



Item 3: Committee Education on Cryptotechnology

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Finance & Audit Committee Meeting

ERCOT Public
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Blockchain

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Blockchain: Hype Versus Reality

Bitcoin and blockchain could be the start of a bigger revolution than the Internet itself.

Jonathan Chevreau: The disruption, and new technologies



MARKETS

BUSINESS

INVESTING

TECH

Blockchain is 'overhyped tech' Roubini says

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Arjun Kharpal
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KAREN BLEIER/AFP/Getty Images

Source: Financial Post, May 6, 2016

OPINION

The Big Blockchain Lie

— October 15, 2018



By Nouriel Roubini

With the value of Bitcoin having fallen by around 70% since its peak late last year, the mother of all bubbles has now gone bust. More generally, cryptocurrencies have entered a not-so-cryptic apocalypse. The value of leading coins such as Ether, EOS, Litecoin, and XRP have all fallen by over 80%, thousands of other digital currencies have plummeted by 90-99%, and the rest have been exposed as outright frauds. No one should be surprised by this: four out of five initial coin offerings (ICOs) were scams to begin with.

Faced with the public spectacle of a market bloodbath, boosters have fled to the last refuge of

“

In practice, blockchain is nothing more than a glorified spreadsheet.

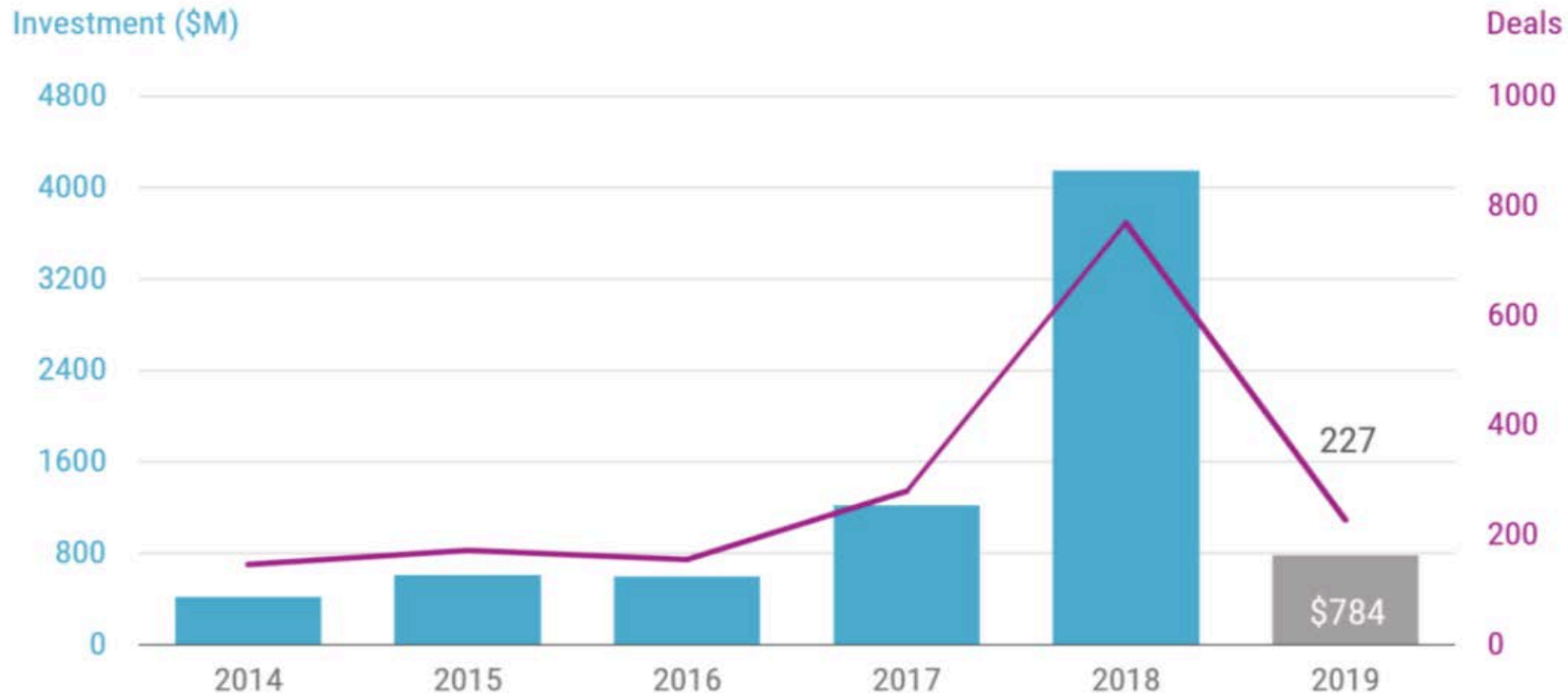
Illustration: Chad Crowe

VC Investments



Blockchain's meteoric rise slowed in 2019

VC investment 2014 – 2019 YTD (7/1/2019)



