FESE Capital Markets Academy
New technologies

FESE – Federation of European Securities Exchanges

FESE represents **36 exchanges in equities, bonds and derivatives**

13 Multilateral Trading Facilities (MTFs) dedicated to listing and trading of SMEs

From **EU member** states as well as **Iceland, Norway and Switzerland**

16 Full Members and **1** Affiliate Member

35 Regulated Markets
13 MTFs dedicated to SMEs

1 Affiliate Member

Key figures: European Financial markets

~11,000
Listed companies

~€13,000 bn
Market cap for listed companies

~€32bn
Money raised at IPO

~€8.5 tn
Equity turnover

~€600 tn
Options and futures notional turnover

~€6 tn
Bonds turnover

Source: FESE and WFE, EOB turnover, 2018 data

Index

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New Technologies in the Financial Sector

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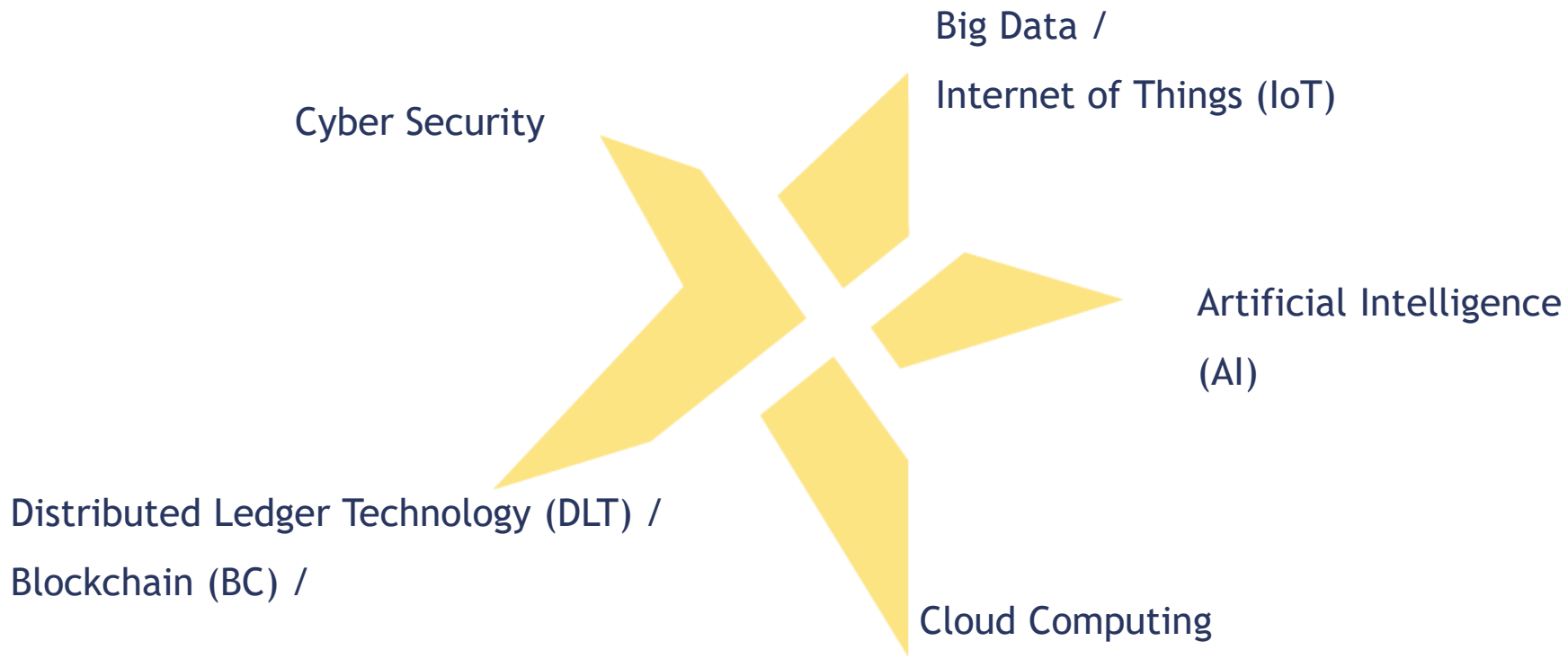
Current Technological Trends in the Financial Sector



Big Data

“The use of massive volume of both structured and unstructured data too large to process using traditional database and software techniques.”

