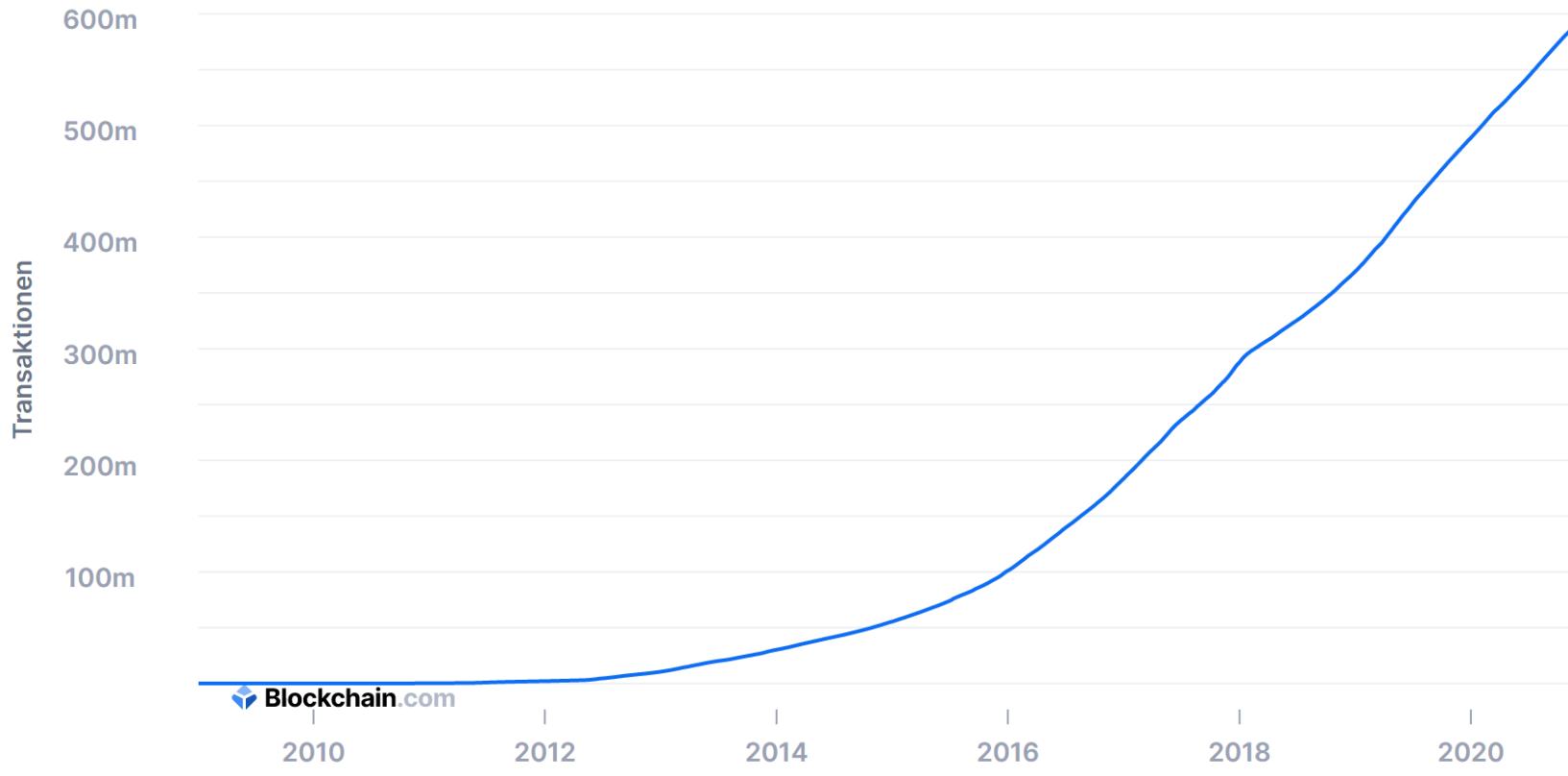


Wie viele Bitcoin-Transaktionen gab es?

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 (blue stick figure) is sending 2.500 units to Carol (orange stick figure). A red stamp labeled "AUTHENTIC" is over the transaction details.

Ledger

account number	balance
1G8bnej6etY...	12.5
1KTA6awsyxj...	323
16pJcrG1m...	3.5
1MVbjHicuJr...	12.7
1G4H4pIp1o...	100
17UP3moev2...	.0000001
1Eeq4FM2Ts...	45
...	...

The ledger shows the current balance for each account. Some accounts have green icons above them, while others have red icons.