Source: cbinsights.com

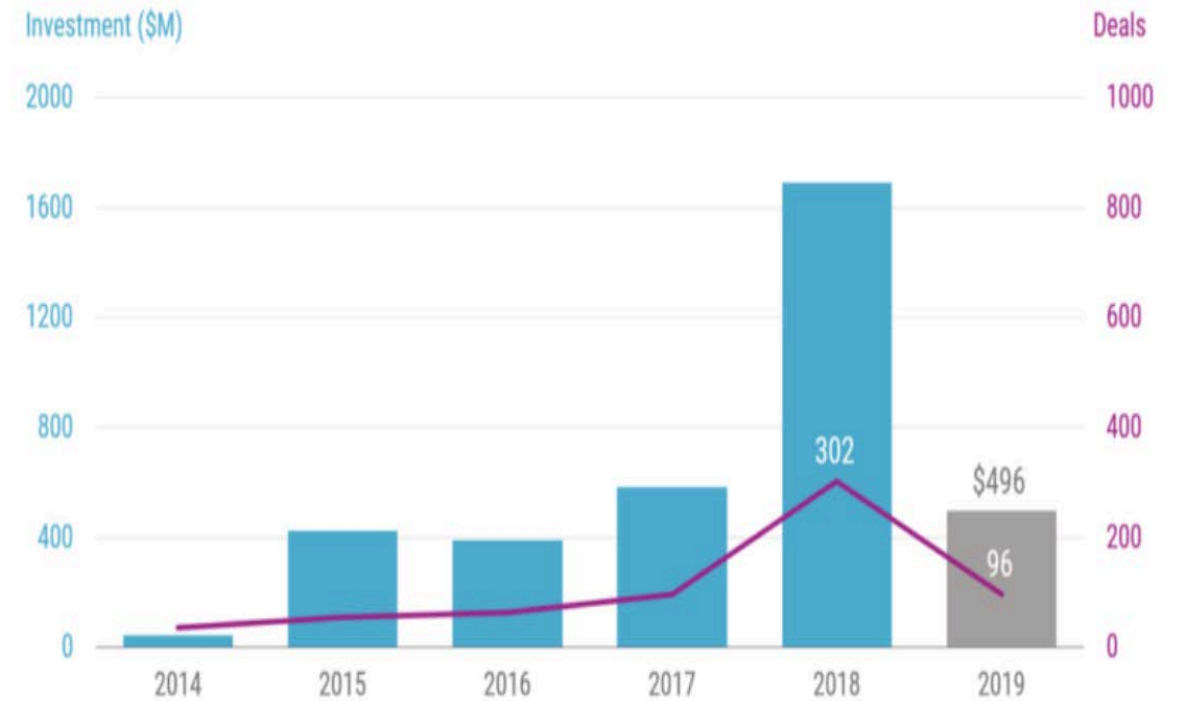
CBINSIGHTS

Cryptocurrency Total Market Capitalization



Corporate participation is falling significantly in 2019

Corporate participation in blockchain deals 2014 - 2019 YTD (7/1/2019)