Big Data covers three Vs:

Volume. Organisations collect data from a variety of sources, including business transactions, social media and information from sensor or machine-to-machine data. In the past, storing it would’ve been a problem – but new technologies have eased the burden.

Velocity. Data streams in at an unprecedented speed and must be dealt with in a timely manner.

Variety. Data comes in all types of formats – from structured, numeric data in traditional databases to unstructured text documents, email, video, audio, stock ticker data and financial transactions.

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Big Data

Big Data Characteristics:

- Maintain a competitive edge.
- Through structure and unstructured data, complex algorithms can execute trades using a number of data sources.
- Sophistication of statistical techniques.

Chances for the Financial Industry:

- Individualised customer experience within the financial services
- More efficient segmentation and targeting
- Optimization and automation of business processes
- Improved cyber security and risk management (prevent hackers by better fraud identification)
- Increased employee performance management

Cloud Computing

“The use of various services, such as software development platforms, servers, storage and software, over the internet, often referred to as the "cloud“.”

Cloud computing is developing fast. Estimates indicate that these developments could lead to the growth of the European cloud market from €9.5bn in 2013 to €44.8bn by 2020, i.e. almost five times the market size in 2013. (European Commission)

Cloud computing features for the financial industry:

- Security
- Cost effectiveness
- Storage and big data
- Scalability
- Compliance
- Availability of Data / Mobility

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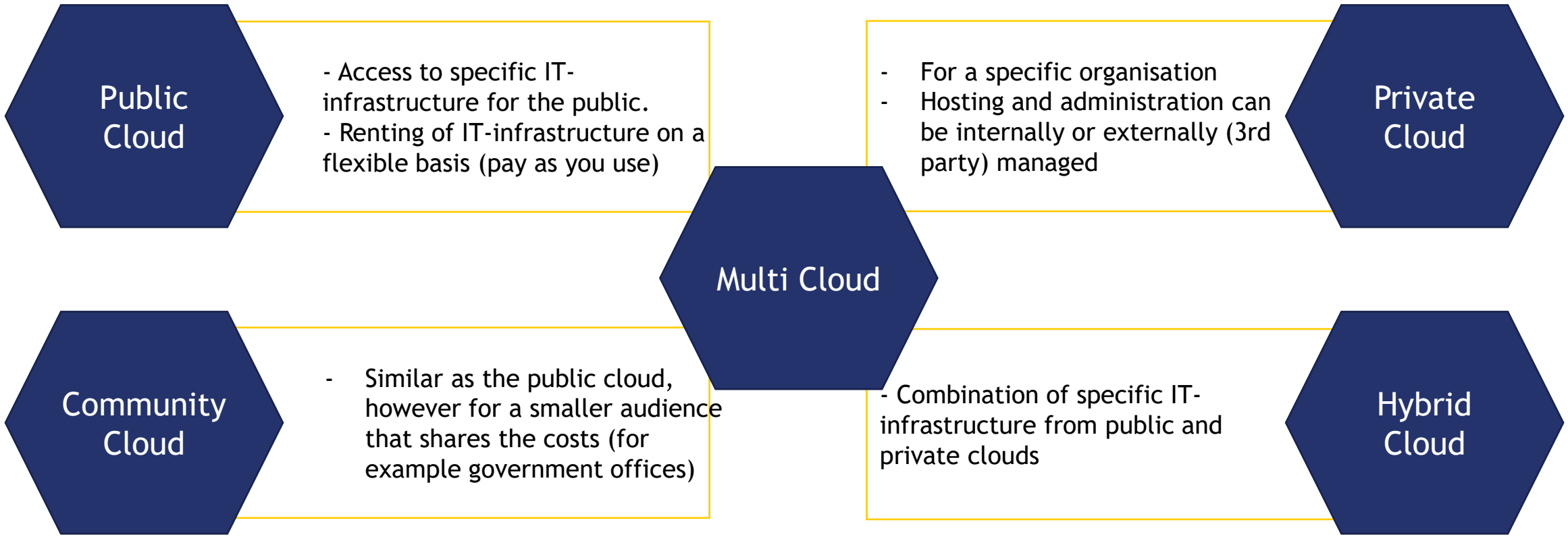
Cloud Computing

“Provision of IT-Infrastructure with one decentralized computer network”