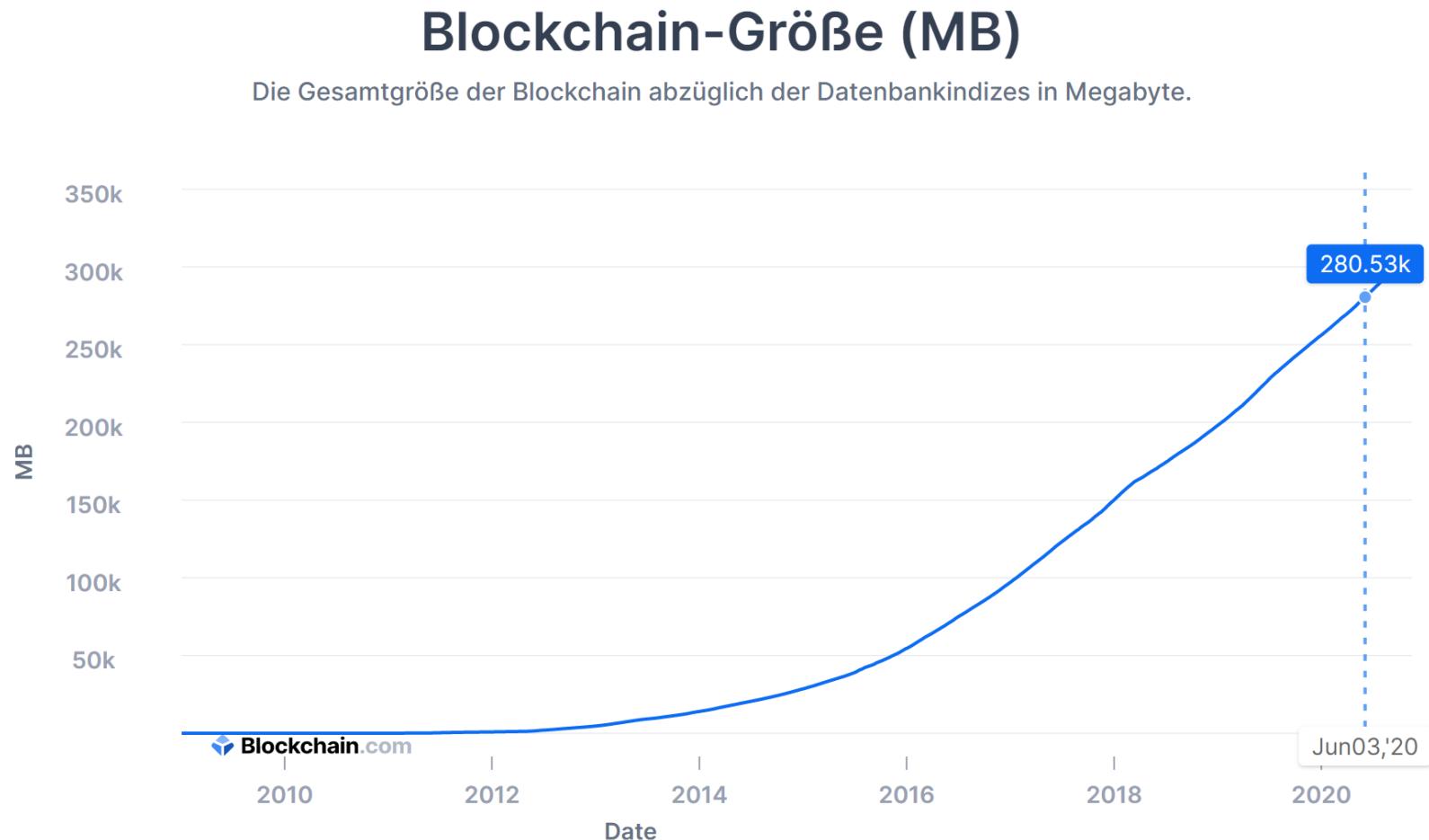
Ledger

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?