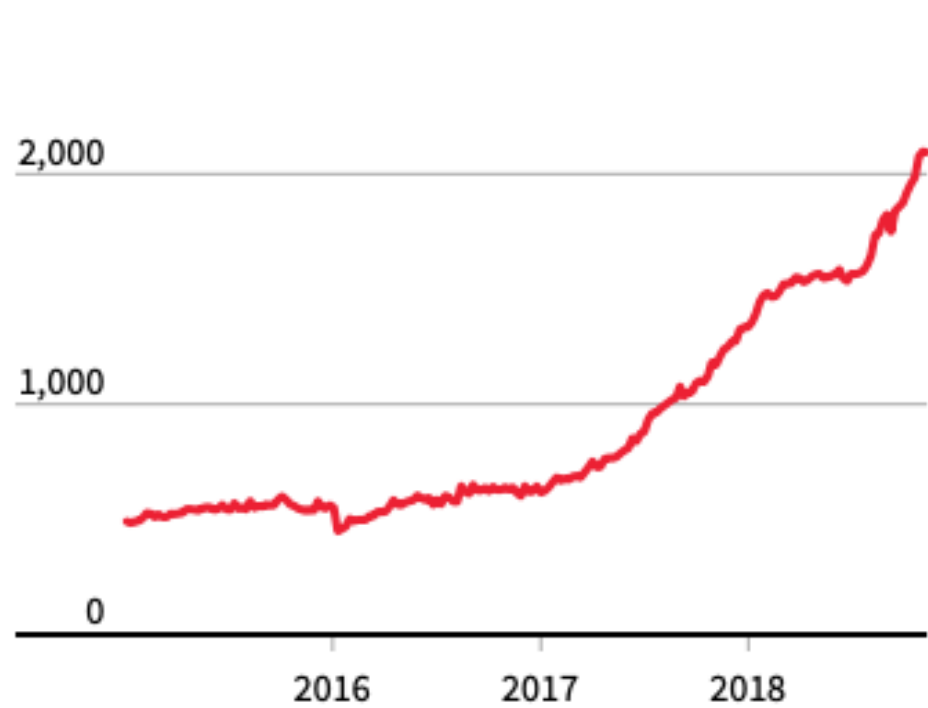
Source: cbinsights.com

CBINSIGHTS

NUMBER OF CRYPTOCURRENCIES

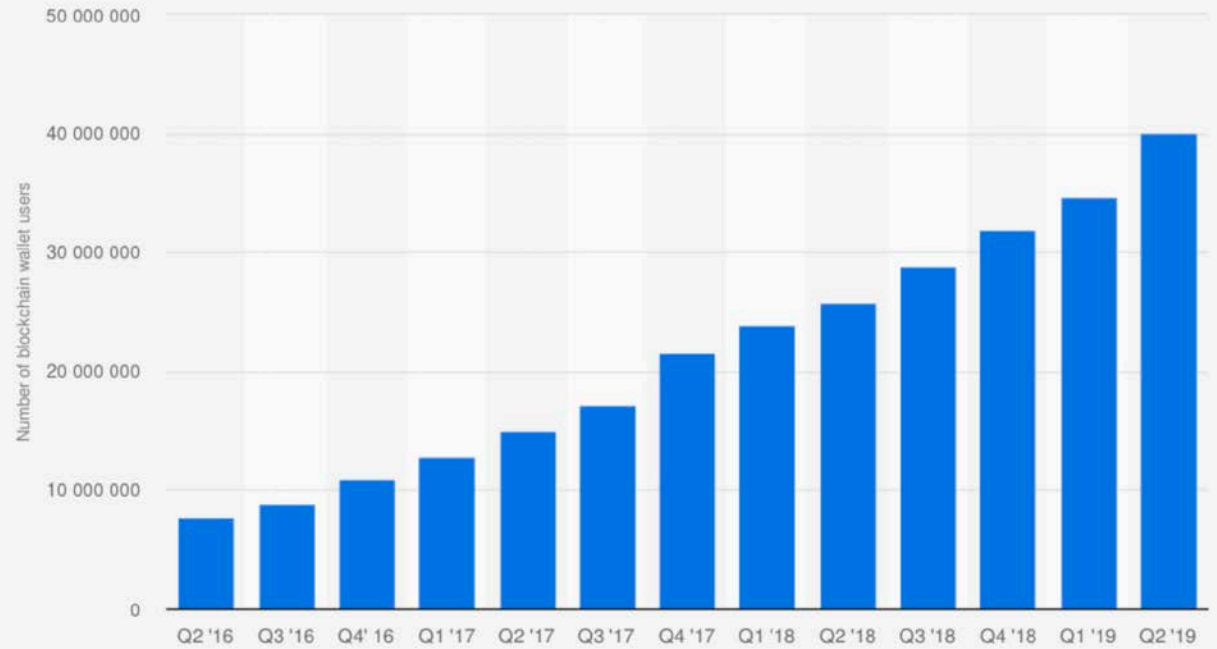
In circulation

3,000 cryptocurrencies



Source: Reuters

Number of Blockchain wallet users worldwide from 2nd quarter 2016 to 2nd quarter 2019



Source
Blockchain
© Statista 2019

Additional Information:
Worldwide; Blockchain; Q2 2016 to Q2 2019

statista

The Promise of Blockchain

Ten percent of global GDP data will be stored on blockchain by 2017 – World Economic Forum (2015)

Fifty-three percent of large companies surveyed say blockchain has become a critical priority (Deloitte 2019 Blockchain Survey)

Eighty-six percent of firms believe blockchain will achieve mainstream (Deloitte 2019 Blockchain Survey)

Example 1: Title Insurance



Happy family buying a home




Why Title Insurance?

- Public records and incorrect or incomplete
- Government records changed by corrupt officials (often the case in many developing countries)
- Claims by heirs unknown and not involved in previous transactions
- Old mortgages, collateral or tax liens never discharged before selling
- Deeds by minors or mentally unstable people
- Deliberate or accidental misrepresentation of wills by previous owners
- Ownership of underground or air rights unknown
- Legal actions pending against titles, etc.

Problems

- Unable to VERIFY past transactions easily
- Unable to verify the veracity of the transactions – Lack of TRUST
- lack of TRANSPARENCY of records
- Records can be TAMPERed without anyone's knowledge
- In some countries, records are controlled by a SINGLE ENTITY – that is, government – and subject to corruption and outright fraud
- Need SECURITY
- It takes TIME and MONEY to verify available information
- You need an expensive THIRD-PARTY to provide the services

Example 2: Asset Tokenization on Blockchain



Sounds good in theory that can be applied to any asset – rare diamonds, art work, antiques, etc. that are often considered illiquid and expensive.

Even Doctor's time or even lawyer's time can be tokenized

Benefits: increase liquidity, reduce friction and costs
Challenges: regulatory alignment needed; monitoring and anonymity become a liability; does tokens = securities? Token = asset ownership?

