Setting the scene: digital technologies in the financial sector

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FINANCE 5.0 – A CHALLENGE FOR CYBER SECURITY?

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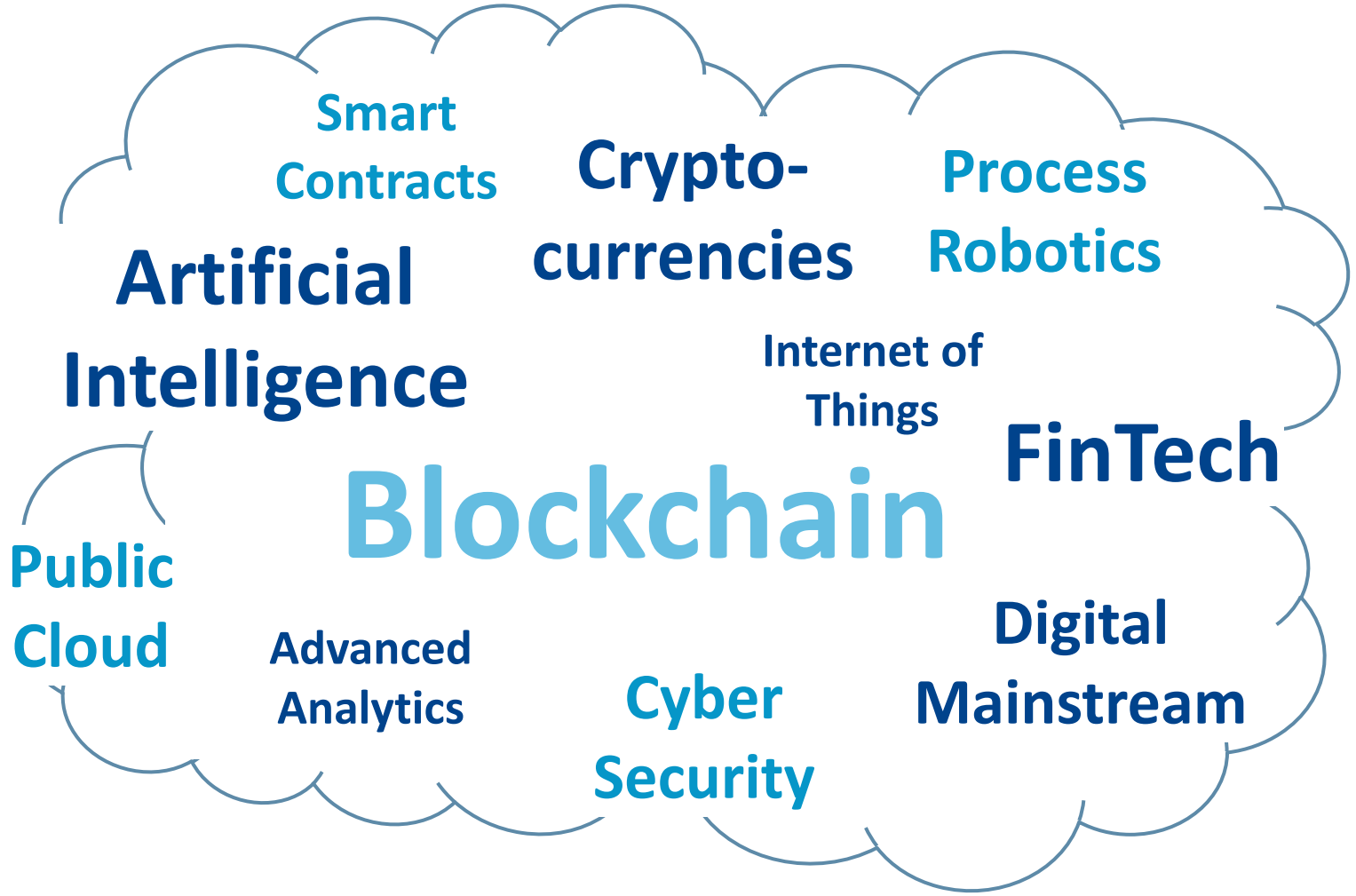
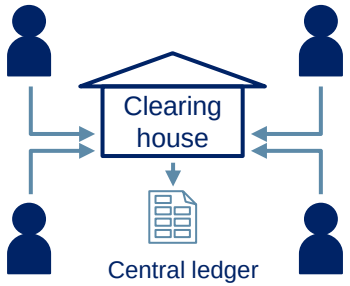
Several trends and technologies are shaping the finance sector nowadays and will do so in future

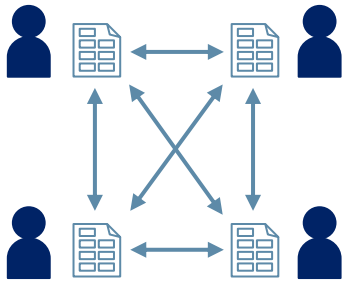


Blockchain is a distributed ledger for transactions based on the concepts of cryptography, P2P networks and game theory