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

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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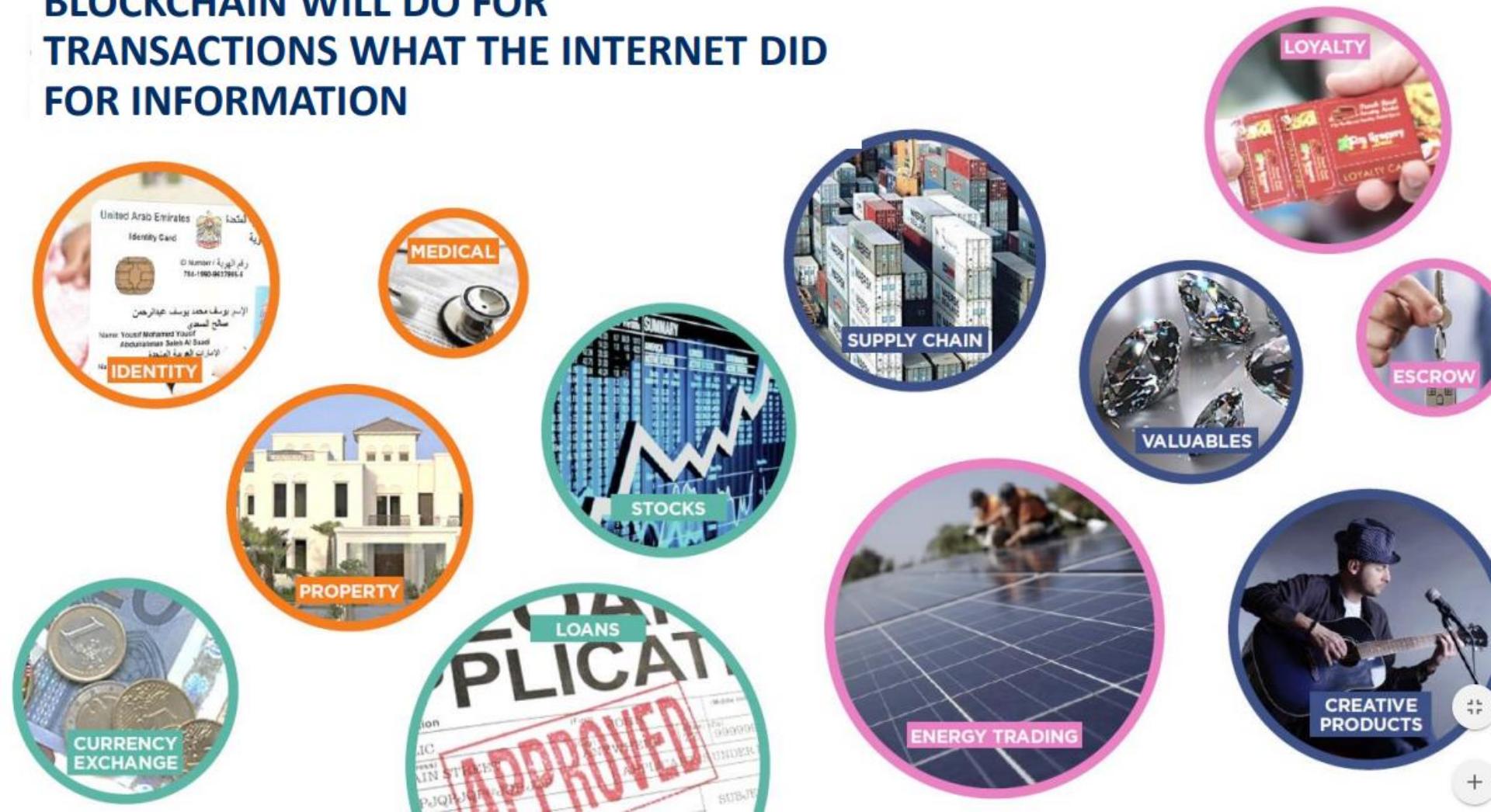
OUR VISION IS TO MAKE DUBAI THE HAPPIEST CITY ON EARTH

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.

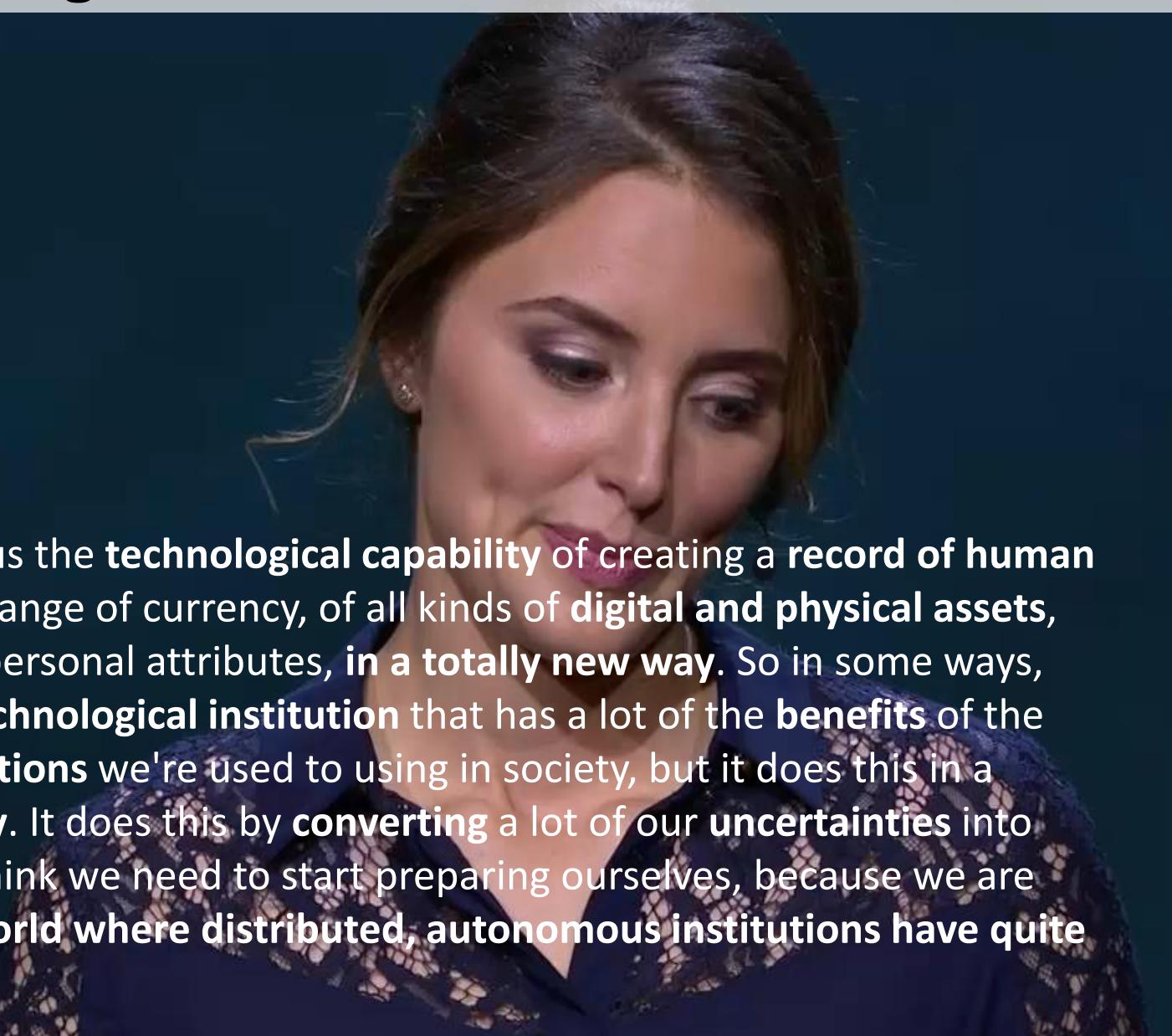
[LEARN MORE](#)

