



the 2019

innovations dialogue.

**DISTRIBUTED LEDGER
TECHNOLOGIES**

**TECH TRACK BREAK-OUT
ROOM XVII**



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Distributed Ledger Technologies (DLT)



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| DIGITAL TECHNOLOGIES & INTERNATIONAL SECURITY

Bitcoin

2008

Bitcoin: A Peer-to-Peer Electronic Cash System

Satoshi Nakamoto
satoshin@gmx.com
www.bitcoin.org

Abstract. A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one person to another without going through a financial institution. Digital signature benefits are lost if a trusted third party is used to facilitate transactions. We propose a solution to the double-spending problem. The network timestamps transactions by hashing them into a proof-of-work chain of hash-based proof-of-work, forming a record that cannot be altered without redoing the proof-of-work. The longest chain rule is used to determine the current state of the network and to resolve any conflicts. As long as a majority of CPU power is controlled by honest nodes, the network is secure: no one can ever falsify or create transactions. The network itself requires minimal structure, no centralized server or base, and nodes can leave and rejoin the network at will, proof-of-work chain as proof of what has been done.

2009



The Man Behind
Bitcoin
Satoshi Nakamoto

2000+ cryptocurrencies
Market Cap US\$ 310 Bi
Bitcoin ~ 70% Market Cap

The challenge to avoid duplication



Copy

Internet of Information



Original

Internet of Value

Bitcoin x Blockchain x DLT

“Blockchain is to Bitcoin, what the internet is to email.”

SHEET NO. 1 ACCOUNT NO. 101
TERMS. NAME W. A. Brooks
RATING. ADDRESS
CREDIT LIMIT.

DATE	ITEMS	Folio	✓	DEBITS	DATE	ITEMS	Folio	✓	CREDITS
Nov 12	Cash from S.H. Allen			158.70	Nov 13	Draft to Barten T1			59.75
13	" " Payroll T1			173.50	13	Bal.			272.45
				332.20					332.20
13	Bal.			272.45	20	Draft to Barten T2			166.65
20	Cash from Payroll T2			154.20	20	Bal.			266.65
				426.65					426.65
20	Bal.			266.00	27	Draft to Barten T3			154.35
27	Cash from Payroll T3			100.10	27	Bal.			211.70
				366.10					366.10
27	Bal.			211.75	Dec 4	Draft to Barten T4			146.20
Dec 4	Cash from Payroll T4			126.30	11	Bal.			281.70
11	" " Eagle Eye "			25.00					363.10
				363.10	Dec 4	Bal.			216.90
Dec 4	Bal.			216.90	11	Cash from Payroll T5			116.70
11	Cash from Payroll T5			333.60					333.60
				208.10	11	Bal.			208.10
18	Cash from Eagle Eye T6			25.00	18	Draft to Barten T6			121.05
				233.40	18	Cash from Payroll T6			31.60
18	Bal.			80.75	18	Bal.			180.75
25	Cash from Payroll T7			56.00	25	Draft to Barten T7			184.30
				136.75	25	Bal.			22.45
									136.75

Blockchain is a kind of Distributed Ledger Technology (DLT)

Consensus



Consensus: agreement that a set of transaction is valid

DLT use a **consensus algorithm**

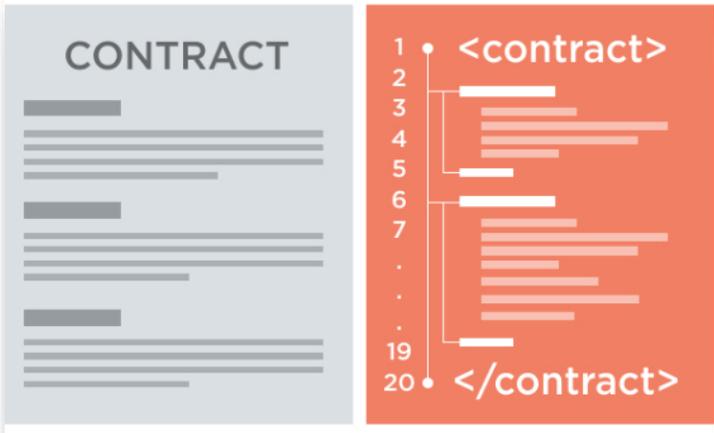


Consensus does NOT necessarily mean that all nodes agree

Examples:



Adding rules to manage assets

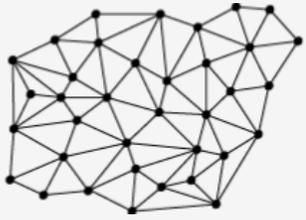


Smart Contracts (Nick Szabo, 1996)

- Computer program that encodes the rules of a contract, including asset transfers and payments



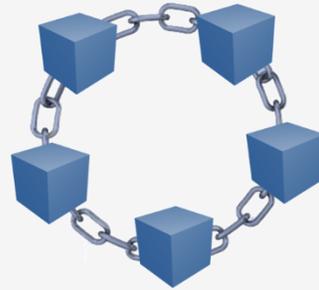
DLT/Blockchain is a Trust Machine



Distributed
(Physical)
and Shared



Decentralized
Power



Tamper-proof
Append-only



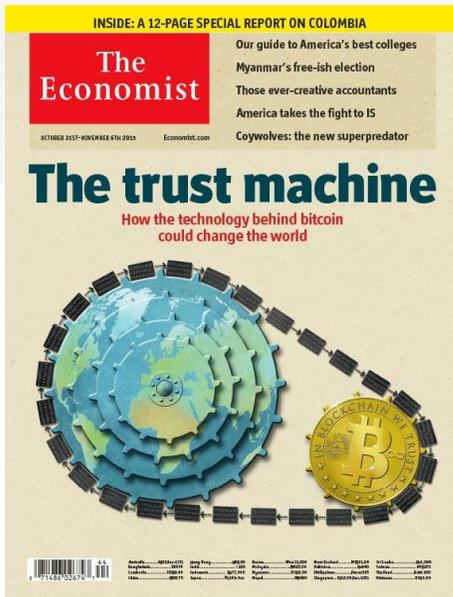
Peer-to-Peer



Resilient
Fault-tolerant



Transparent
and Traceable
[not always]



“What the internet did for communications, blockchain will do for trusted transactions.”