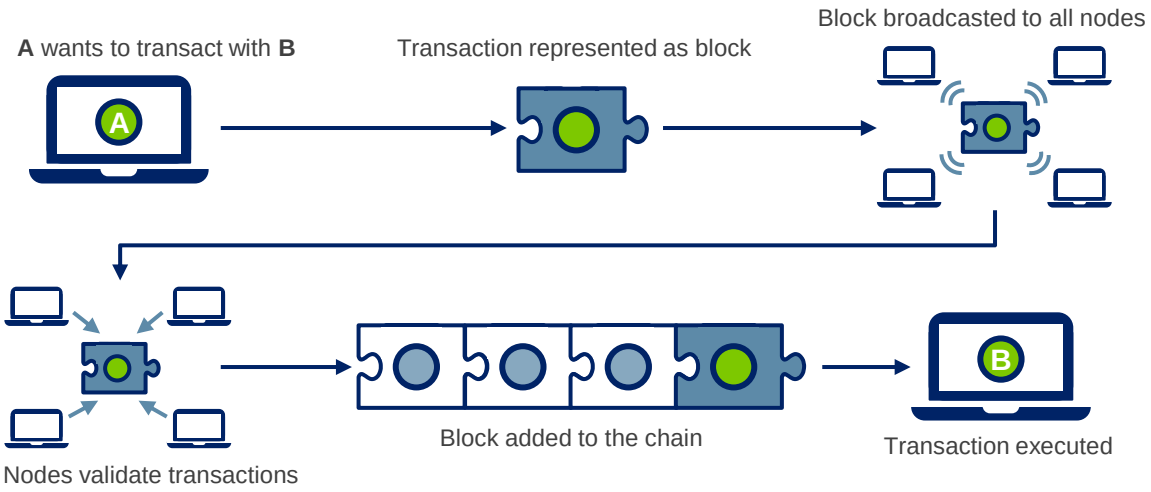
Central ledger



Distributed ledger



How does blockchain work?