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

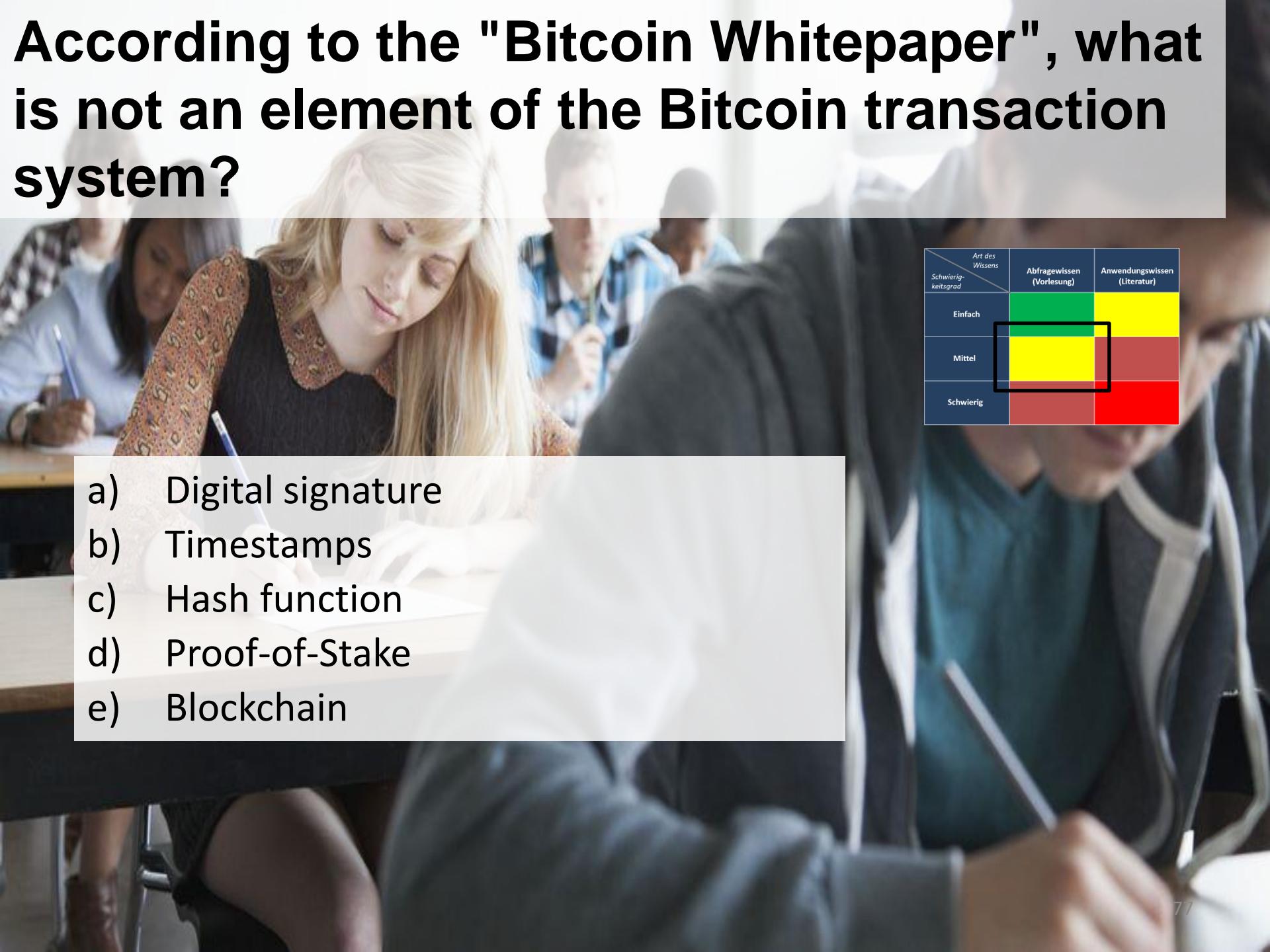
Content:

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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

