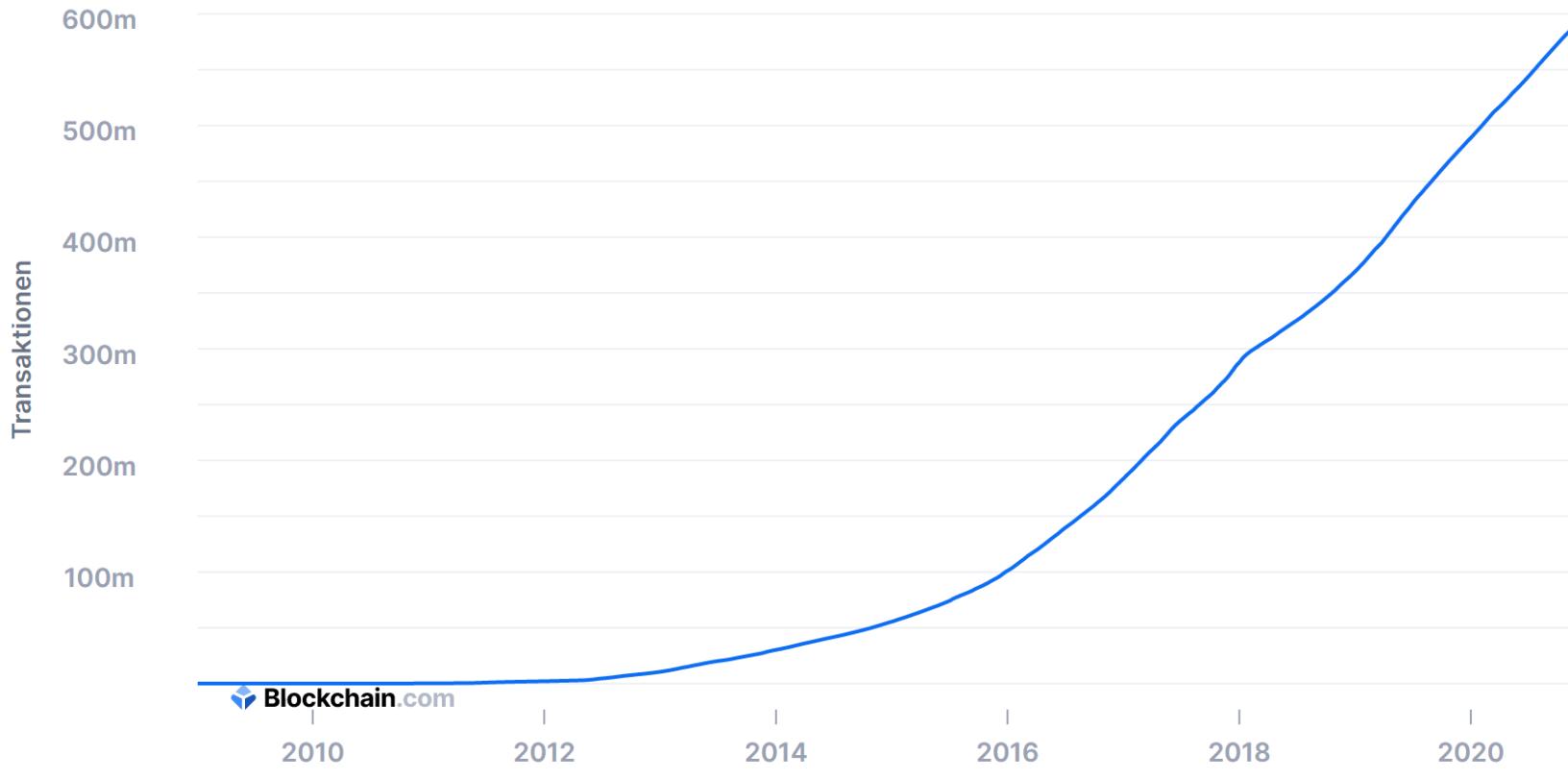


Wie viele Bitcoin-Transaktionen gab es?

Gesamtzahl der Transaktionen

Die Gesamtzahl der Transaktionen in der Blockchain.





3 Protect Data

- Protecting the Security & Integrity of Data
(4) Blockchain Technology

Summary

Transaction Message

From: Bob (1MVbjH...)
To: Carol (16pJcrG...)
Amount: 2.500
3045022100dc5
0fec013bc11eb...

AUTHENTIC

Bob is sending 2.500 LD to **Carol**. The transaction is marked as **AUTHENTIC**.

Ledger

account number	balance
1G8bnej6etY...	12.5
1KTA6awsyxj...	323
16pJcrG1m...	3.5
1MVbjHicuJr...	12.7
1G4HtHIp1o...	100
17UP3moev2...	.0000001
1Eeq4FM2Ts...	45
...	...

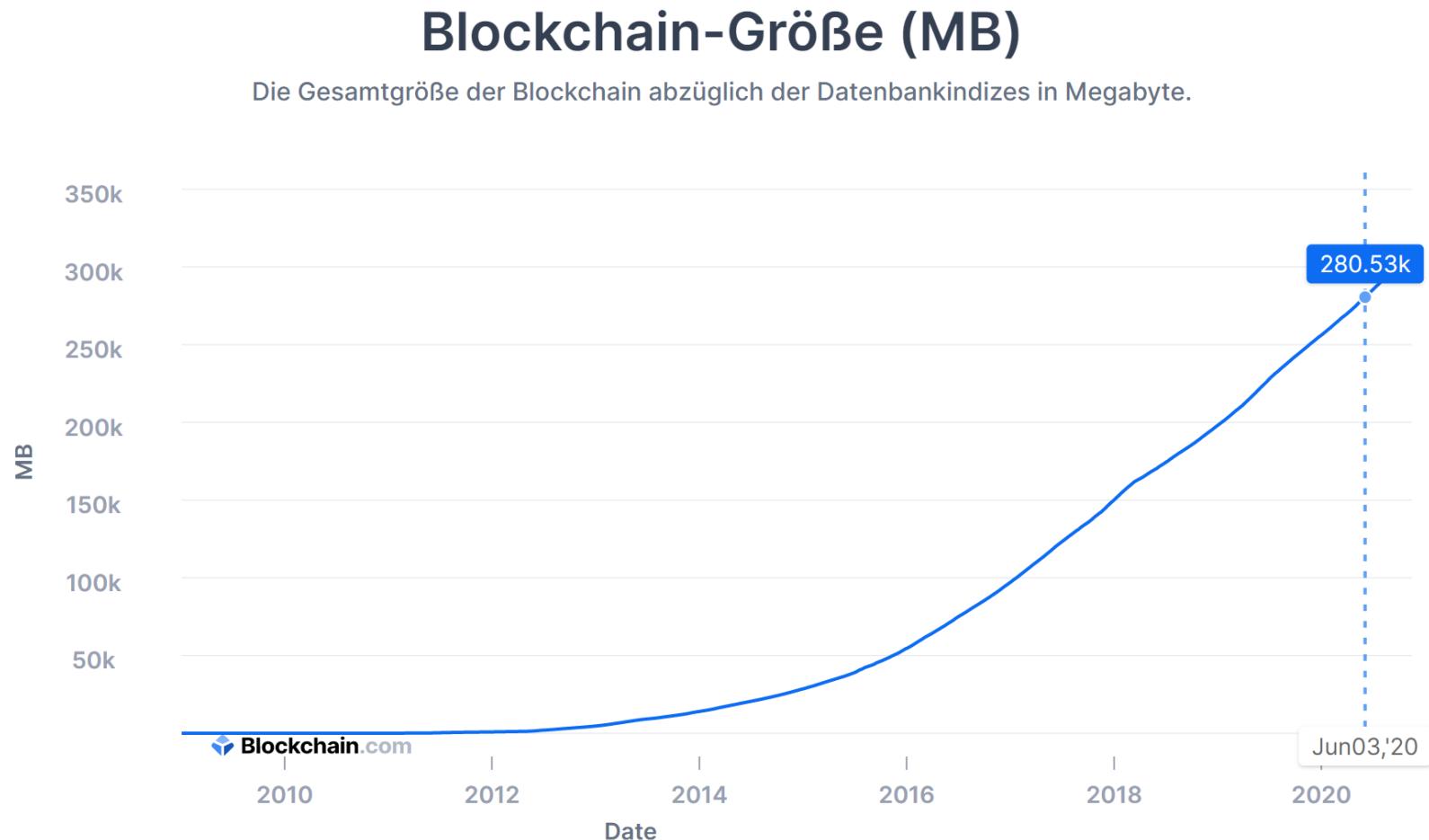
Ledger

Alice pays Bob 20 LD
Alice pays You 30 LD
Charlie pays You 100 LD
1073765433

SHA256 → 30 zeros

0000000000000000000000000000000011
00110001011011101100100100110110
100000000010001100010110110100011
1011111100111000110010010111000
11011011101110010101101101000111
00011110001000001000100110000110
11100111000110100001100010010001
10000101100010011010000101000000

Wie groß ist die Bitcoin-Blockchain?



Elon Musk: No Value except Illegal Transactions?

IDEAS • BITCOIN

Why Bitcoin Matters for Freedom

By **ALEX GLADSTEIN** December 28, 2018

IDEAS

Gladstein is Chief Strategy Officer at the Human Rights Foundation and Guest Lecturer at Singularity University

But innovation happens at the edge. Today, Venezuelans are adopting and experimenting with Bitcoin to evade hyperinflation and strict financial controls. Speculation, fraud, and greed in the cryptocurrency and blockchain industry have overshadowed the real, liberating potential of Satoshi Nakamoto's invention. For people living under authoritarian governments, Bitcoin can be a valuable financial tool as a censorship-resistant medium of exchange.

Take, for example, remittances. After ravaging the domestic economy, the Venezuelan regime is [now taking a cut](#) of money coming in from abroad. New laws force Venezuelans to go through local banks for foreign transactions, and require banks to disclose information on how individuals get and use their money. According to Alejandro Machado, a cryptocurrency researcher at the [Open Money Initiative](#), a wire transfer from the United States can now encounter a fee as high as 56% as it passes from dollars to bolivares in a process that can last several weeks. Most recently, Venezuelan banks have, under pressure from the government, even [prevented clients](#) using foreign IP addresses from accessing their online accounts.