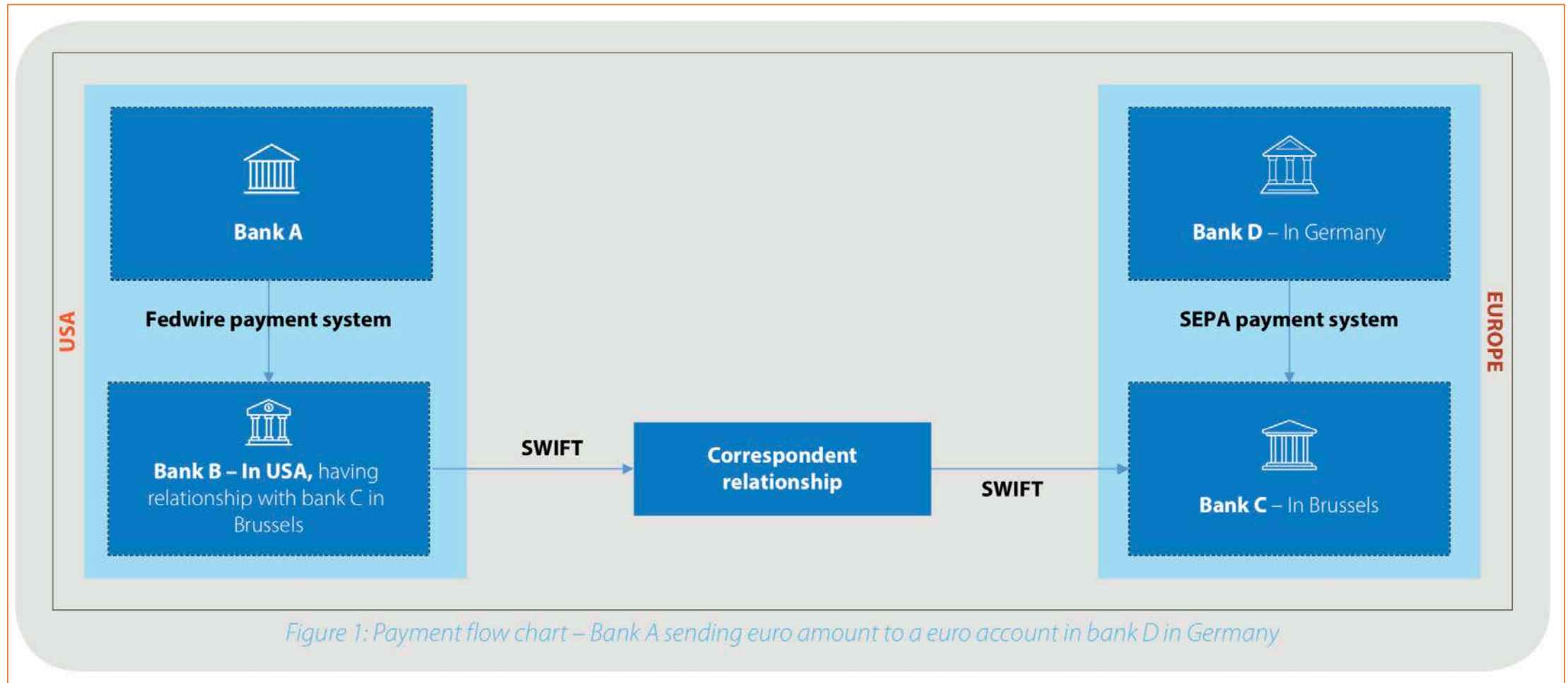
Example 3: Supply Chain Management

- Supply chain management – food industry or diamonds that need traceability and transparency
 - E.g., Walmart and 9 Food Giants Team Up on IBM Blockchain Plan
- Any supply chain with complex network of manufacturers, brokers, distributors, retailers, regulators, banks, and consumers

Challenges with Global Trade Processes

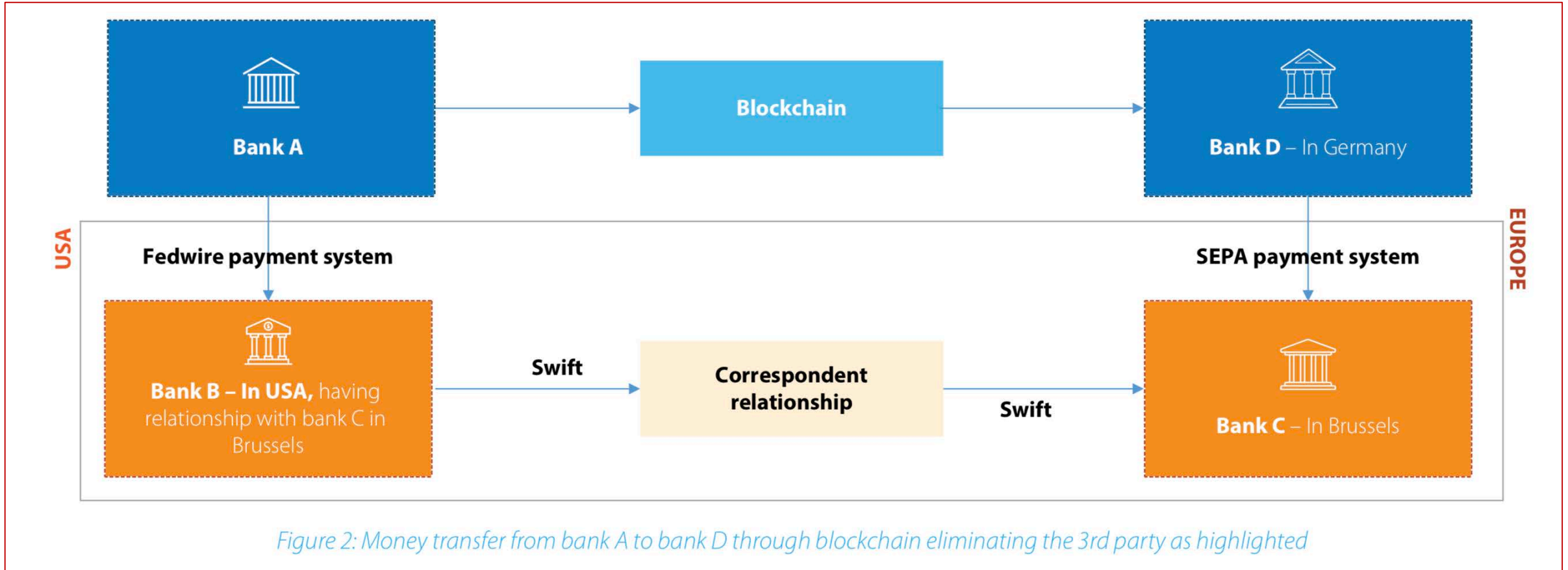
- Too many approvals from different entities (or intermediaries or approval bodies) – MULTIPLE PARTIES in the ECOSYSTEM
- Avoid fake, illegal trades, and tampering – that is, need TRUST, TAMPER-PROOF, SECURITY, and TRANSPERENCY
- Multiple systems have huge interoperability, compatibility and standards issues
- Many sequential approvals
- Complex array of automated and manual processes
- Too expensive and time consuming

Example 4: International Money Transfer



Source: Infosys Consulting

IMT through Blockchain



Source: Infosys Consulting

Where is Blockchain Applicable?