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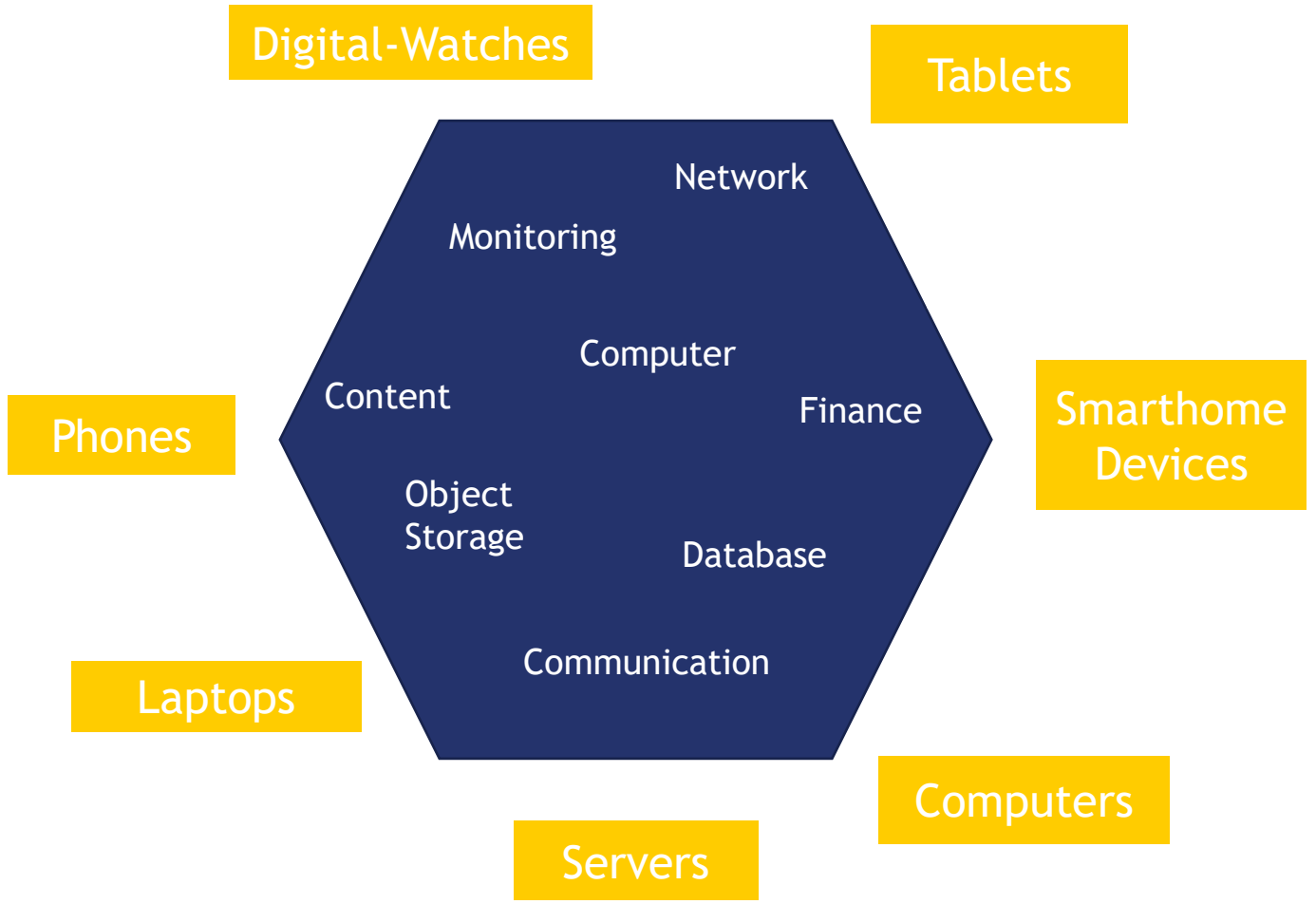
Cloud Computing

Characteristics:

- On-demand self-service
- Measurement of services
- Broad access to network
- Pooling of Resources
- Fast and high elasticity

Risks:

- Access Security
- Security to Data
- Unauthorized Access of the cloud provider

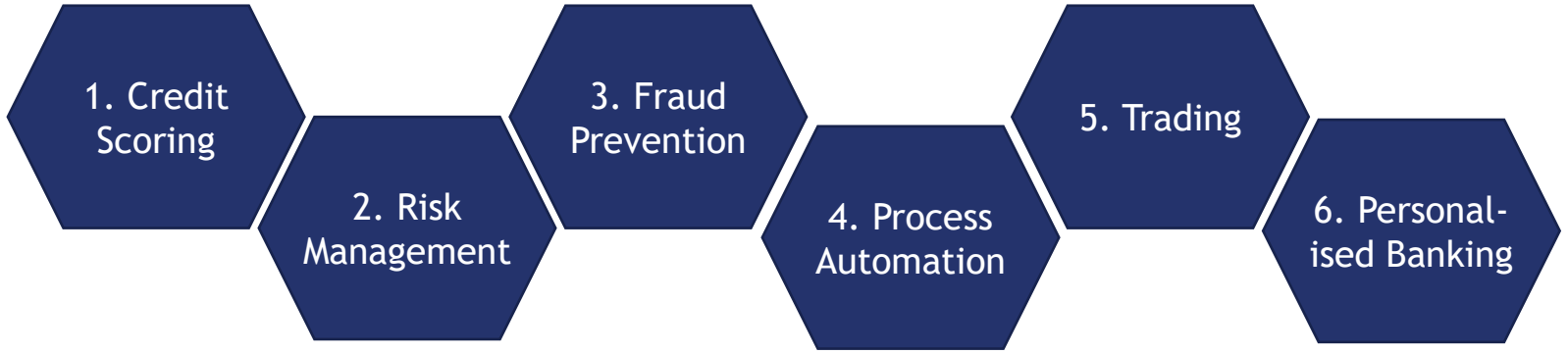


Artificial Intelligence

“A branch of computer science dealing with the simulation of intelligent behaviour in computers. Artificial intelligence mirrors the capability of a machine to imitate intelligent human behaviour.”

Artificial Intelligence is taking the financial services industry by storm. Almost every company in the financial technology sector has already started using AI to save time, reduce costs, and add value.

6. Pillars of AI



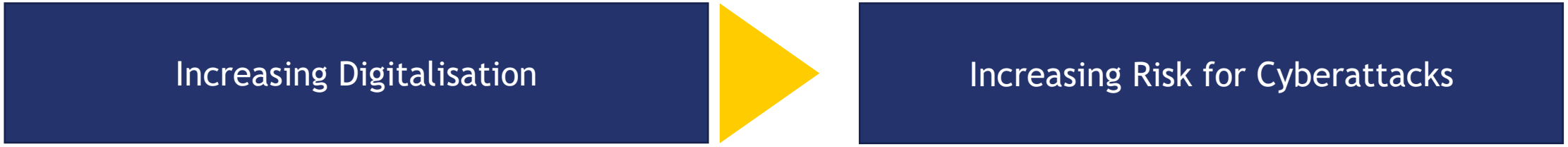
Artificial Intelligence

AI impact on the financial industry:

- Maximizing resources and efficiency
- Replace human decision-making with more sophisticated technologies
- Filtering information and analysing sentiment
- Algo-trading
- Robo advisers (investment & trading management)
- Credit lending assessment, managed risk
- Market surveillance / Fraud detection
- Image recognition

Cyber Security

“Cyber Security is a subset of information security. It specifically focuses on protecting computer systems and their components, including hardware, software and data, and digital infrastructure from attack, unauthorised access or being otherwise damaged or made inaccessible. Data centres, websites, programmes, servers or accounts can all be exploited through a cyber attack.”



Cyber Security

Top 5 Threats 2018 (ENISA)

Top 5 Cyber-Attack Industries (Forbes)