3 Protect Data

- Protecting the Security & Integrity of Data

Content:

- 1. Motivation**
- 2. Data Integrity**
- 3. Bitcoin Crypto Currency**
- 4. Blockchain Technology**
- 5. Bitcoin Miner**
- 6. Smart Contracts**
- 7. IOTA**
- 8. Crypto Currency Opinions**
- 9. Summary**

Vitalik Buterin: Change whole Industries?



Vitalik Non-giver of Ether @VitalikButerin · 10. Dez. 2018

3. A simple example is a blockchain university degree verification app I saw recently. A degree is certified with just a digital signature, but *revocations* are put on chain. With cryptography alone you can't check that a revocation was *not* signed; but with a blockchain....

22

66

332



Vitalik Non-giver of Ether

@VitalikButerin

Folgen

4. To check that a degree was not yet revoked, you simply scan the chain and check all of the logs of the revocation contract. If a given degree was signed, and the revocation is not found on chain, then that means it's still valid.

08:04 - 10. Dez. 2018

Don Tapscott, 2016: How blockchain is changing ...

RETHINKING THE FINANCIAL SERVICES INDUSTRY



So to understand what a **radical change** this is going to bring, let's look at one **industry**, **financial services**. Recognize this? **Rube Goldberg machine**. It's a **ridiculously complicated machine** that does something really **simple**, like crack an egg or shut a door. Well, it kind of reminds me of the **financial services industry**, honestly. I mean, you **tap your card** in the corner store, and a **bitstream goes through a dozen companies**, each with their **own computer system**, some of them being 1970s mainframes older than many of the people in this room, and **three days later**, a **settlement occurs**. Well, with a **blockchain financial industry**, there would be **no settlement**, because the **payment** and the **settlement** is the **same activity**, it's just a **change in the ledger**.

Eine Rube-Goldberg-Maschine ist eine **Nonsense-Maschine**, die eine Aufgabe in zahlreiche unnötige und komplizierte Einzelschritte zerlegt. (Wikipedia)



Tapscott 2016, Blockchain Revolution:

„**Financial transactions** are comparable to **rube goldberg machines** – deliberately over-engineered but performing just a simple task.“

Bettina Warburg: Trust in Technology



As Douglass North saw it, **institutions** are a tool to **lower uncertainty** so that we can **connect** and **exchange all kinds of value in society**. And I believe we are now entering a further and **radical evolution** of how **we interact and trade**, because for the first time, we can **lower uncertainty** not just with **political and economic institutions**, like our **banks**, our **corporations**, our **governments**, but we can do it **with technology alone**.

Smart Dubai - Dubai Blockchain Strategy

"DUBAI WILL BE THE FIRST CITY FULLY POWERED BY BLOCKCHAIN BY 2020"

His Highness Sheikh Hamdan Bin Mohammed Al Maktoum
On the launch of the Dubai Blockchain Strategy, October 5 2016

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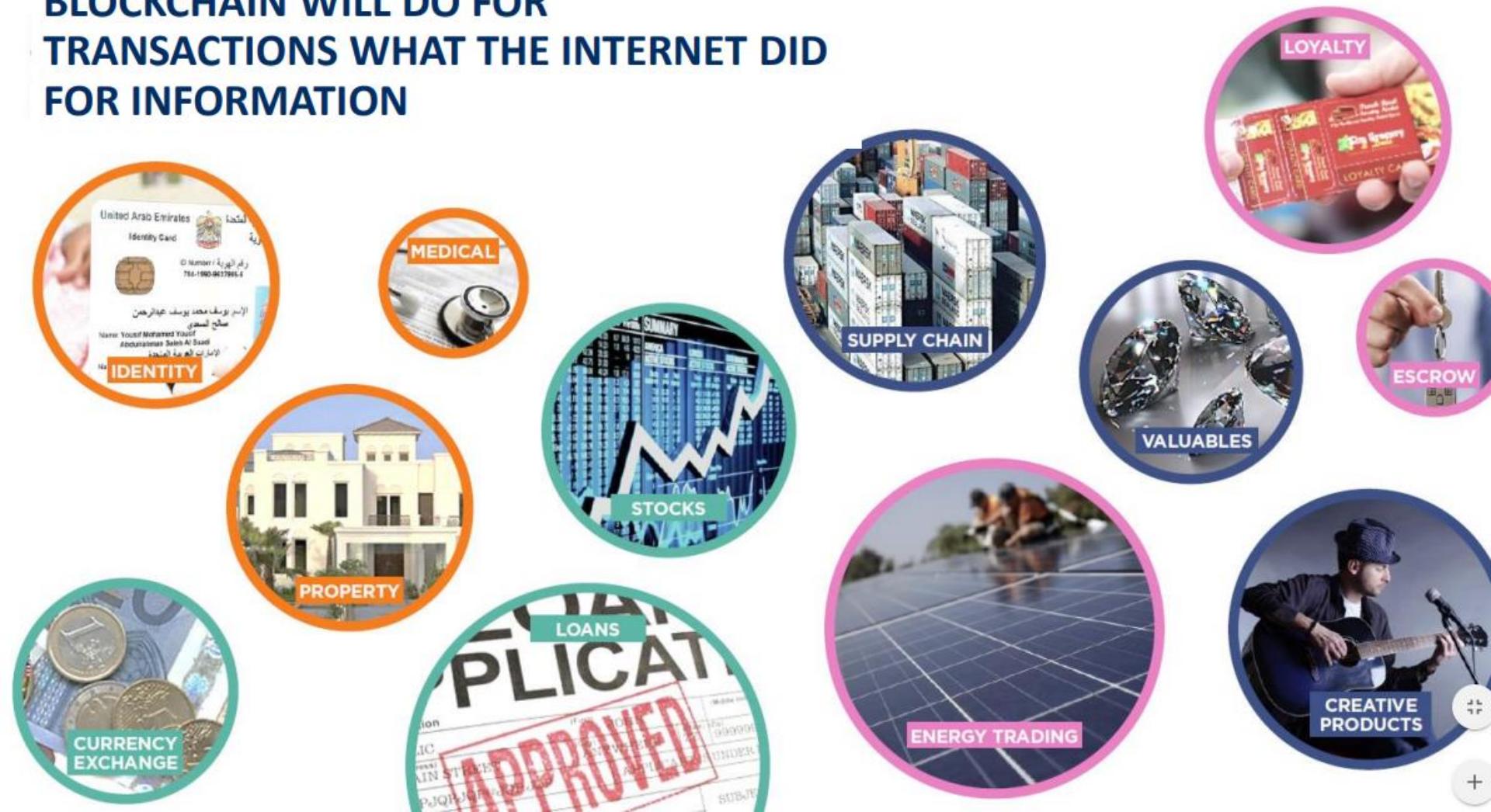
OUR VISION IS TO MAKE DUBAI THE HAPPIEST CITY ON EARTH

The Smart Dubai initiative was founded following the vision of His Highness Sheikh Mohammad bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, to make Dubai the happiest city on earth. Participation from all city stakeholders — residents, visitors, business owners, parents and families — is a cornerstone of our strategy.

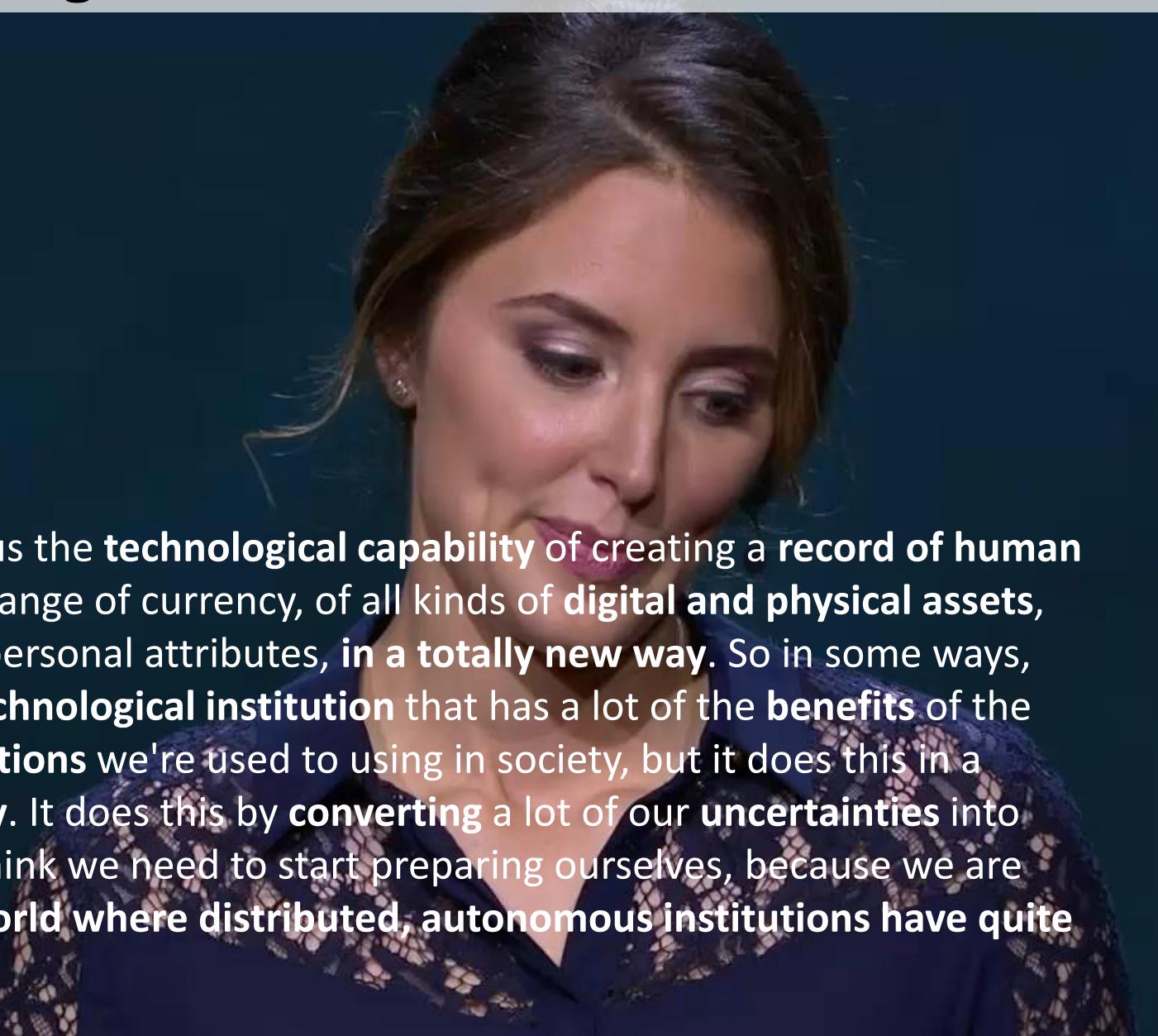
[LEARN MORE](#)

Smart Dubai - Dubai Blockchain Strategy

BLOCKCHAIN WILL DO FOR
TRANSACTIONS WHAT THE INTERNET DID
FOR INFORMATION



Bettina Warburg: Role of Autonomous Institutions?