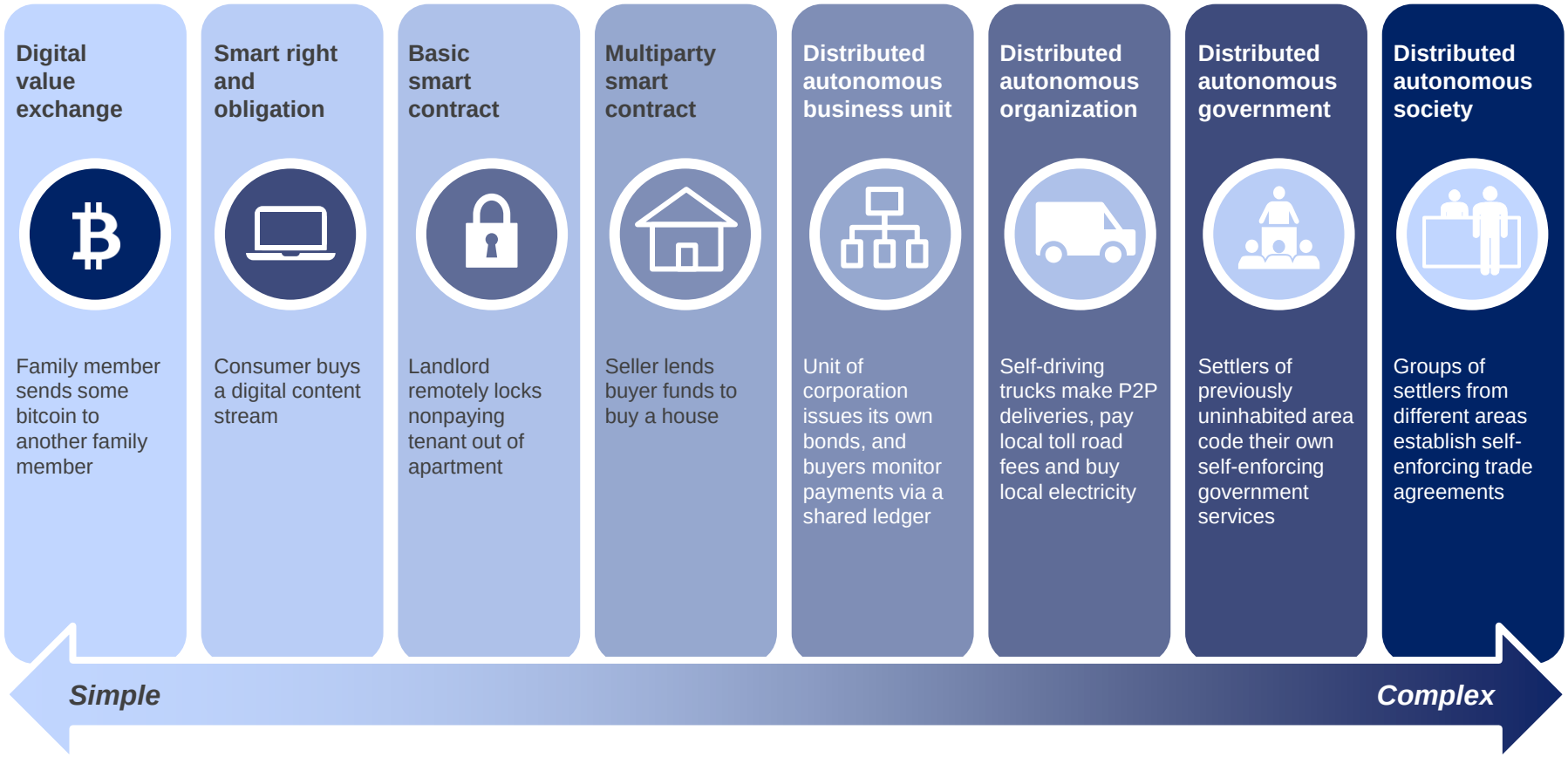
Comments

- The network stores all information in blocks and links them cryptographically (public keys, hash functions) in a chain
- All network participants (nodes) store a copy of the whole blockchain (P2P network)
- New blocks are added by consensus of network validators (miners) at even time intervals
- Miners are rewarded transaction fees and native tokens for validating transactions, following economic incentive mechanisms (game theory)
- Manipulating the blockchain is expensive (majority node control, consecutive blocks)

Proof-of-work is energy and resource consuming – proof-of stake can be used to remedy current downsides

	Description	Evaluation	Comments
Proof-Of-Work (PoW)	• Validators (miners) receive a block reward for solving a crypto puzzle of a block • Probability of validating a block determined by computational work • CPU based competition • Mining pools centralize	✚ Well known and tested ✚ High security, discourages forking ▬ Prone to centralization in mining (exponential rewards) ▬ Very energy intensive (no skills, just brute force)	• Consensus mechanism is needed for every distributed ledger – the network should collectively agree with the ledger contents • PoW and PoS are the most common consensus mechanisms for validating blocks and network transactions • Main differences in the way they delegate and reward the verification of transactions • Byzantine Fault Tolerance, Federated Byzantine Agreement or Distributed PoS can also be used as consensus mechanism
Proof-Of-Stake (PoS)	• Validators collect network fee (no block reward) • Probability of validating a block determined by stake size • No puzzle, no mining • No new coin creation, all coins created at beginning	✚ High energy efficiency ✚ Network health by better economic incentives ▬ Newer than PoW, lower level of adoption, testing ▬ “Nothing at stake” problem, forking, deposits	

Blockchain enables smart contracts and decentralized autonomous organizations



Source: PWC

In 2017 crypto currencies exploded, reaching a USD 800 bn market capitalization

Market capitalization [USD bn]

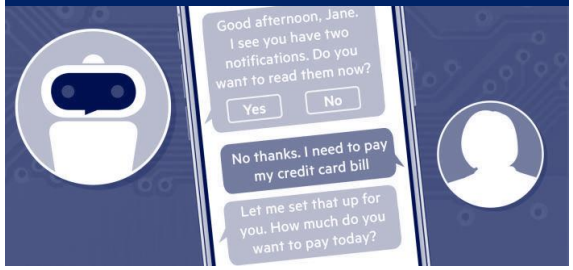
Comments

- High volatility of crypto currencies
- Currently over 1.600 tokens listed at coinmarketcap.com
- Initial coin offering (ICO) is the new source of financing for startups
- Receive initial funding based on white paper, team and idea through ICO
- Risky investment – 56% of the crypto startups that raise money through tokens die within 4 months of the ICO
- Crypto currencies are not regulated, although regulatory efforts are ongoing
- Lack of standards for ICOs and crypto exchanges pose financial and cyber security risks

Source: coinmarketcap.com, Bloomberg

Artificial Intelligence is already being used in the financial sector for customer interaction, analytics and decision support

Customer communication



- Chatbots and personal assistants
- Natural language processing & generation
- Voice & facial recognition

Customer profiling

- Profiling, sorting, risk analysis, targeting
- Machine learning, language analysis
- Decision automation

Process streamlining

- Documentation, decision support (regulat.)
- Image recognition, machine learning
- Document digitalization, decisions

Pattern recognition

- Fraud prevention, analytics
- Machine learning, voice recognition
- Spot anomalies and patterns