2015

1. Healthcare
2. Manufacturing
3. Financial Services
4. Government Agencies
5. Transportation

2018

1. Healthcare
2. Financial Services
3. Businesses
4. Government Agencies
5. Transportation

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Cyber Security

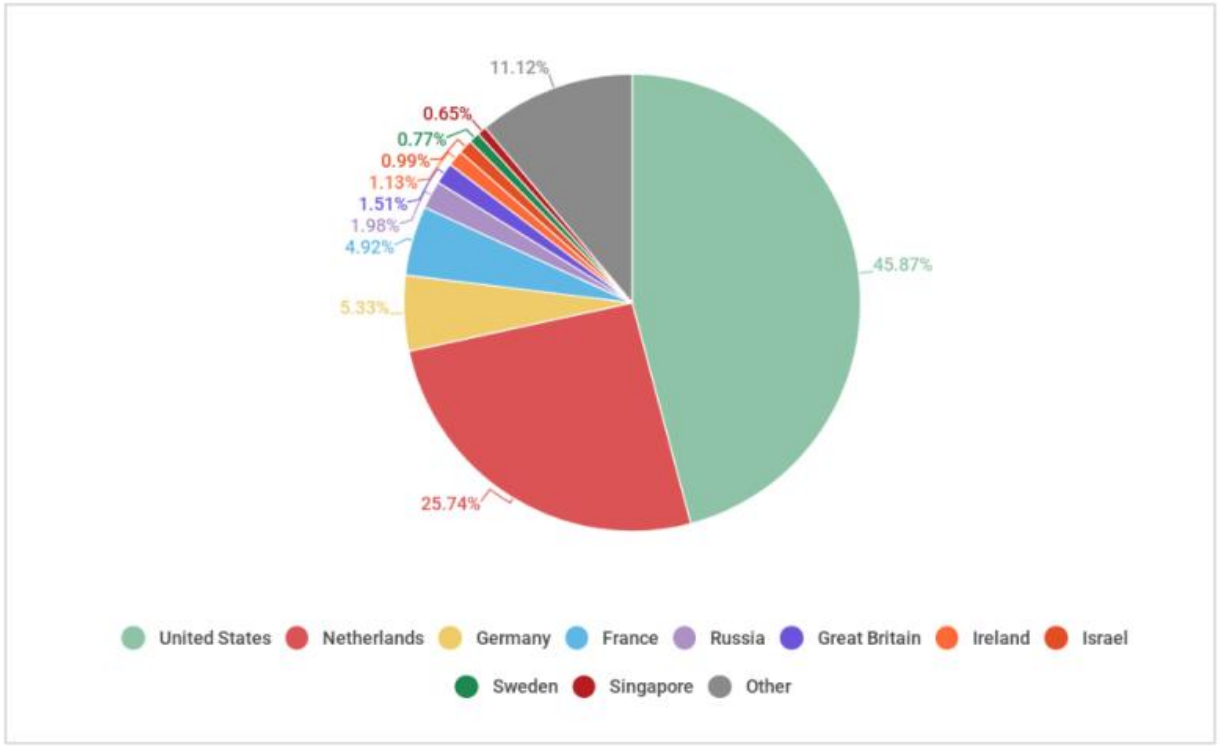
Average expenditures on cybercrime are increasing dramatically, and costs associated with these crimes can be crippling to companies who have not made cybersecurity part of their regular budget.

→The average cost of a malware attack on a company is $2.4 million (*source: Accenture*)

The three pillars of cyber security:

- *People - Users must understand and comply with basic data security principles*
- *Process - Organisations must have a framework for how they deal with both attempted and successful cyber attacks*
- *Technology - Essential for computer security tools needed to protect themselves from cyber attacks*

Cyber Security



Web-Based Attack distribution by source Country (Q2, 2018)

Source: ENISA Threat Landscape Report 2018, Jan 2018

2 Digital Assets – A New Asset Class Era

INTRODUCTION

Financing Types According to the Legal Position of Investors

Funding source	External Financing	Internal financing
Equity financing	Deposit- and equity funding	Profits (Self financing) Equity release Provision
Debt financing	Credit	