– Ginni Rometty, CEO of IBM



There are exceptions and hybrid platforms

Permissionless



Anyone can be a node

Financial Incentives

Censorship resistant + Trustless

Internet

Permissioned



Approval to become a node

Non-Financial Incentives

Privacy + Permissioning + Performance

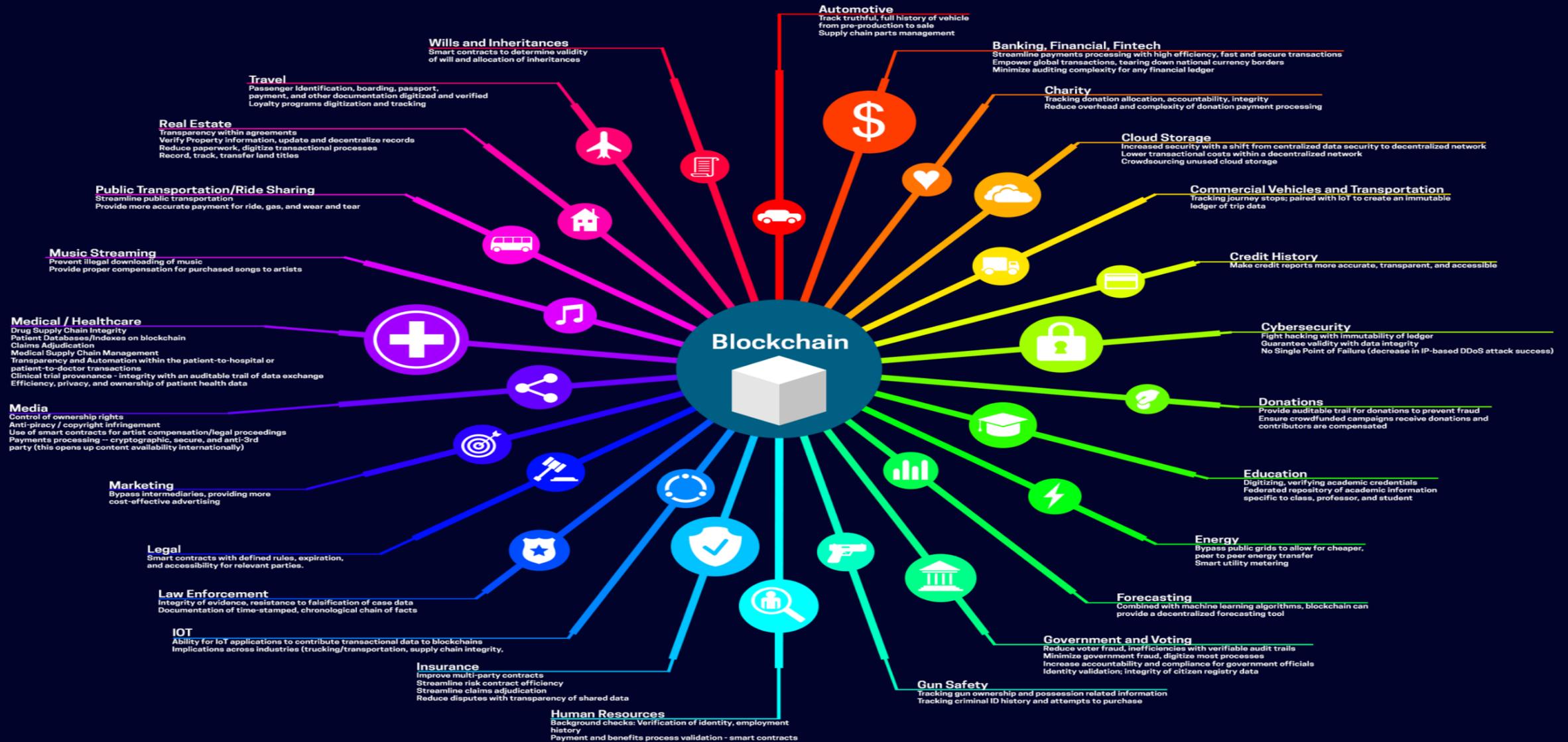
Intranet

QUESTION TIME



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Applications in Many Domains

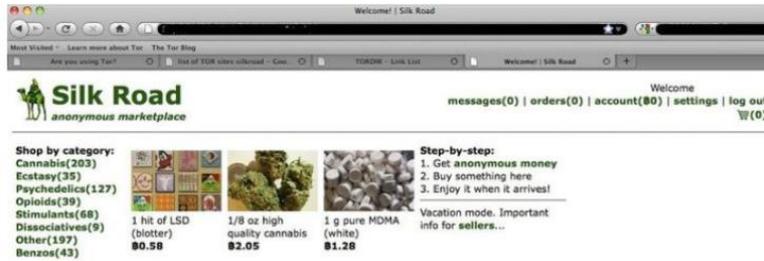


Not Without Issues



The Silk Road Report

Bitcoin News > Articles > The Silk Road Report



Black Markets



Financial Risks



Technology Bugs



Illegal Transfers



Ransomwares

Distributed Ledger Technologies

Policy challenges and opportunities

Giacomo Persi Paoli, PhD

Programme Lead— Security and Technology

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Challenges



Regulation and governance



Standardisation



Security, confidentiality and privacy



Interoperability

Challenges



Access



Education



Innovation

Opportunities

Opportunities derive from some of the key technical features of DLT:

- Data integrity
- Shared repository and rules
- Traceability
- Compliance by design
- Proof of existence
- Resilience

Opportunities

- Data integrity

Advantage: storing large amounts of data for very long periods of time (maybe centuries or more) while ensuring data integrity

Opportunities

- Shared repository and rules

Advantage: fast and secure sharing of data without the need of reconciliation

Opportunities

➤ Traceability

Advantage: ability to track in real-time the supply chain of specific items in order to enable the identification of points of diversion, trafficking routes and other illegal activities.

Opportunities

- Compliance by design

Advantage: automate a process or activity using a system that registers steps and outcomes in neutral repository (e.g. a tamper-proof workflow)

Opportunities

➤ Proof of existence

Advantage: ability to demonstrate that a file existed in a specific status and in a specific moment in time without revealing its content, but only revealing a kind of digital footprint of the file.

Opportunities

➤ Resilience

Advantage: ability to protect data against failures (downtime) and cyberattacks.

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