Blockchains give us the **technological capability** of creating a **record of human exchange**, of exchange of currency, of all kinds of **digital and physical assets**, even of our own personal attributes, **in a totally new way**. So in some ways, they become a **technological institution** that has a lot of the **benefits** of the **traditional institutions** we're used to using in society, but it does this in a **decentralized way**. It does this by **converting** a lot of our **uncertainties** into **certainties**. So I think we need to start preparing ourselves, because we are about to face a **world where distributed, autonomous institutions have quite a significant role**.

3 Protect Data

- Protecting the Security & Integrity of Data

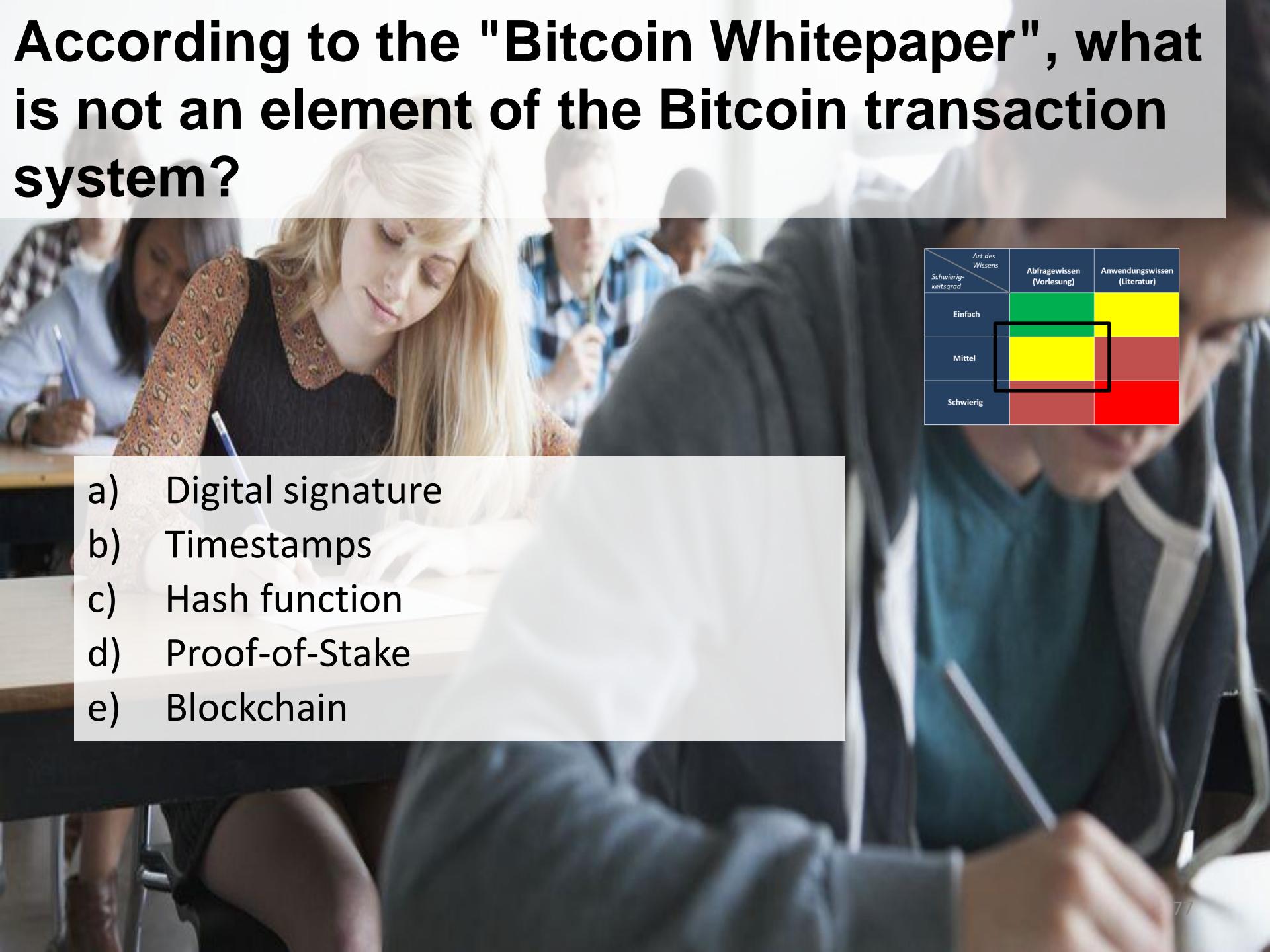
Content:

1. Motivation
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6. Smart Contracts
7. IOTA
8. Crypto Currency Discussions
9. Summary



- Data is the new **Gold**.
- Encryption is key to **Data Integrity**.
- Blockchain helps in **applications** with **no trust in networks**.
- **Crypto Currencies** are on the rise.

According to the "Bitcoin Whitepaper", what is not an element of the Bitcoin transaction system?

- 
- a) Digital signature
 - b) Timestamps
 - c) Hash function
 - d) Proof-of-Stake
 - e) Blockchain

Schwierigkeitsgrad \ Art des Wissens	Abfragewissen (Vorlesung)	Anwendungswissen (Literatur)
Einfach	Green	Yellow
Mittel	Yellow	Red
Schwierig	Red	Red

The ledger consists of a _____, each of which can store around 2,500 ___ per block.



- a) blockchain | transactions
- b) transaction | blockchains
- c) blockchain | bitcoins
- d) transaction | cryptocurrencies
- e) blockchain | cryptocurrencies

Art des Wissens Schwierigkeitsgrad	Abfragewissen (Vorlesung)	Anwendungswissen (Literatur)
Einfach		
Mittel		
Schwierig		

What is an advantage of blockchain technology?



Schwierigkeitsgrad	Art des Wissens	
	Abfragewissen (Vorlesung)	Anwendungswissen (Literatur)
Einfach	Green	Yellow
Mittel	Yellow	Red
Schwierig	Red	Red

- a) Accessibility
- b) Easy to tack transactions
- c) Faster transactions
- d) High level of security
- e) All

What is not true about IOTA?



Schwierigkeitsgrad	Art des Wissens	
	Abfragewissen (Vorlesung)	Anwendungswissen (Literatur)
Einfach	Green	Yellow
Mittel	Yellow	Red
Schwierig	Red	Red

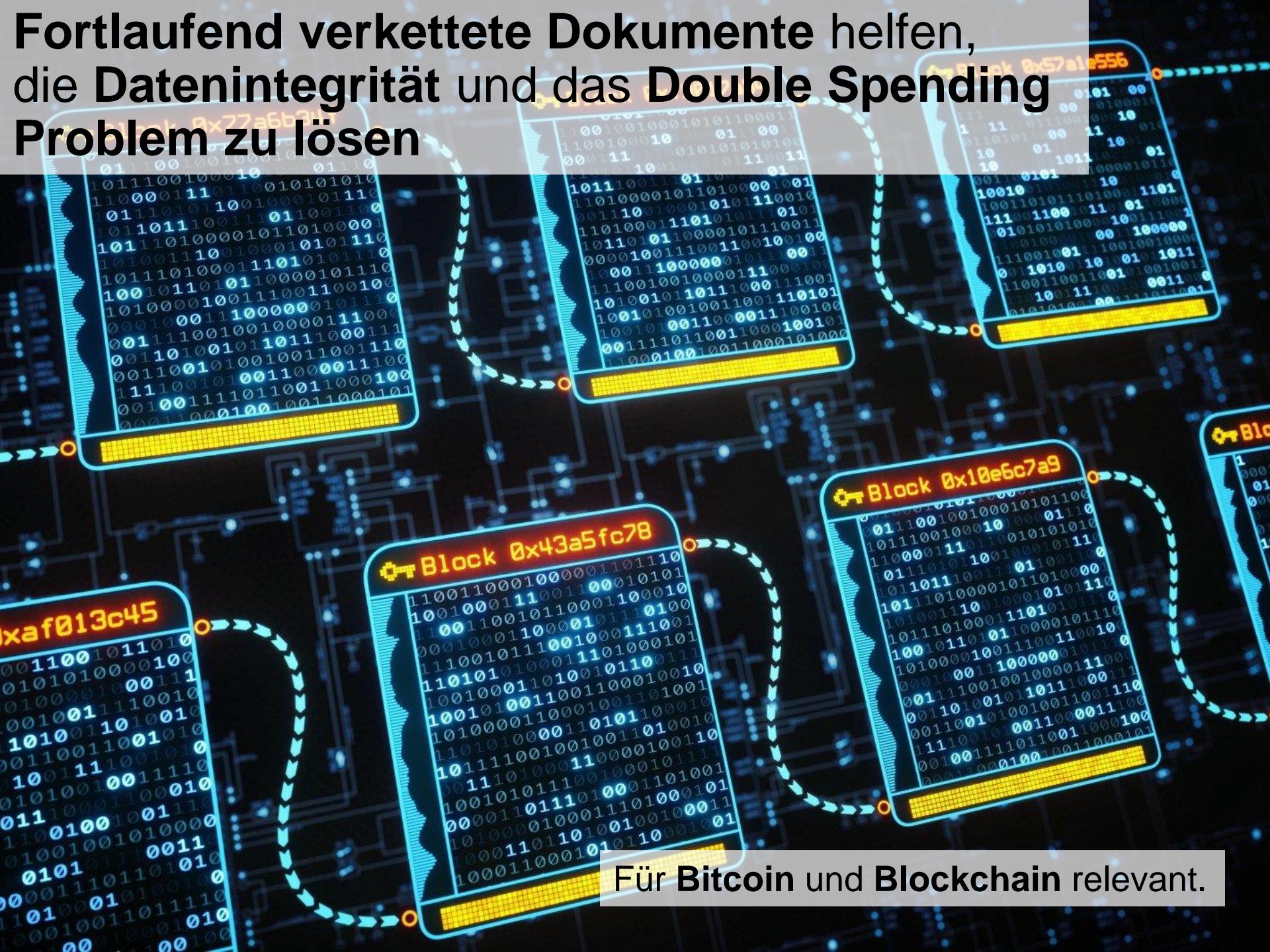
- a) It uses blockchain as baseline technology.
- b) It is an open-source distributed ledger and cryptocurrency.
- c) It uses a directed acyclic graph technology.
- d) It focuses on providing secure communications and payments between machines (Internet of Things).
- e) IOAT's transactions are free and confirmation times are fast.