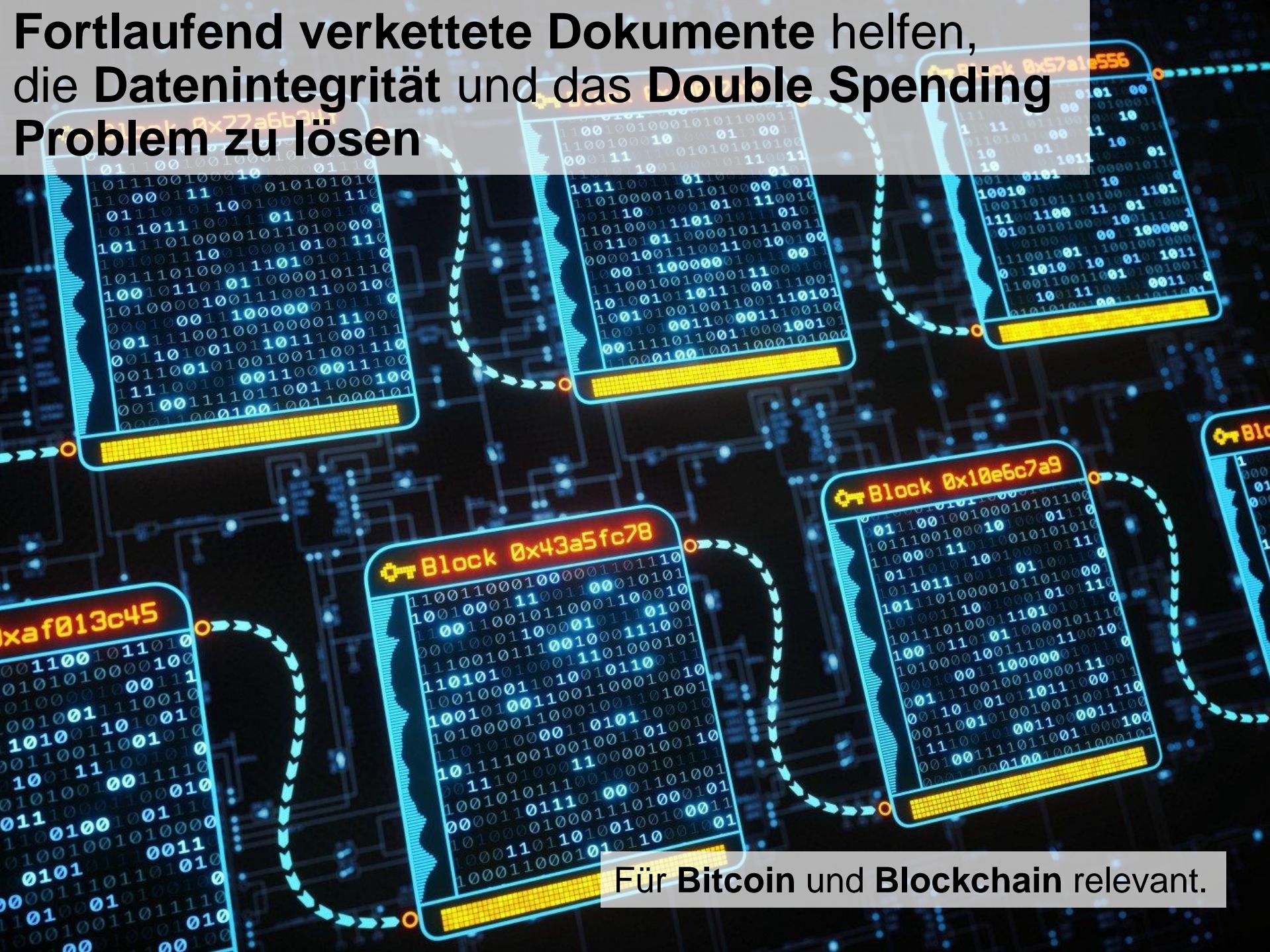
- a) Blockchain
- b) Smart contract
- c) Radar sensor
- d) Digital signature
- e) Biometrics

Homework



1. How big is the **Bitcoin Blockchain**?
2. How many **Bitcoin Transactions** have there been?

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**
- 5. Bitcoin Miner**
- 6. Smart Contracts**
- 7. IOTA**
- 8. Crypto Currency Discussions**
- 9. Summary**



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.

