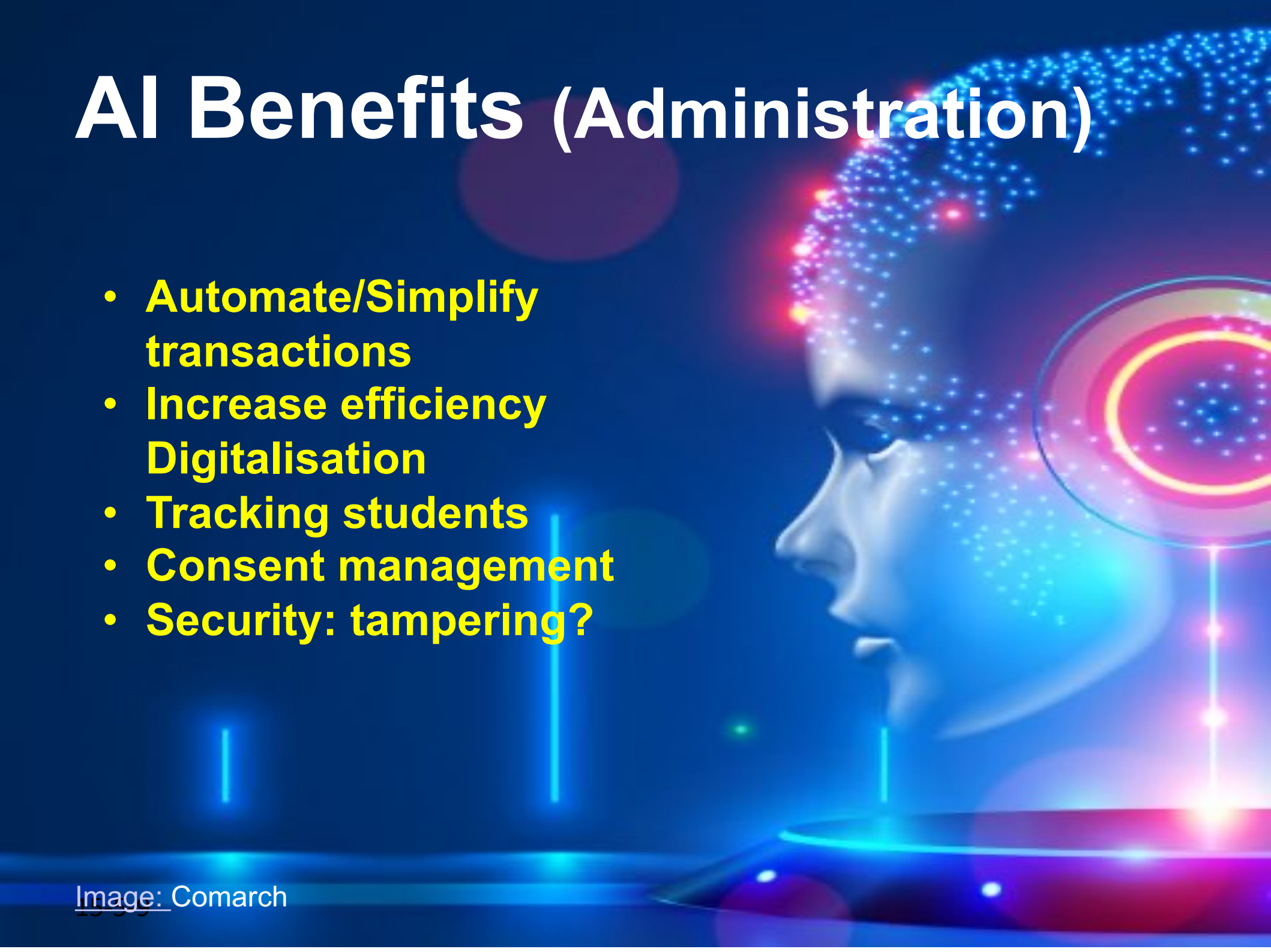


Image: Comarch

AI Benefits (Instructors)