What technology is used in libelium – smart parking?

Schwierigkeitsgrad	Art des Wissens	
	Abfragewissen (Vorlesung)	Anwendungswissen (Literatur)
Einfach	Green	Yellow
Mittel	Yellow	Red
Schwierig	Red	Red

- a) Blockchain
- b) Smart contract
- c) Radar sensor
- d) Digital signature
- e) Biometrics

Fortlaufend verkettete Dokumente helfen, die Datenintegrität und das Double Spending Problem zu lösen



Für Bitcoin und Blockchain relevant.

Michael Amberg

Todays Content:

- 1. Motivation**
- 2. Data Integrity**
- 3. Bitcoin Cryptocurrency**
- 4. Blockchain Technology**
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Bitcoin-Adresse

Adressen sind Kennungen, die verwendet werden um Bitcoins an eine andere Person senden.

Zusammenfassung

Adresse [13AM4VW2dhwYgXeQepoHkHSQuy6NgaEb94](https://blockchain.info/address/13AM4VW2dhwYgXeQepoHkHSQuy6NgaEb94)

Hash 160 [17b4bd9a139158614e8f54c6b800a1822609436a](https://blockchain.info/address/17b4bd9a139158614e8f54c6b800a1822609436a)

To's [Kennzeichnungen - Unausgeglichene Ausgänge](#)

Transaktionen

Anzahl der Transaktionen 136

Gesamtempfang \$ 318,065.22

Endgültige Balance \$ 2,842.16

Zahlungsanfrage

Spenden-Button



Transaktionen (Die ältesten zuerst)

Filter ▾

[02992bd48551f4d9ec2d2c4f6f82dab42b5a20f22593a5b2a656153162a9855](https://blockchain.info/tx/02992bd48551f4d9ec2d2c4f6f82dab42b5a20f22593a5b2a656153162a9855)

2018-01-03 22:31:06

1soKWfCPVrr2GAuN2v3SbXGjrYsCEs2TG



13AM4VW2dhwYgXeQepoHkHSQuy6NgaEb94

\$ 1.60

\$ 1.60



Simple. Seamless. Secure.
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[GET STARTED](#)

BLOCKCHAIN

[103ec673850e844b10e38941953b44ee73a8b80e5bfee5eb56d3401428d73820](https://blockchain.info/tx/103ec673850e844b10e38941953b44ee73a8b80e5bfee5eb56d3401428d73820)

2018-01-03 03:23:16

11WoLbasoiuFbe2cVV5VuaJYkwSJn72z



13AM4VW2dhwYgXeQepoHkHSQuy6NgaEb94

\$ 1.60

\$ 1.60

Wannacry, 12.5.2017 (Bitcoin-Adresse = „Bitcoin-Konto“)

Block #478789

Zusammenfassung

Anzahl der Transaktionen	2359
Ausgang insgesamt	\$ 1,206,937,377.37
Geschätztes Transaktionsvolumen	\$ 102,176,632.18
Transaktions Gebühren	\$ 31,717.60
Height	478789 (Hauptchain)
Zeitstempel	2017-08-03 03:39:15
Empfangene Zeit	2017-08-03 03:39:15
Weitergeleitet von	F2Pool
Schwierigkeit	860,221,984,436.22
Bits	402736949
Größe	1000.0 kB
Gewicht	3999.748 kWU
Version	0x20000012
Nonce	3623102768
Block Reward	\$ 183,589.13

Transaktionen

842c80e199a9fb03fe0047f468d8f5802fc140d6b657d4428e16510df1736a

2017-08-03 03:39:15

Wannacry, 12.5.2017 (Bitcoin-Block = ca. 2.500 Transaktionen)

\$ 215,306.79

\$ 0.00

Hashes

Hash	0000000000000000000000000000000010b7b850ebea209fc1e693c113f4cf5e78456dd8842bb5a
Vorheriger Block	0000000000000000000000000000000056b1869264b9825a767c6e139ddcef4c888bef0eeabb5
Nächster Block	0000000000000000000000000000000015430fd4a784b3e3cb541ff35fbf12271d7e2f8a81af6d
Merkle Root	04d88d28adcd88ee3b32be88899f315ab36a3c7db24dbf30e003955c2503e643



Be Your Own Bank.

Use your Blockchain wallet
to buy bitcoin now.

[GET STARTED →](#)



Transaktion Informationen zu einer Bitcoin Transaktion anzeigen

a1075db55d416d3ca199f55b6084e2115b9345e16c5cf302fc80e9d5fbf5d48d

1XPTgDRhN8RFnzniWCddobD9iKZatrVH4



17SkEw2md5avVNyYgj6RiXuQKNwkXaxFyQ

10,000 BTC

10,000 BTC

Zusammenfassung

Größe 23620 (Bytes)

Gewicht 94480

Empfangene Zeit 2010-05-22 18:16:31

Enthalten in folgenden Blöcken 57043 (2010-05-22 18:16:31 + 0 Minuten)

Bestätigungen 444352 Bestätigungen

Visualisieren [Baum Chart anzeigen](#)

Ein- und Ausgänge

Insgesamte Eingänge 10,000.99 BTC

Insgesamte Ausgänge 10,000 BTC

Gebühren 0.99 BTC

Gebühr pro Byte 4,191.363 sat/B

Gebühr pro Gewichtseinheit 1,047.841 sat/WU

BTC übertragen, geschätzt 10,000 BTC

Scripts [Scripts & coinbase anzeigen](#)



Bitcoin has been the best performing currency 3 of the last 4 years.

[BUY YOURS NOW](#)

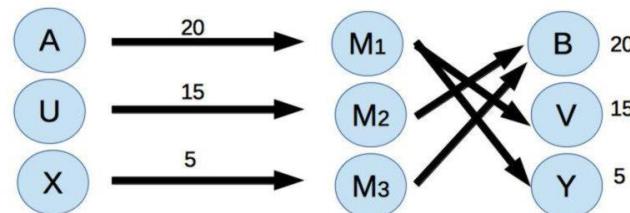


Bitcoin Mixer

Bitcoin Mixer sind Angebote, die dazu dienen, die Geldflüsse Deiner Bitcoins (BTC) zu verschleiern. Damit helfen sie, die Privatsphäre Deines Vermögens zu schützen. Kritiker sehen Bitcoin Mixer als Werkzeuge, um kriminelle Aktivitäten der Beobachtung zu entziehen.