Comments

- AI can handle vast amounts of data and can deliver predictable and accurate results
- Pure cost savings should not be the ultimate goal of implementing AI, creating new business models and revenue sources should
- AI, robotic and intelligent process automation are ideal for repetitive tasks in middle office and back end
- Quality of machine learning depends on the size of data – pooling different sources can be problematic
- Using AI in customer profiling and decision support processes can be tricky under data protection laws

Source: Financial Times

FinTech companies provide technology-driven innovation and promote new business models, processes and products

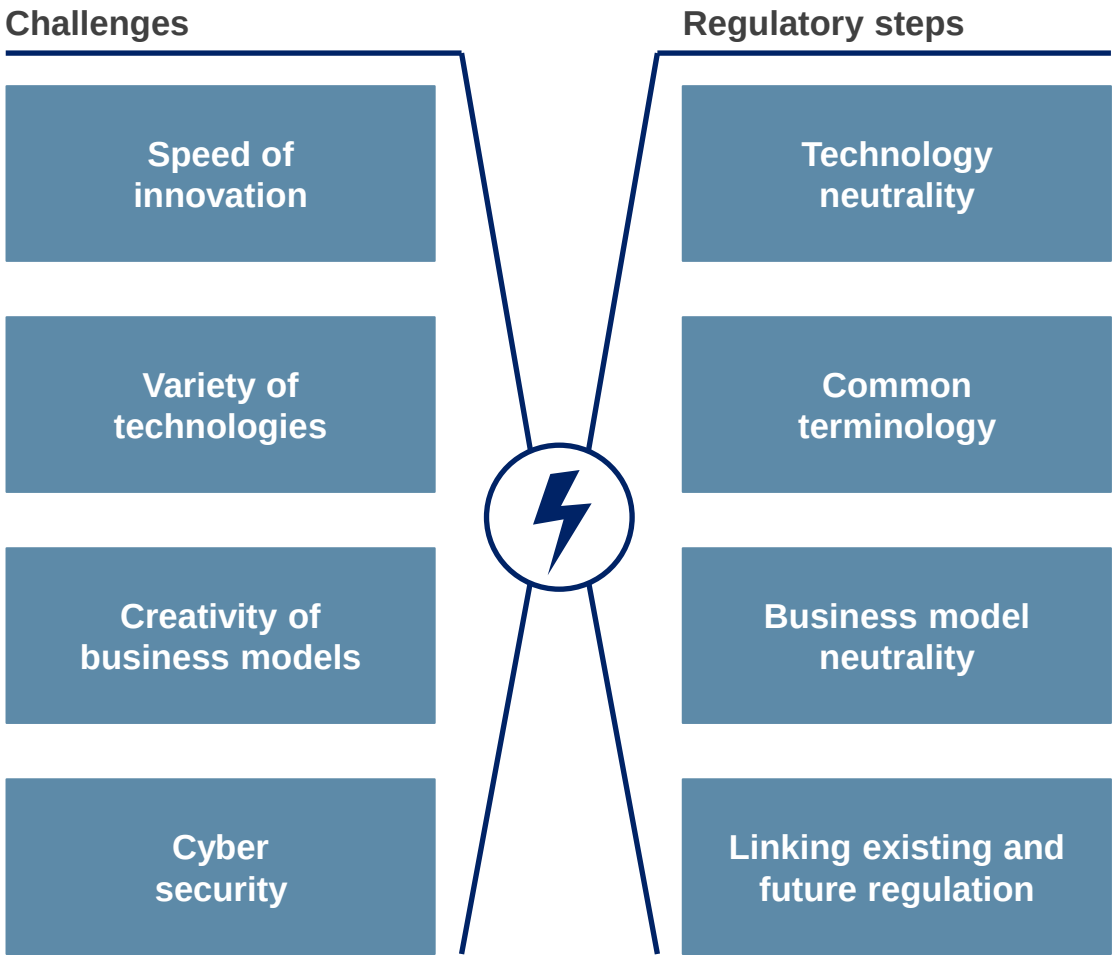
FinTech companies (examples)

Comments

- FinTech companies emphasize the technology in the financial sector, are small, but agile and strongly growing
- Usually focus on parts of the value chain of traditional players or create completely new business models
- Occupy niches or position between customer and traditional player and score by performing better in terms of speed, usability and user experience
- FinTech is changing customer behaviour and expectations tremendously – risk for slow traditional players
- Cooperating with FinTech companies can provide a much necessary innovation boost

Source: Venture Scanner

Regulators are challenged – keep the balance between setting boundaries for new technology and promoting innovation



Comments

- Technological innovation is fast and regulators need to keep with the pace
- Enable freedom of innovation in initial phase, but create clear boundaries for next phases
- Creating common taxonomy and categorization for various technologies and business models
- Usage of regulatory sandboxes for new and innovative setups
- Enable technological benefits, but disable technological misuse as far as possible
- Cyber security first – encourage security by default and design

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