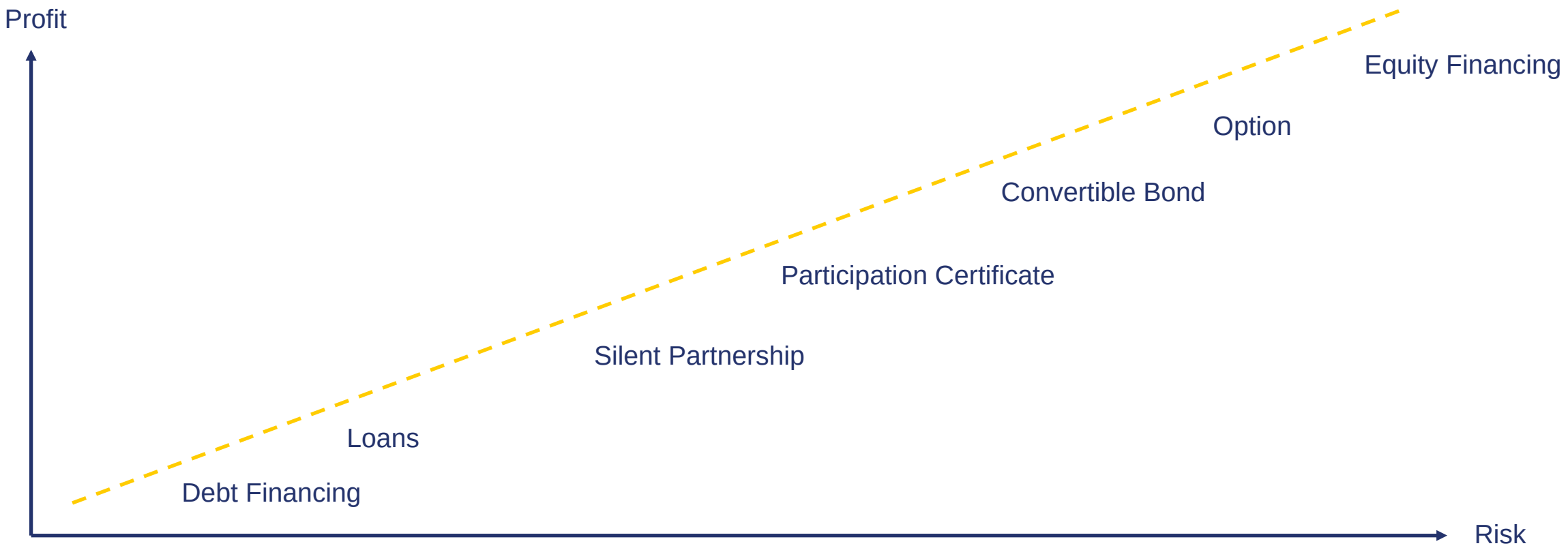
INTRODUCTION

Financing Types According to the Legal Position of Investors

Comparison Criteria	Equity Financing (Equity Finance)	Mezzanin-Capital	Debt Financing
Legal Justice	Ownership at the company	In dependance of the depth, equity and debt financing characteristics	Creditors of the company
Requirement Basis	Ratio		Nominalratio
Success Underlying	Performance based payments		Contract based payments
Limitation	No		Yes
Liability	Yes, but limited		No
Managing Control	Yes, but limited		No
Risk and Profit	Higher compared to debt financing		Lower, compared to equity financing

INTRODUCTION

Financial Innovation Profit-Risk Matrix



Does the Blockchain-Technology has key financial innovation potential?

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INTRODUCTION

The Potential of Blockchain

„Anything that you can conceive of as a supply chain, **blockchain** can vastly **improve** its **efficiency** – it doesn‘t matter if ist **people, numbers, data, money**.“

Ginni Rometti, CEO IBM

Bob Greifeld, CEO NASDAQ

„The **biggest opportunity** set we can think of **over the next decade**.“

„I‘ve been at this 35 years, wirting about the digital age. I‘ve never seen a **technology** that I thought had **greater potential for humanity**.“

Don Tapscott, Writer

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BLOCKCHAIN AND DISTRIBUTED LEDGER TECHNOLGIES

DISTRIBUTED LEDGER TECHNOLOGIE (DLT)

- Distributed = Allocated
- Ledger = Basis account containing information as for example the transaction history
- Nodes = Multiple computers
- Peer-to-peer = Equal

BLOCKCHAIN – ONE TYPE OF SPECIFICATION OF THE (DLT)

- Storing of data in blocks
- Cryptographical implementation to connect the blocks (Hashs)
- Chronological connection of the blocks
- Consesus nmechanism for example Proof of work (Bitcoin), Proof-of Stake (Ethereum)
- Digital signatures (private and public keys)