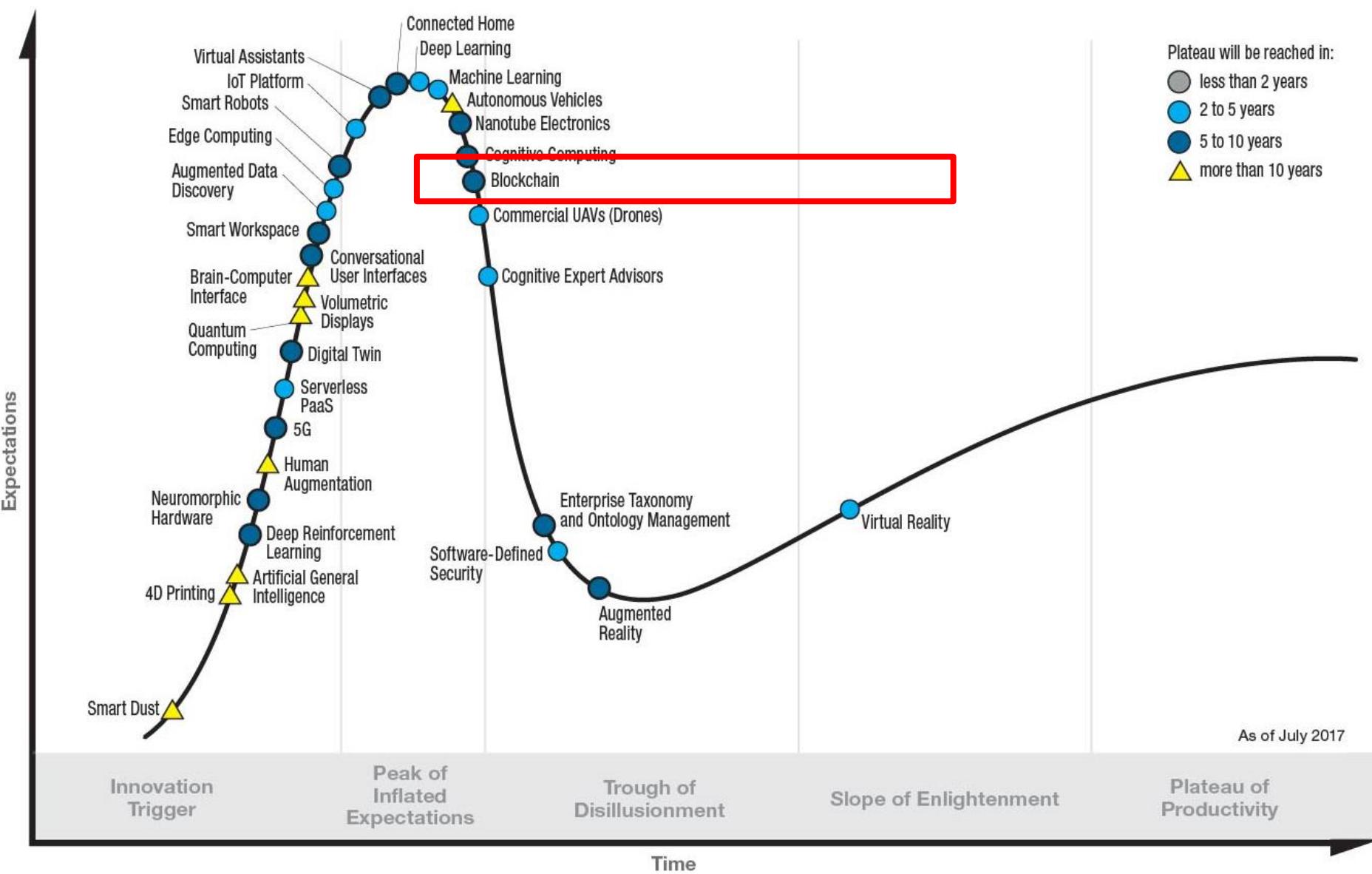
Bitcoin (BTC) als erste und führende Kryptowährung hat zwar in seinem Konzept prinzipiell Anonymität verankert. Doch in der Realität ist bei der üblichen Nutzung von BTC diese Anonymität nicht oder nur in geringem Ausmaß gewährleistet. Denn alle Transaktionen werden in der öffentlich einsehbaren Blockchain für immer dokumentiert. Sobald es jemandem gelingt, die Adresse einer Bitcoin Wallet einer konkreten Person oder Unternehmen zuzuordnen, lässt sich also nachvollziehen, von wo und wohin diese Wallet Transaktionen durchgeführt hat und um welche Beträge es dabei ging. Verglichen mit dem klassischen Bankkonto heißt das, jeder könnte herausfinden, von wem du wie viel Geld bekommst und wofür Du es wieder ausgibst. Um diese Schwachstelle im Konzept von BTC zu schließen, wurden Bitcoin Mixer erfunden.

Mit Mixer



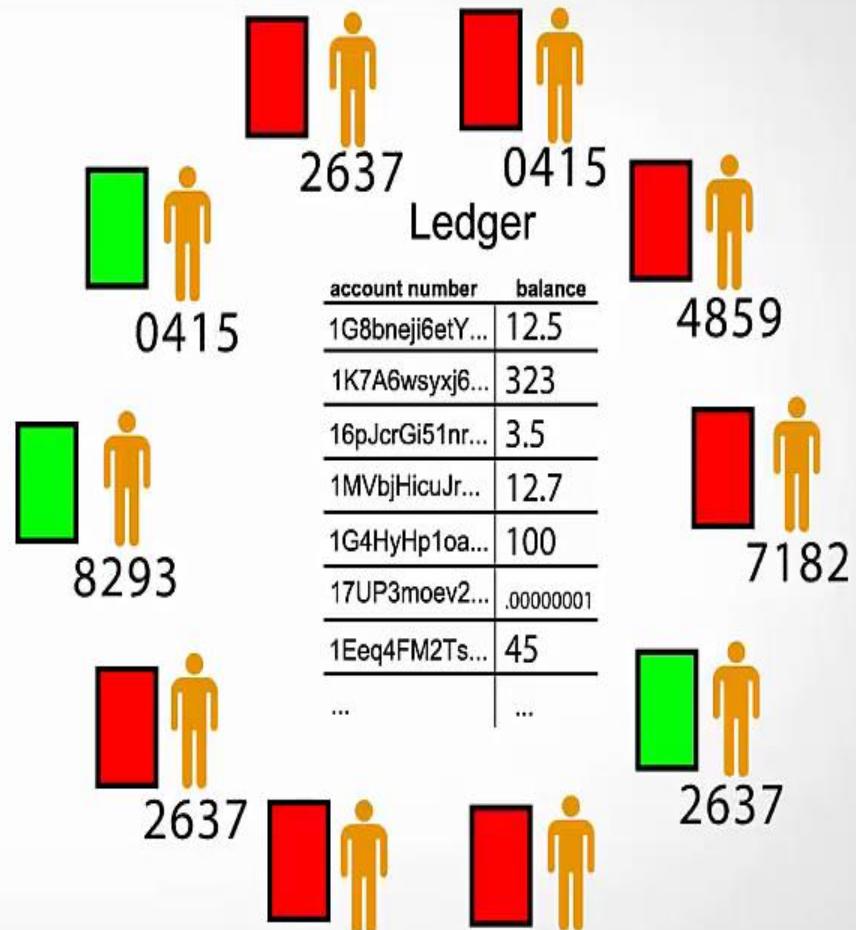
4. Blockchain The Technology Behind Bitcoin

Gartner Hype Cycle for Emerging Technologies, 2017



Summary

Transaction Message

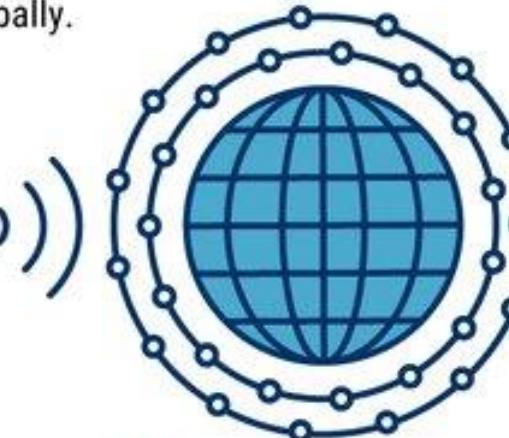


Der **Ledger** besteht aus einer **Kette von Blöcken (Blockchain)**, die jeweils ca. **2.500 Transaktion pro Block** speichern können.

1

Alice wants to send Bob two bitcoin.

She sends a **TRANSACTION REQUEST** to the Bitcoin blockchain, a distributed database running on thousands of computers globally.

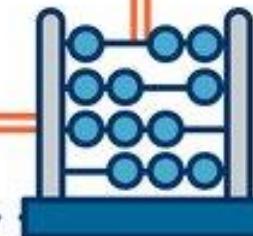


2

Computers known as **MINERS** verify this transaction (e.g. check Alice's balance) and compete to place it into a **BLOCK** with other transactions.



Once the answer is **VERIFIED** – when



3



ALICE

SEND BOB



BOB



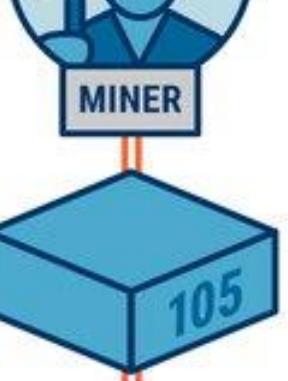
105

Once the answer is **VERIFIED** – when a majority of miners in the network approve the block – the miner who solved the puzzle gets paid in bitcoin.



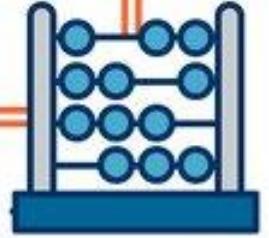
4

Others in the network check the miner's work.



2

Computers known as **MINERS** verify this transaction (e.g. check Alice's balance) and compete to place it into a **BLOCK** with other transactions.