- Wherever there is a need to authenticate assets like cars, homes, land, securities, material, electricity, and other physical or intangible (music, software) goods and any transactions
- Wherever there are delays due to intermediaries like centralized processing and verification (e.g., securities clearance, title verification, credit card processing) and those intermediaries take a cut/commission
- Wherever there is a need for transparency and immutability
- Wherever there is a need for high levels of privacy, trust, and security

What is Blockchain?

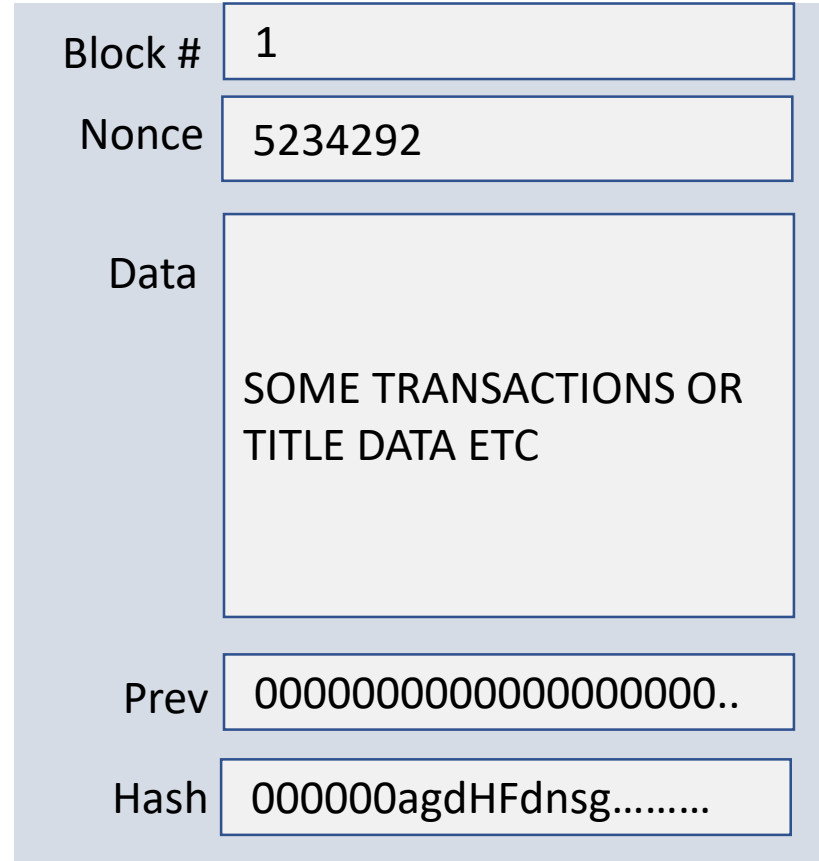
- A blockchain is a digital, chronologically updated, distributed and cryptographically sealed record of all data transfer activity.
- Another version – It is distributed ledger (database) that maintains all records and transactions without a central authority. Network approves a block of transaction and added to the previous chain of blocks
- **Permissioned vs. Unpermissioned Blockchains**
 - Permissioned BC:
 - Restricted to only approved and trusted participants
 - Identity disclosure needed – supply chain partners
 - Unpermissioned BC → anyone can participate

How does Blockchain work?

Block



Block



SEALED BLOCK

Hash("data"+"prev") = 8ABFGJDxsk983abHbs.....

Hash("data"+"prev"+nonce) = 000000agdHFdnsg.....

Blockchain: How does it work?

Block

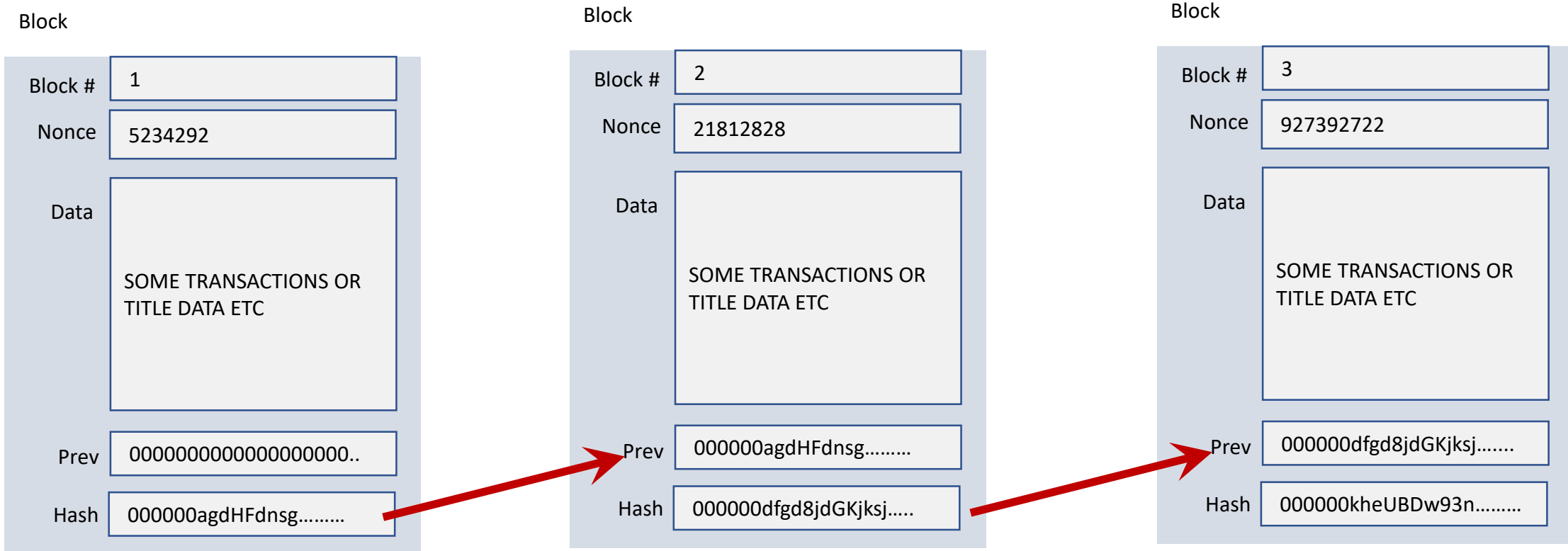
Block #	1
Nonce	5234292
Data	SOME TRANSACTIONS OR TITLE DATA ETC
Prev	00000000000000000000..
Hash	000000agdHFdnsg.....