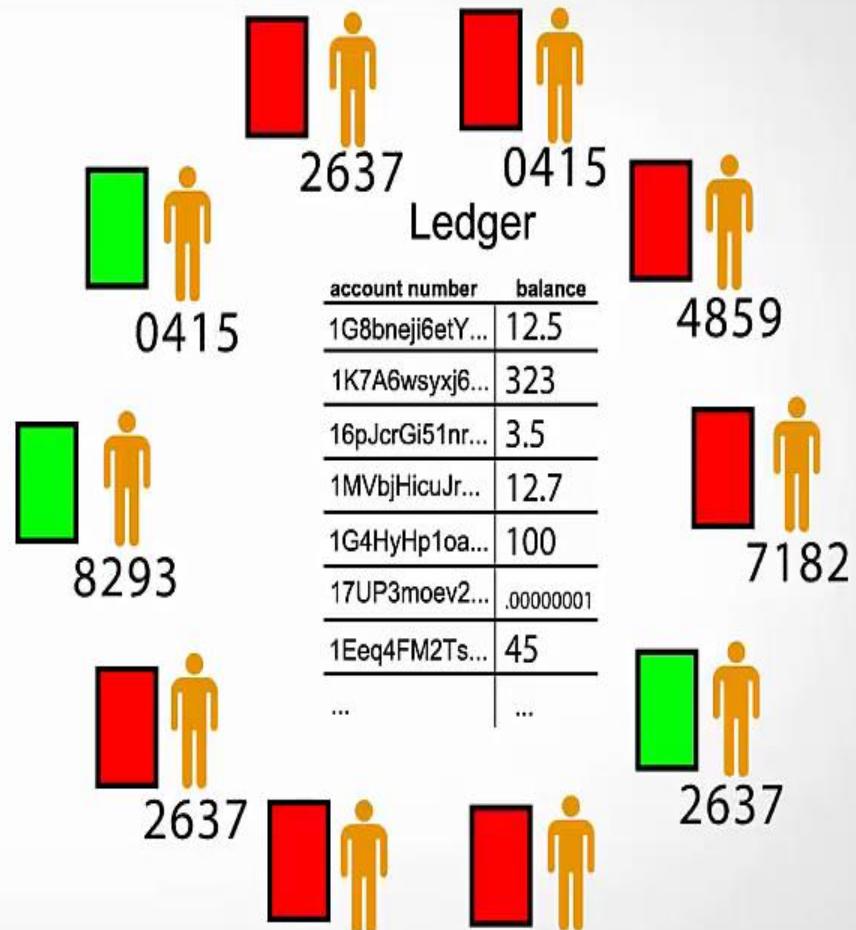
[BUY YOURS NOW](#)



4. Blockchain The Technology Behind Bitcoin

Summary

Transaction Message



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

Benefits of a Distributed Ledger Technology

Blockchain & Distributed Ledger Technologies



Centralized Networks



Decentralized Networks



Distributed Networks

Open Source

More creation and collaboration occurs in a global network that anyone and everyone can join



Uncensorable

It can not be shut down or hacked because it exists throughout every participating node globally

Robust

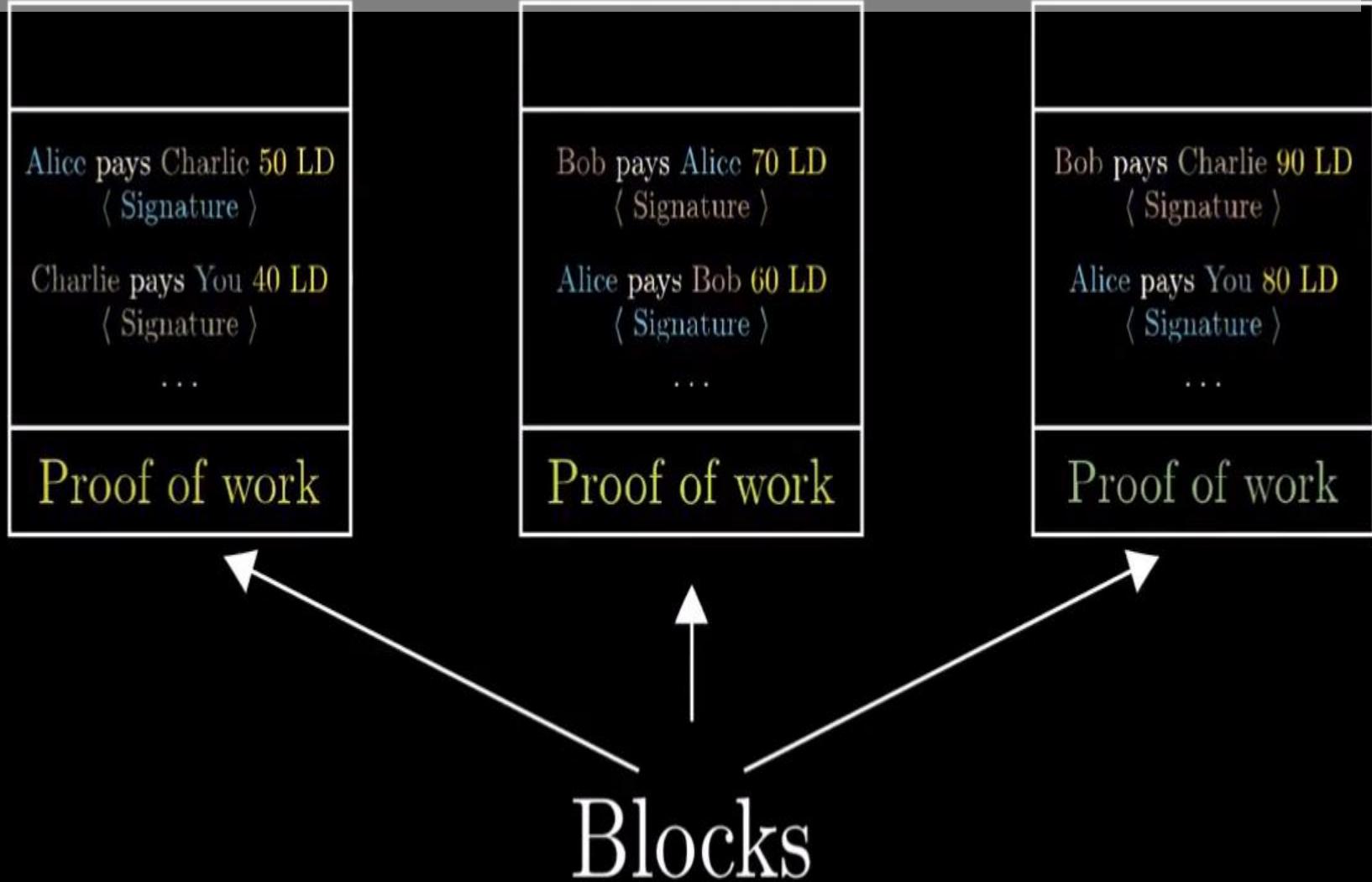
Power outages can not bring it down because it is dispersed by nodes throughout the world