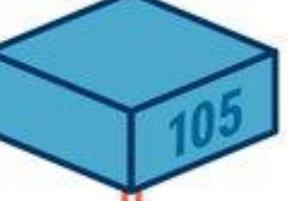


105

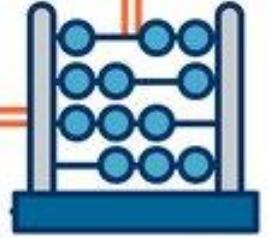


3

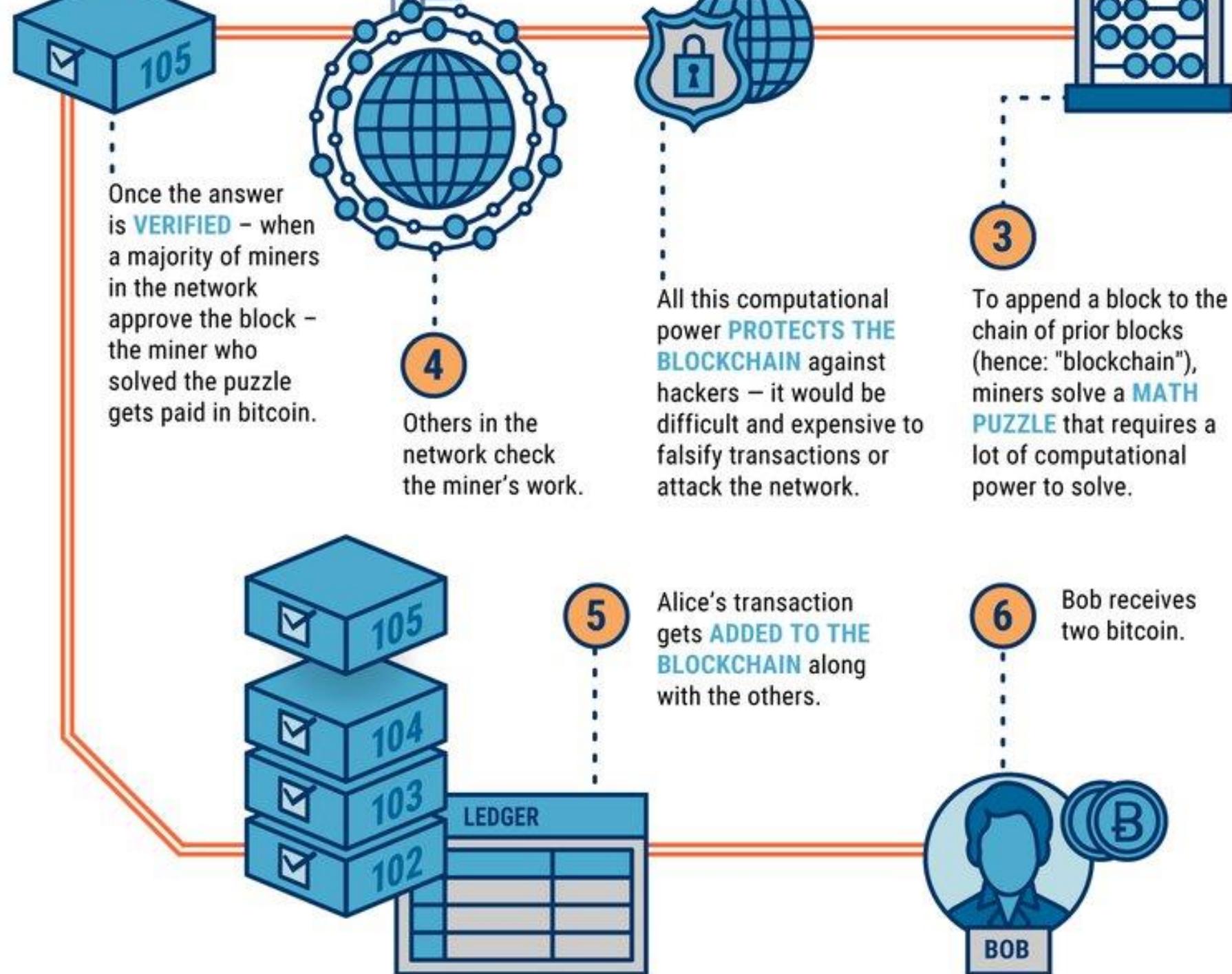
All this computational power **PROTECTS THE BLOCKCHAIN** against hackers – it would be difficult and expensive to falsify transactions or attack the network.



MINER



105



171056 unbestätigte Transaktionen

Live aktualisierte Liste der aktuellen Bitcoin Transaktionen



Zusammenfassung

Status: In Verbindung gebracht

Gebühren, gesamt

72.23228052 BTC

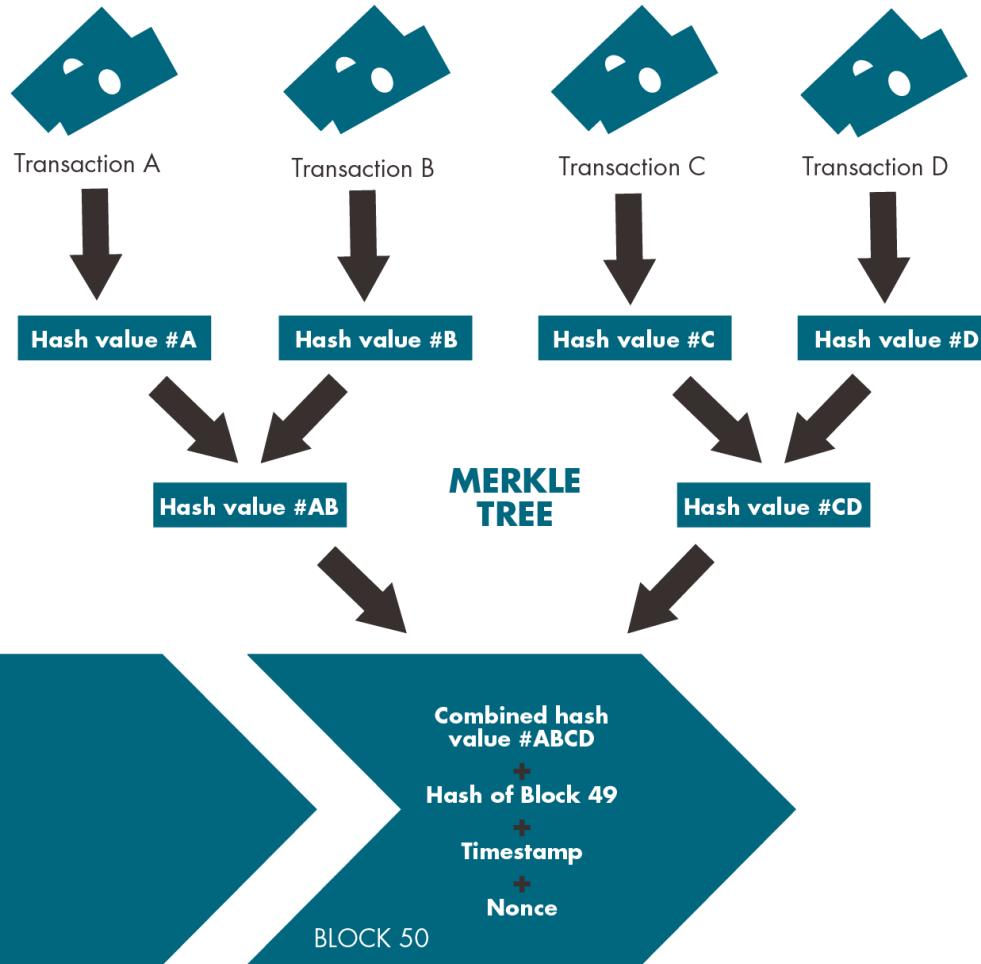
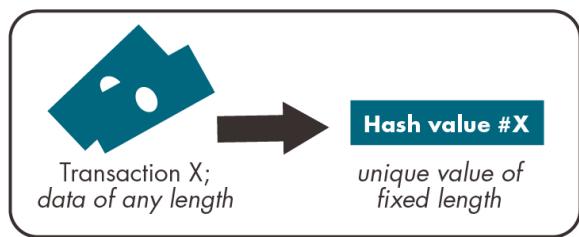


Bitcoin has been the best performing currency 3 of the last 4 years.

BUY YOURS NOW

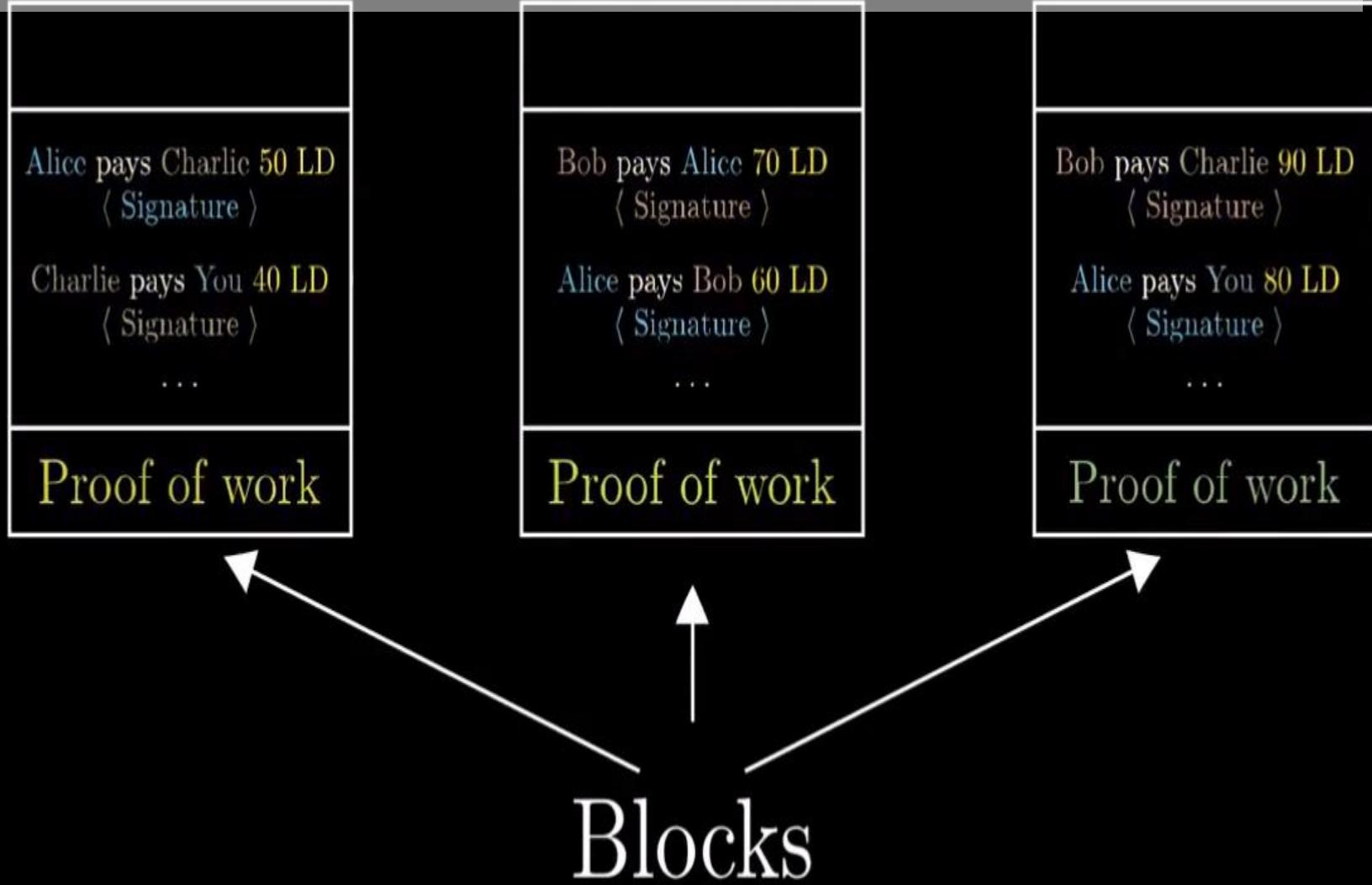
BLOCKCHAIN

HOW THE BLOCKCHAIN WORKS



Reproduction of an original figure in "The Great Chain of Being Sure About Things" by the Economist

A Chain of Blocks (Blockchain) is harder to hack



Währungs Statistik

Summary of bitcoin statistics for the previous 24 hour period.