Block

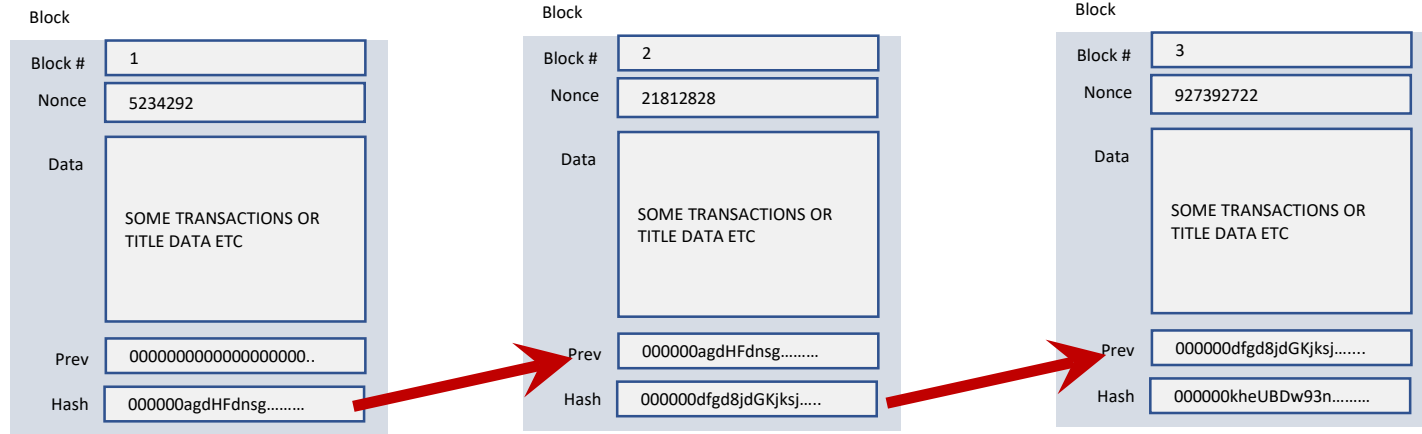
Block #	2
Nonce	21812828
Data	SOME TRANSACTIONS OR TITLE DATA ETC
Prev	000000agdHFdnsg.....
Hash	000000dfgd8jdGKjksj.....