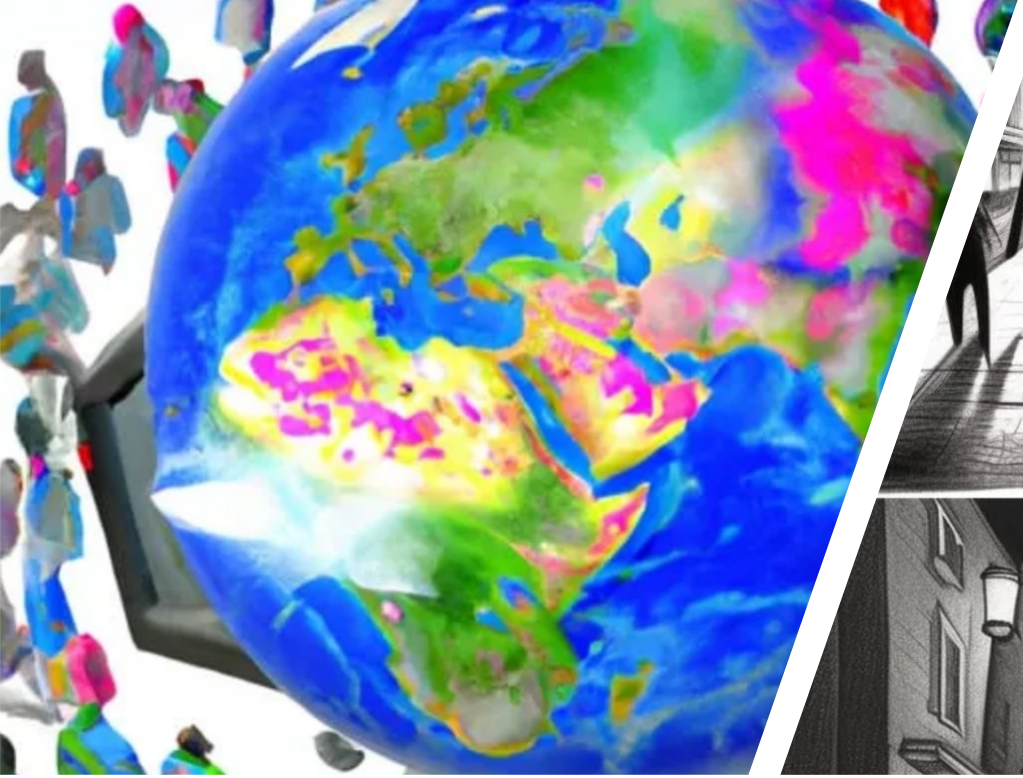
- Verify learning outcomes
- Discover skill gaps
- Discern learning difficulties
- Open