Decentralized

With no single authority in charge, the network remains that of the masses, with no economic/geographic discrimination possible

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

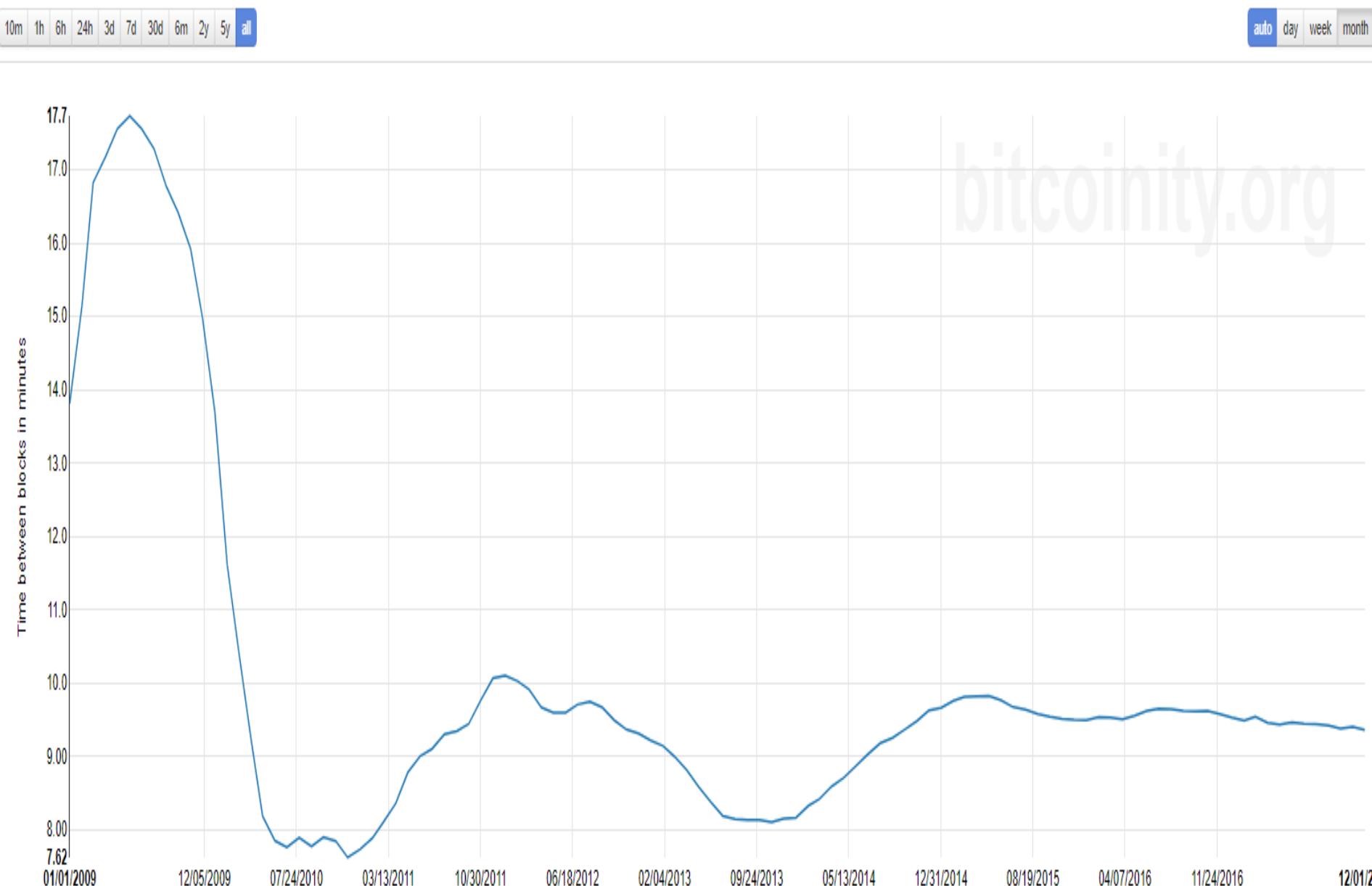
MARKTÜBERSICHT

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

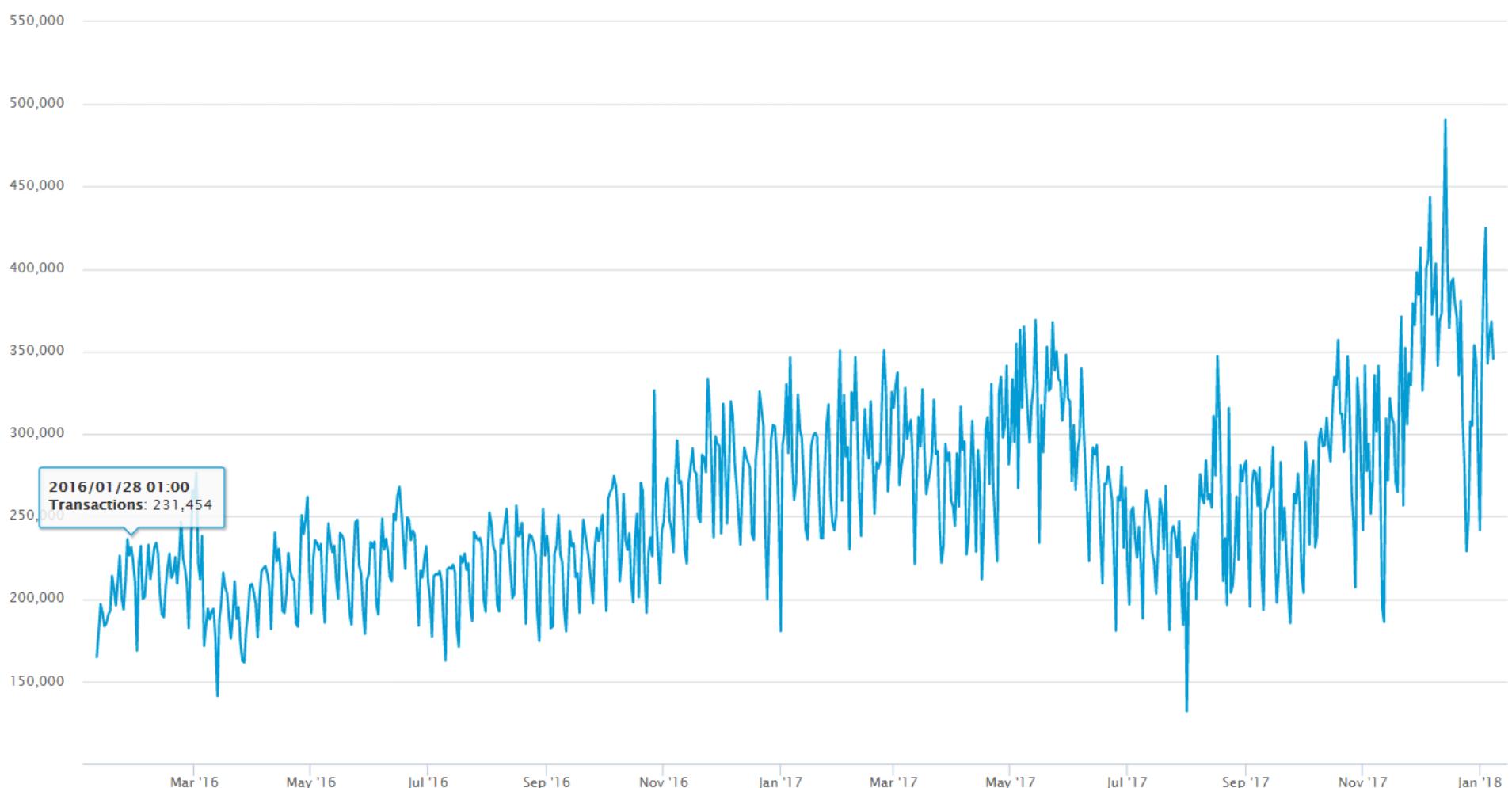
Average time to mine a block in minutes



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)

Smart Contract Explained



- ✓ A contract is created between two parties
- ✓ Both parties remain anonymous
- ✓ The contract is stored on a public ledger

- ✓ Some triggering events are set i.e. deadlines
- ✓ The contract self-executes as per written codes

- ✓ Regulators and users can analyze all the activities.
- ✓ Predict market uncertainties and trends

IOTA

(Acronym of Internet of Things & Tangle)

IOTA is an open-source **distributed ledger (cryptocurrency)** focused on providing **secure communications and payments between machines (Internet of Things)**.

IOTA uses **Directed Acyclic Graph (DAG / Tangle)** technology instead of the traditional **blockchain**.

IOTA's **transactions** are **free**, confirmation times are **fast**, the number of transactions the system can handle simultaneously is **unlimited**, and the system can **easily scale**.

[en.wikipedia.org/wiki/IOTA_\(technology\)](https://en.wikipedia.org/wiki/IOTA_(technology))

IOTA



IOTA

IOTA logo

Denominations

Superunit

10^3	Kilolota (Ki)
10^6	Megalota (Mi)
10^9	Gigalota (Gi)
10^{12}	Teralota (Ti)
10^{15}	Petalota (Pi)

Symbol	IOTA, MIOTA ^[1]
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Demographics

Date of introduction	11 June 2016
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Source	Initial Coin Offering
--------	-----------------------

User(s)	Worldwide
---------	-----------

Valuation

Supply growth	Fixed supply of 2,779,530,283,277,761 iota
---------------	--