BLOCK SUMMARY

Blöcke gefunden	155
Zeit zwischen den Blöcken	8.69 Minuten
Bitcoins gefunden	1,937.5000000 BTC

MARKTÜBERSICHT

Marktpreis	\$14,841.45	Diagramm anzeigen
Handelsvolumen	\$1,287,568,036.15	
Handelsvolumen	84,515.71000000 BTC	

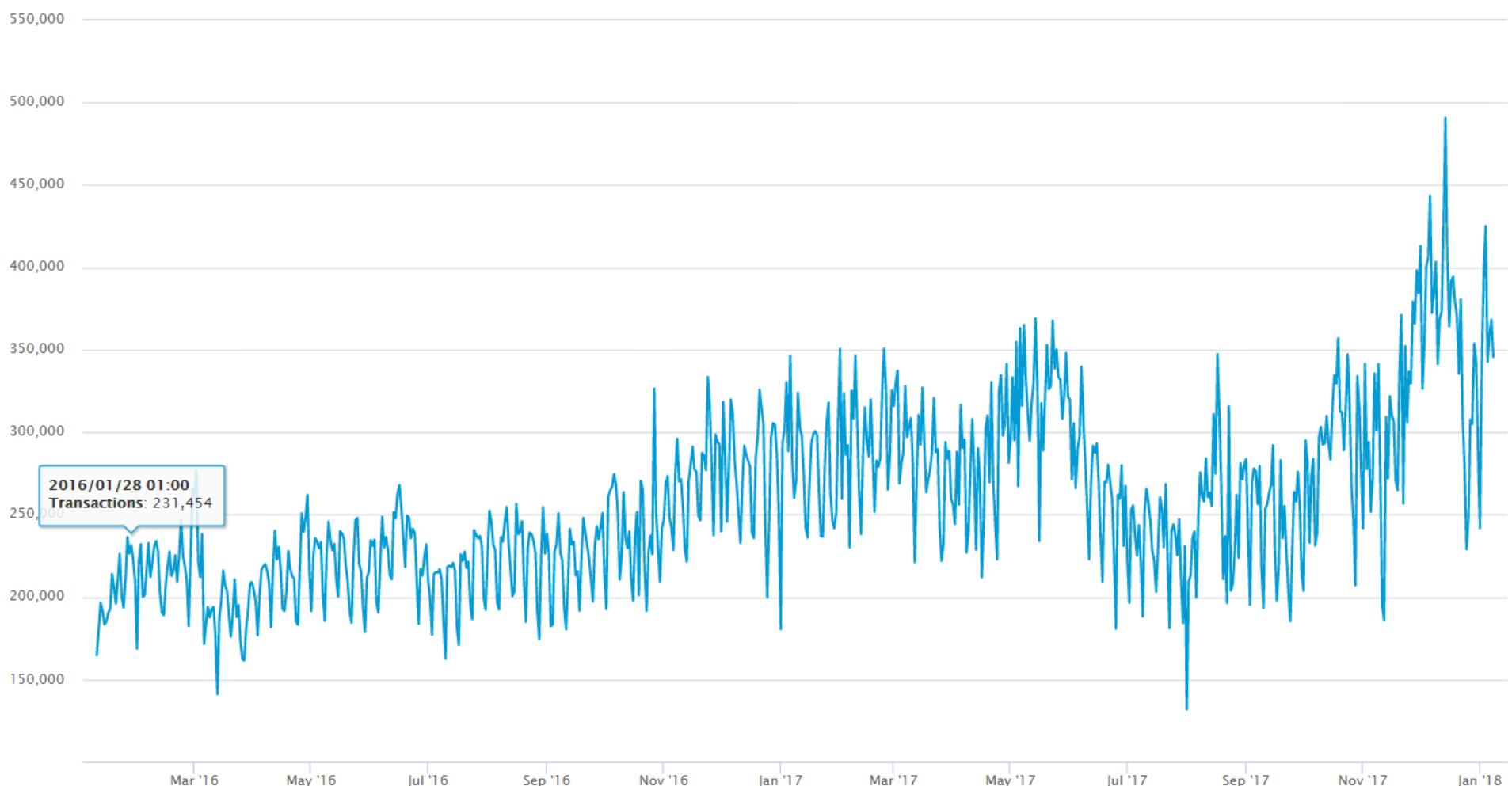
TRANSACTION SUMMARY

Gesamte Transaktions-Kosten (BTC)	709.38512803 BTC	Diagramm anzeigen
Anzahl der Transaktionen	337,427	Diagramm anzeigen
Total Output Volume (BTC)	2,070,244.34016876 BTC	Diagramm anzeigen
Geschätztes Transaktions Volumen (BTC)	244,720.83521011 BTC	Diagramm anzeigen
Geschätztes Transaktions Volumen (USD)	\$3,728,238,311.47	Diagramm anzeigen

Confirmed Transactions Per Day

The number of daily confirmed Bitcoin transactions.

Source: blockchain.info



Anzahl erfolgreicher Bitcoin-Transaktionen pro Tag (blockchain.info)⁷⁰

TOP 5 BLOCKCHAIN BENEFITS



ADVANTAGES OF BLOCKCHAIN TECHNOLOGY

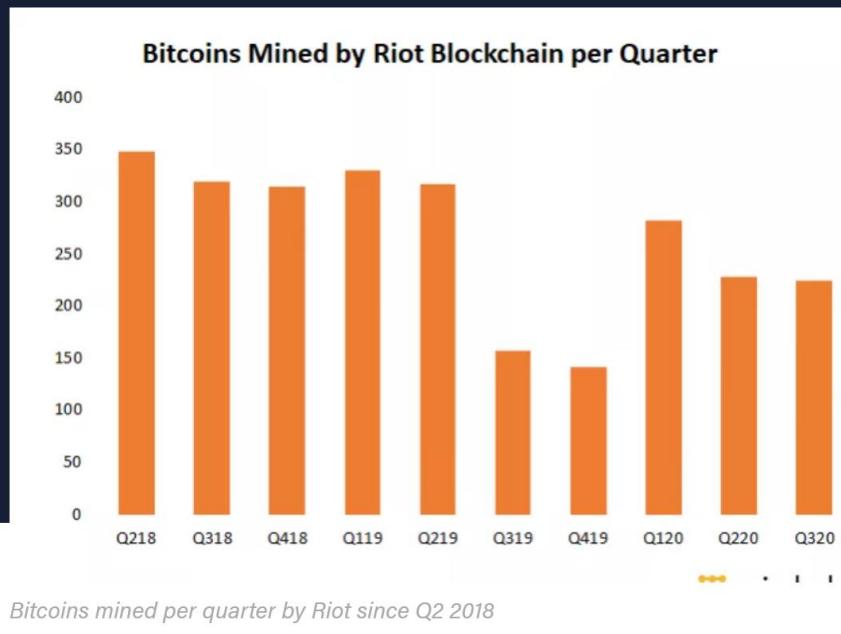


BENEFITS OF BLOCKCHAIN IN DIFFERENT SECTORS

- TRADE FINANCE**
 - Data integrity
 - Streamlines process
 - Programmable process
 - Market reactivity
 - Code reduction
- ENERGY SECTOR**
 - Environmental sustainability
 - Reduced costs
 - Improved transparency
- REAL ESTATE**
 - Tokenization
 - Proper tenant and investor identity
 - Property sale
 - Real-time accounting
- GOVERNMENT**
 - Proper identity management
 - Transparent elections
 - Finance management
- HEALTH CARE**
 - Universal patient profile
 - Drug traceability
 - Better clinical trials
 - Electronic health records (EHRs)

Riot Blockchain Mined 222 Bitcoins in Q3

Nov 10, 2020 at 2:32 a.m. ▪ Updated Nov 10, 2020 at 2:41 p.m.



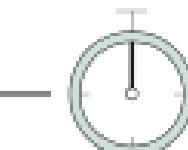
Publicly traded bitcoin mining company Riot Blockchain

Zeitbedarf
für 100 000
Transaktionen:

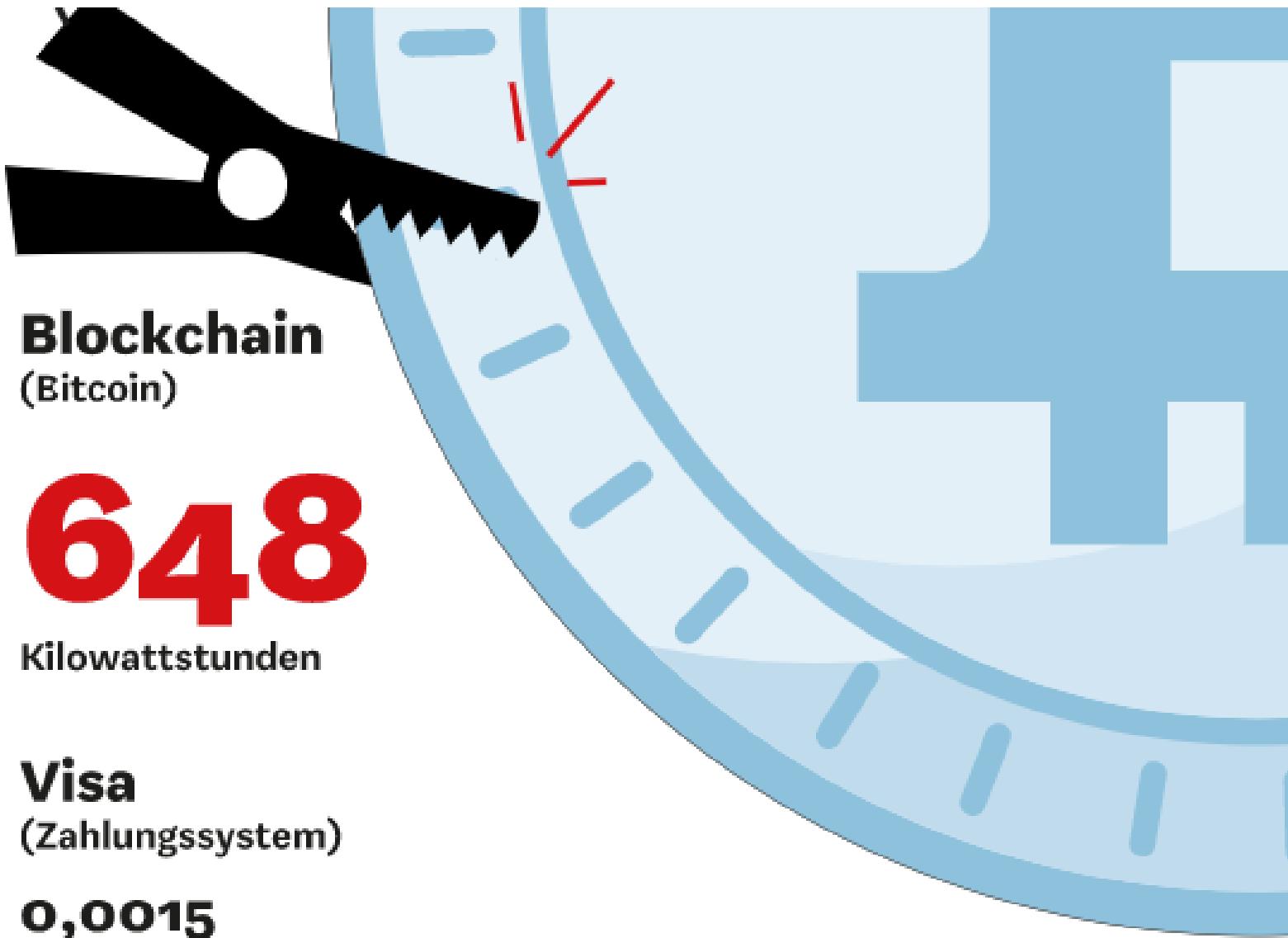
Blockchain
(Bitcoin)



Visa
(Zahlungssystem)



1,8
Sekunden



Laut WiWo 24.11.19: Wie viel Strom Bitcoin aktuell verbraucht

The Tangle

Serguei Popov*

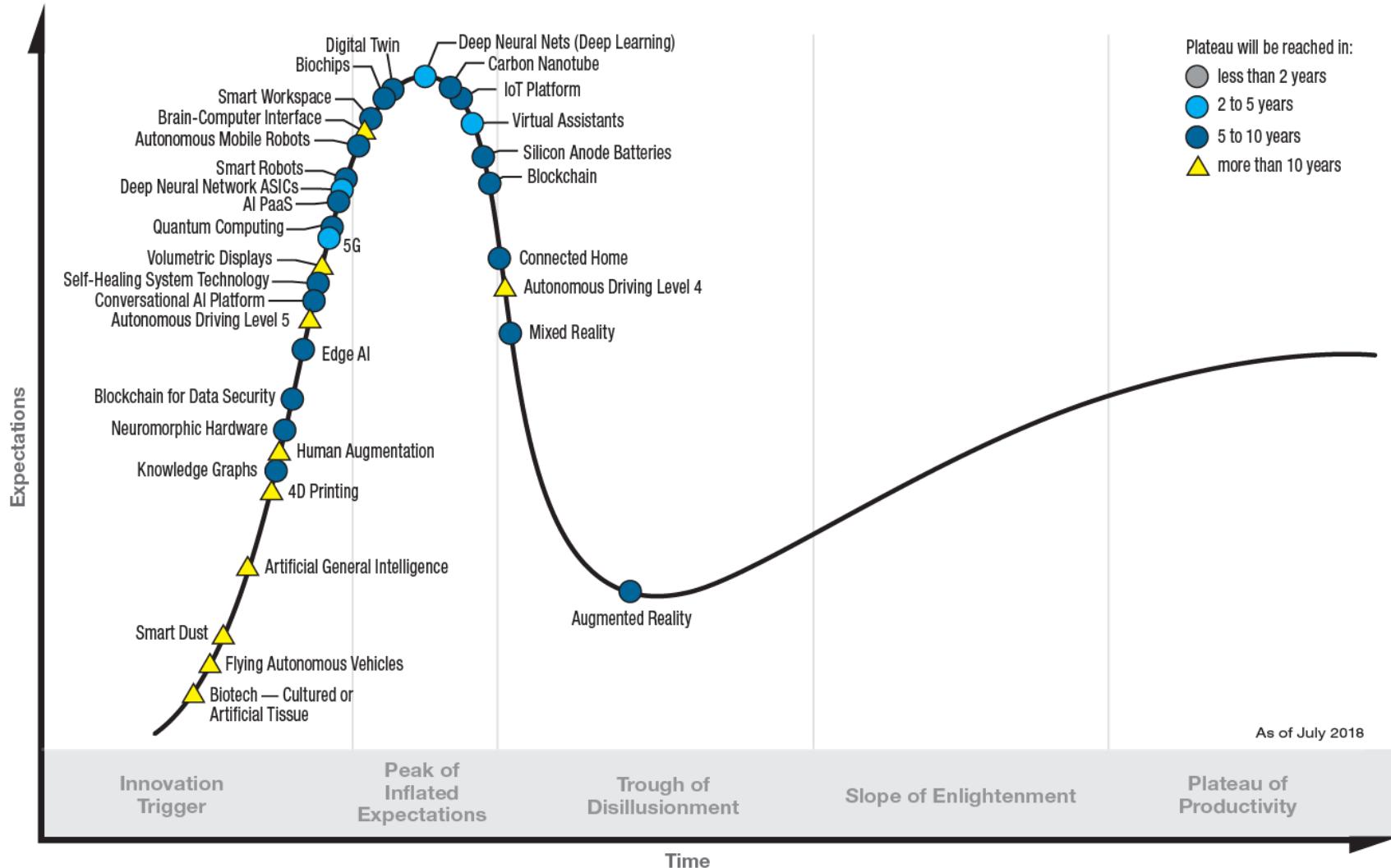
October 1, 2017. Version 1.3

Abstract

In this paper we analyze the mathematical foundations of IOTA, a cryptocurrency for the Internet-of-Things (IoT) industry. The main feature of this novel cryptocurrency is the *tangle*, a directed acyclic graph (DAG) for storing transactions. The tangle naturally succeeds the blockchain as its next evolutionary step, and offers features that are required to establish a machine-to-machine micropayment system.

An essential contribution of this paper is a family of Markov Chain Monte Carlo (MCMC) algorithms. These algorithms select attachment sites on the tangle for a transaction that has just arrived.

Hype Cycle for Emerging Technologies, 2018



gartner.com/SmarterWithGartner

Source: Gartner (August 2018)

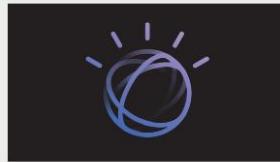
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Gartner

IBM Watson heute?

Moments from IBM's transformation

As our company has led clients on their digital journeys, IBM has also transformed itself—through acquisitions, breakthrough technologies and social innovations.



IBM Watson

IBM Watson helped AI emerge from a long “winter” and is now deployed in customer service, healthcare, supply chain, weather forecasts, energy exploration and other fields—totaling more than 30,000 client engagements.



P-TECH

Pathways in Technology Early College High Schools (P-TECH) is a new education model co-developed by IBM working together with educators, policymakers and elected officials.



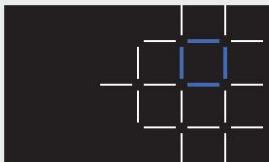
IBM Cloud

IBM Cloud has grown to be a more than \$21 billion business offering enterprises public, private and hybrid cloud solutions. In 2019, IBM introduced the world's first financial services-ready public cloud, secure and purpose-built for the industry.



IBM Security

IBM Security was built for industry-leading compliance, threat monitoring and container security. In 2019, Cloud Pak for Security was introduced to orchestrate tools across the entire security stack.



IBM Blockchain

IBM Food Trust, TradeLens and other initiatives are streamlining supply chain processes and bringing trust and transparency to transactions.



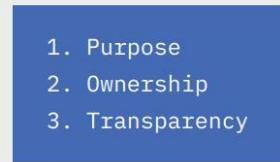
IBM Q

A fundamentally different way of computing, quantum has the potential to transform business and solve some of the world's biggest problems. IBM has led in quantum research and development and now offers a fleet of 15 advanced quantum computers.



IBM Garage

A comprehensive approach to innovation and transformation, the IBM Garage process brings designers and developers together with clients and stakeholders. The process helps create and scale new ideas and achieve business value.



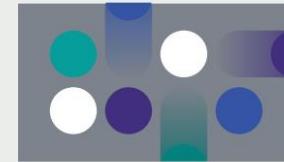
Principles for Trust & Transparency

For more than a century, IBM has earned the trust of clients and society. In 2018, we codified the core principles that guide everything we do, from handling client data to the responsible deployment of new technologies.



Red Hat

One of the largest technology acquisitions in history combined the power and flexibility of Red Hat's open hybrid cloud technologies with the scale and depth of IBM's innovation and industry expertise.



Strategic Divestitures

Over eight years, IBM has sold businesses with more than \$10 billion in revenue, including semiconductor manufacturing and x86 servers, in order to allocate capital to innovation.



Business Roundtable

In 2019, IBM signed the Business Roundtable Statement on the Purpose of a Corporation. The Business Roundtable is a group that brings together the CEOs of nearly 200 American companies.