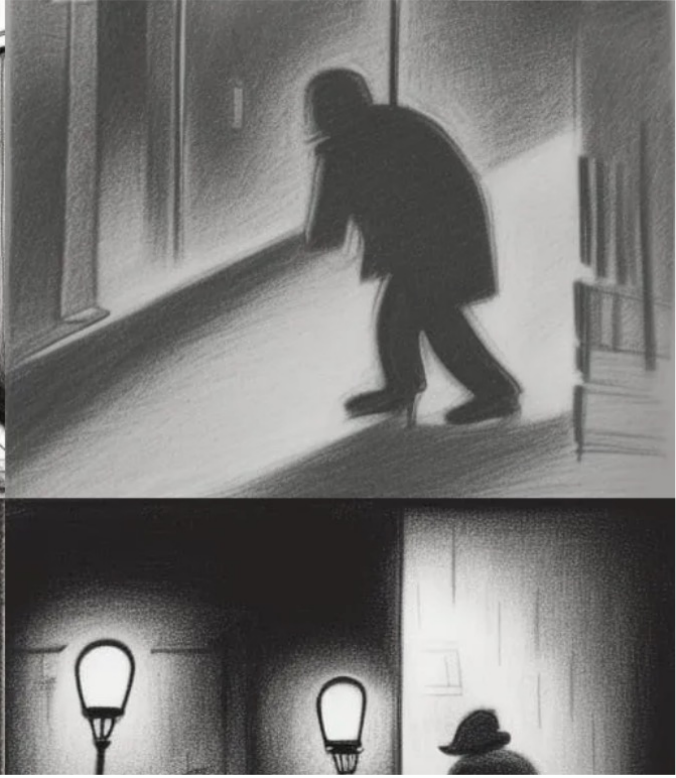
AI Limitations

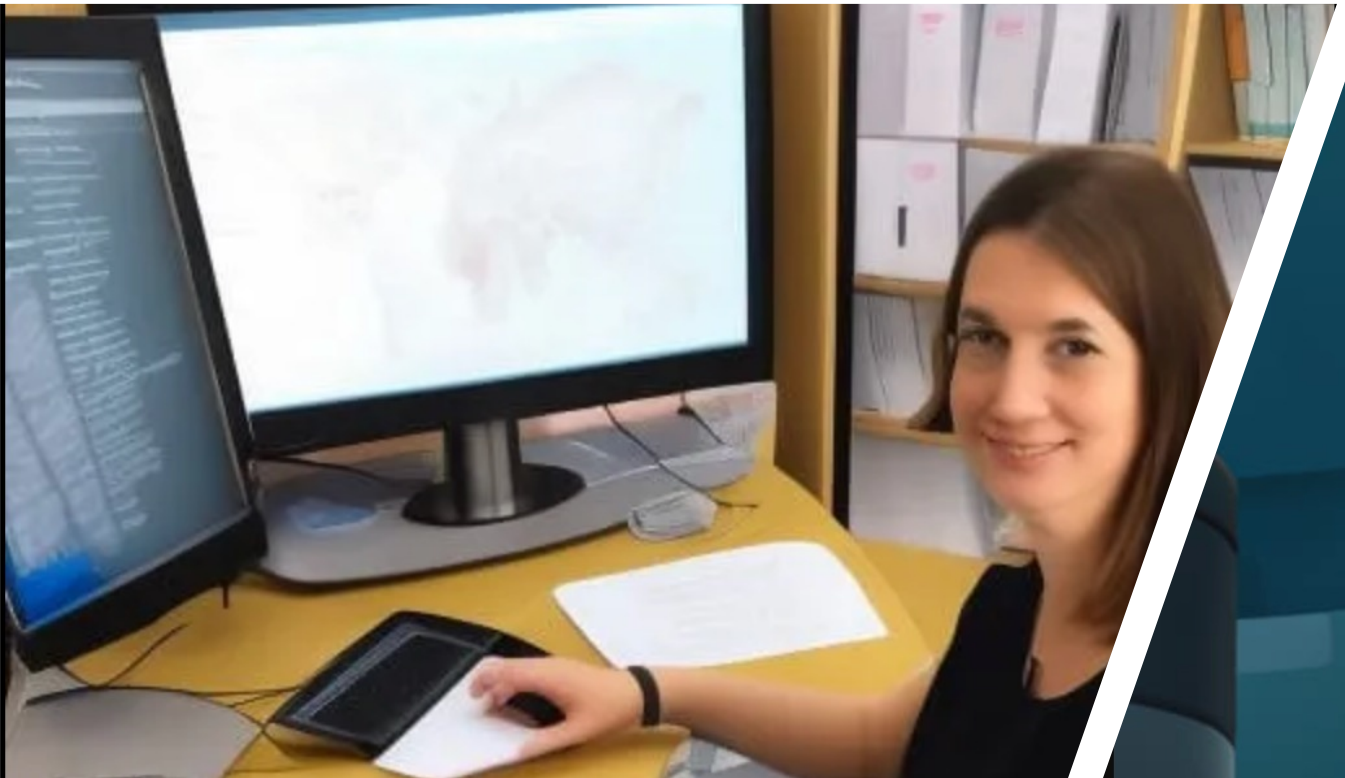
- Need for large computer resources
- Ethics & broader context
- Bias
- Human control

Kilroy, Riley and Bhatta (2023)

Image: HOBI Intl







05/24/15

Micro-credentials, Blockchain and Artificial Intelligence

Parameters	Micro-credentials	Blockchain	Artificial Intelligence
Definition	Short-term, specialized learning credentials that validate specific skills or knowledge.	A decentralized, distributed ledger technology that securely records and verifies transactions across multiple parties.	The simulation of human intelligence by machines, enabling them to perform tasks that typically require human intelligence.
Application	Skill development and validation, professional certifications, upskilling, and reskilling.	Secure and transparent data management, identity verification, and data integrity.	Data analysis, natural language processing, machine learning, computer vision, robotics, virtual assistants, and automation.
Verification	Typically issued by educational institutions, professional organizations, or online platforms.	Consensus mechanisms, , and decentralized network consensus.	Neural networks, algorithms, and statistical models trained on large datasets.
Decentralization	Not decentralized; administered by educational institutions or online platforms.	Decentralized network architecture with distributed nodes.	Can be centralized or decentralized depending on the implementation.
Security	Low risk and less prone to hacking. Dependent on the verification of the issuing organization.	Cryptographic encryption, immutability, and consensus mechanisms ensure data integrity and security.	Vulnerable to attacks but can be enhanced through encryption and secure protocols.
Scalability	Easily scalableto large numbers of learners, due to digitization and online delivery.	Scalability challenges due to consensus mechanisms and the need for network participants.	Scalability depends on computational resources, data availability, and processing power.
Impact	Addresses the skills gap, facilitates continuous learning, and enhances employability and career enhancement	Enhances transparency, trust, and efficiency in education.	Enables automation, optimization, and innovation.
Ethical Considerations	Ensuring quality and standardization, avoiding bias, and protecting personal data.	Privacy concerns, data ownership, governance, and environmental impact.	Bias in algorithms, privacy concerns, job displacement, and ethical use of AI in areas such as surveillance and decision-making.