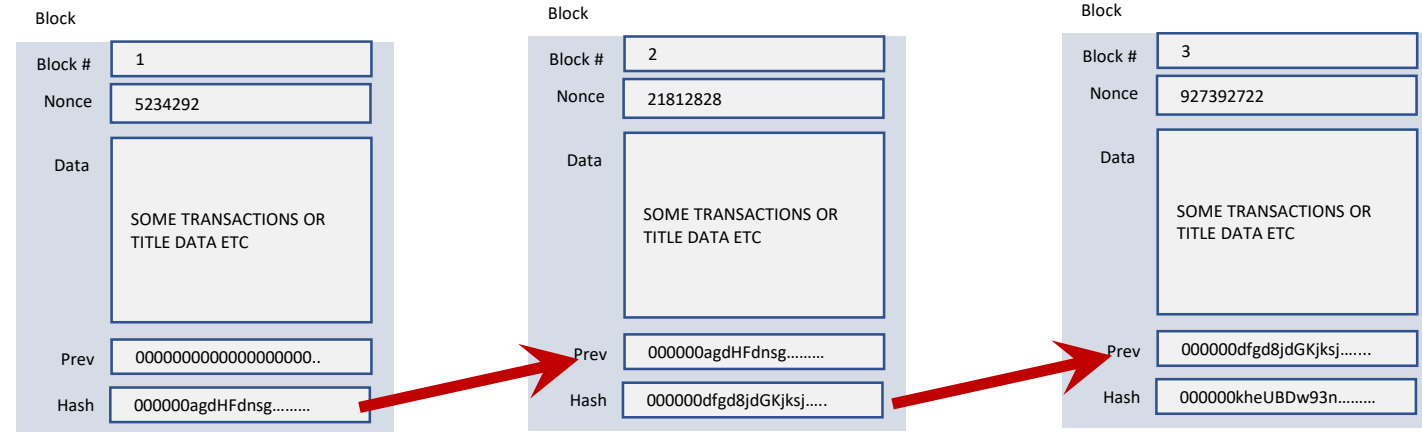
Blockchain



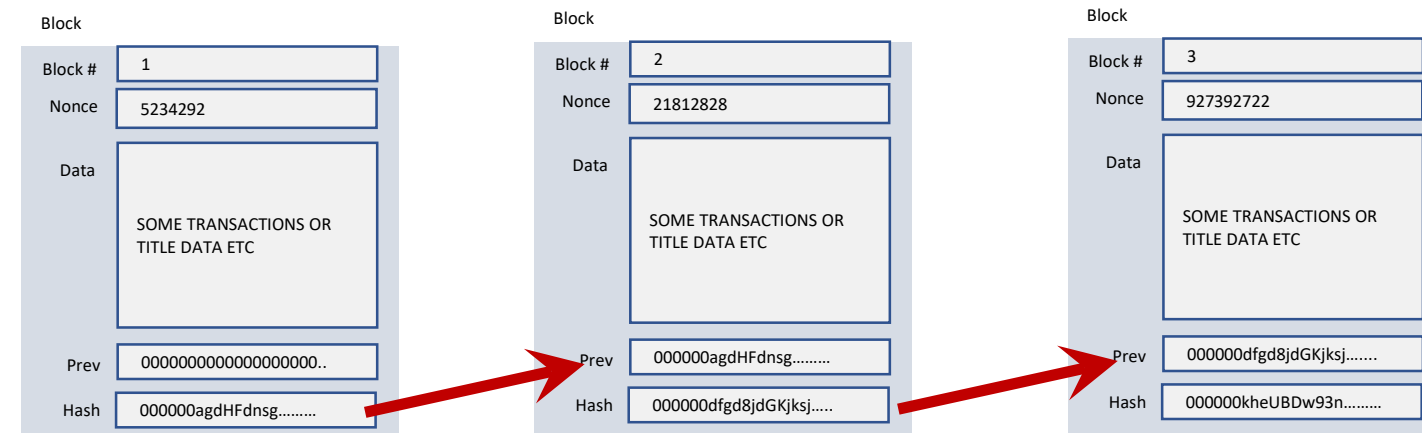
Distributed Copy A



Distributed Copy B



Distributed Copy C

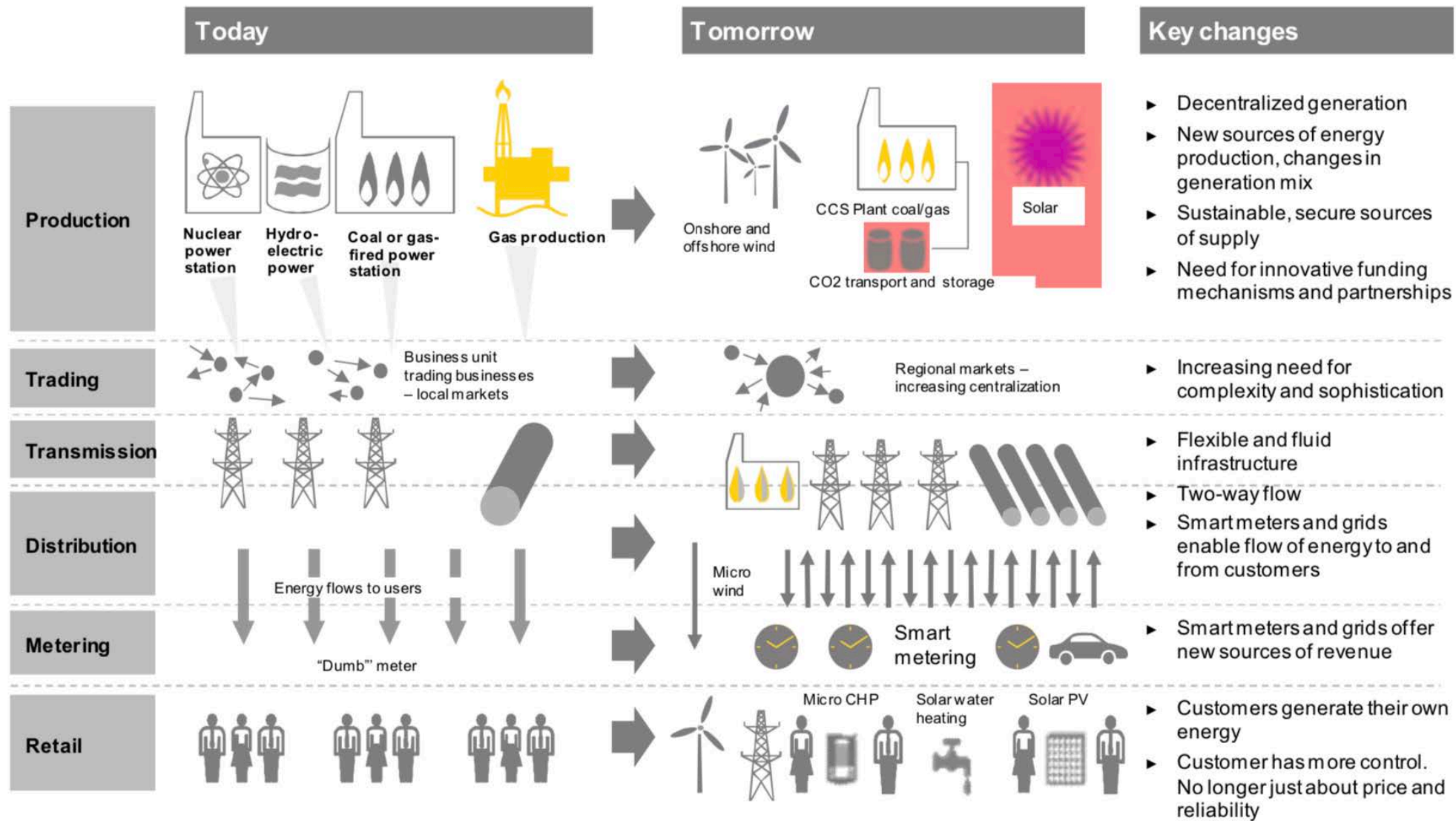


Application of Blockchain to Energy Industry

Decentralized energy systems, smart grid, smart meters, and micro-grid management using smart contracts