- Table 1: Comparison of Micro-credentials, Blockchain and Artificial Intelligence (adapted from ChatGPT)


Future is NOW

Open Credential Services

- must have credible local accreditation

Image:

Microcredentials: Affordable Learning for ALL

+ Blockchain

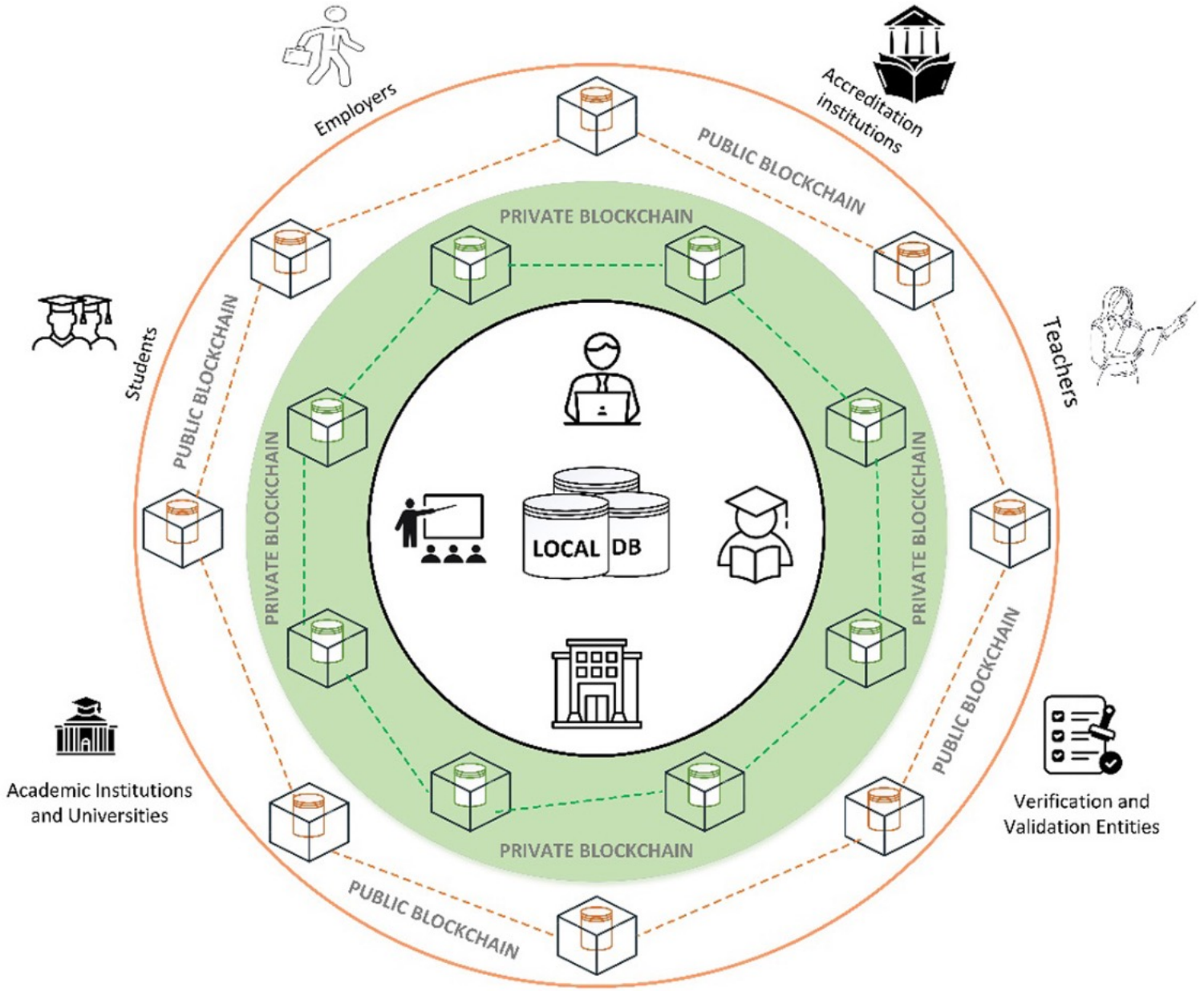
+ Artificial Intelligence

+ Openness

Image: Wikipedia CC-BY

Thank you

rory@athabascau.ca



Kabashi, F., Snopçe, H., Luma, A., & Neziri, V. (2024). Trustworthy Verification of Academic Credentials through Blockchain Technology. *International Journal of Online and Biomedical Engineering (iJOE), 20*(09), 51 - 64. https://doi.org/10.3991/ijoe.v20i09.48999