Energy trading and supply

Automated billing for consumers and distributed generators



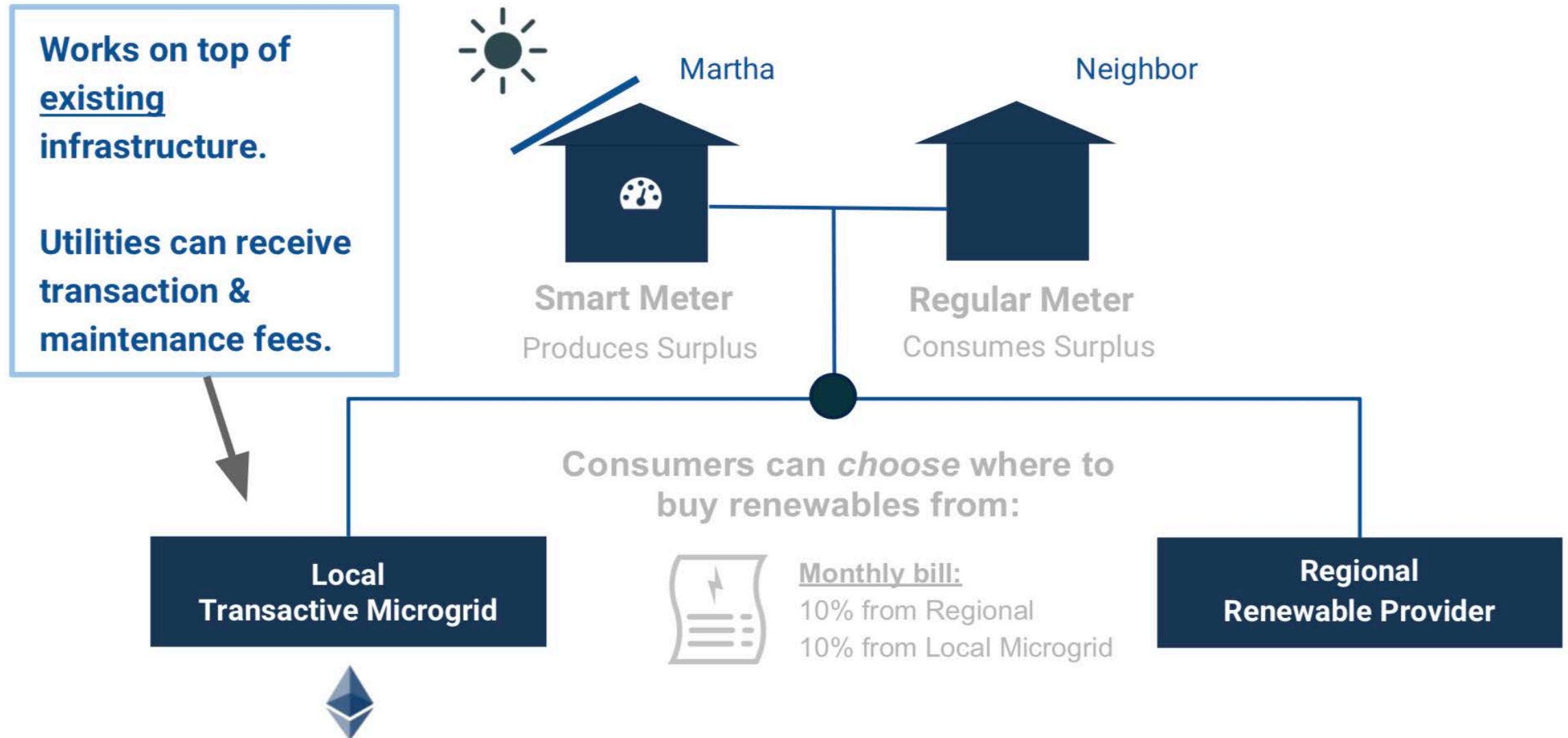
Source: Ernst & Young

Energy and Commodity Trading Life Cycle



Source: E&Y – Overview of Blockchain for Energy & Commodity Trading

Transacting Local Energy with Neighbors



Source: TransActive Grid

Summary: Where is Blockchain Appealing?

- Need to maintain privacy and anonymity while maintaining transparency (e.g., I need to know X owns property but I don't have to know who that X is. Or, we need to know a citizen X voting is legit but I don't have to know X voted for so and so).
- Too many intermediaries taking time and transaction fee for non-value added work
- When there are too many different entities using different standards and systems creating a challenge for integration and data exchange
- When centralized processing is too cumbersome and time consuming
- Need for peer-to-peer exchange dominates centralized processing

Blockchain: Adoption challenges

- Technology and standards still evolving
- Resistance from deeply entrenched players – control access
- Massive energy consumption and need expensive computing power
- Integration challenges with legacy systems
- Unknown regulatory concerns
- Rules of engagement must be determined upfront – not amenable to flexibility or exceptions unless possible exception scenarios are pre-defined
- May not be suitable for real-time transaction execution under high volume
- Huge barriers in adoption – domain experts cannot understand Blockchain