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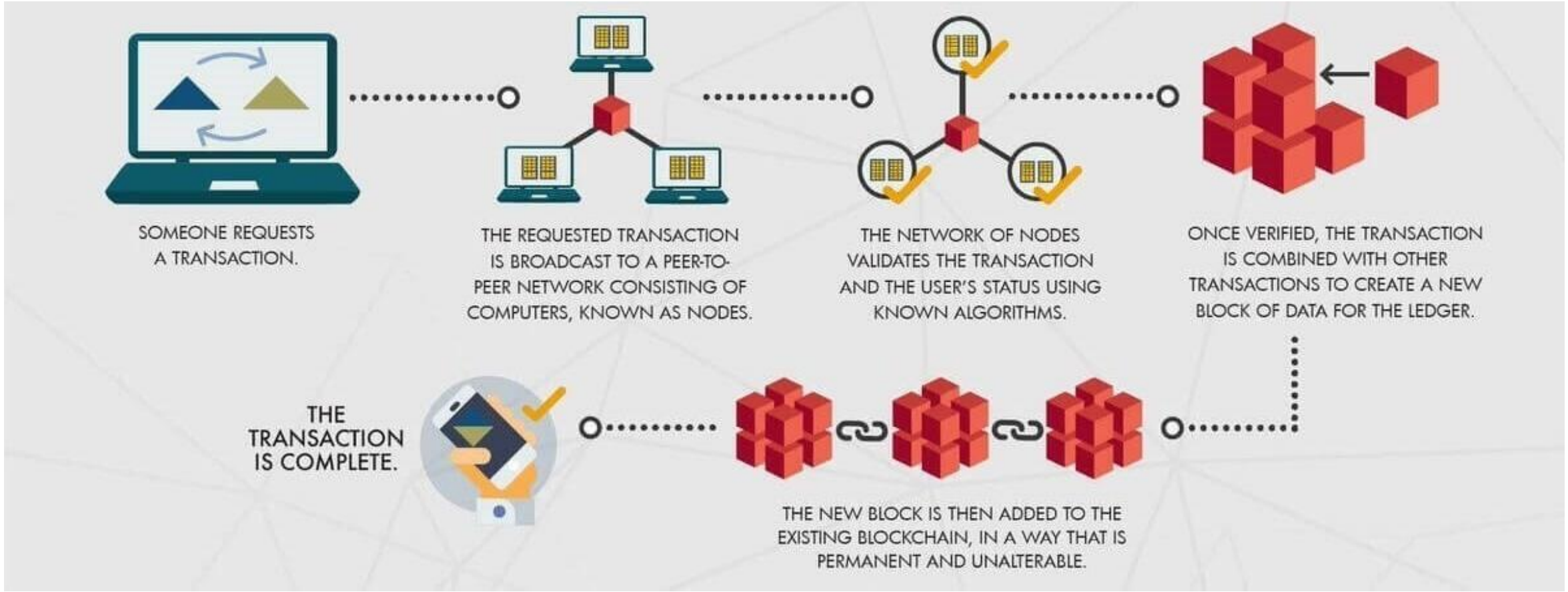
BLOCKCHAIN AND DISTRIBUTED LEDGER TECHNOLGIES

Purchase of a Stock



DIGITAL ASSETS AND CORPORATE FINANCE

Difference between a coin and a token

COINS

- Independent and own blockchains
- Separate setup, rules and use cases
- Bitcoin, Ethereum/Ether, Litecoin

TOKENS

- Use of existing blockchains
- More than just a digital P2P currency: corporate participation, voting rights or preemptive rights
- ERC20 Token, based on the Ethereum blockchain

A Token can turn into a Coin whenever it uses it‘s own platform and operates independently

DIGITAL ASSETS AND CORPORATE FINANCE

THE COINS/TOKENS ARE KEY ELEMENT IN CORPORATE FINANCE USE CASES

PAYMENT-TOKEN

- represents a **cryptocurrency**
- to be classified as private payment solution (P2P)

UTILITY-TOKEN

- provide access to the **goods & services** that the project will launch in the future
- they can also be used as a type of **discount or premium** access to the goods & services of the project

SECURITY-TOKEN

- represents **assets** to physical underlyings, companies, earnings streams, dividends or interest payments
- **very similar to equities, bonds or derivatives**

Utility-Tokens and Security-Tokens are often called to be attained through ICOs

DIGITAL ASSETS AND CORPORATE FINANCE

BLOCKCHAIN		ATTAINED THROUGH	EXPLANATION	CORPORATE FINANCE CONTEXT
		Is often referred to as ICO		
Own	Coin	Initial Coin Offering (ICO)	Unit of account Cryptocurrency	Earlier sales in terms of time
Other	Token			
		Primary Market		
	Payment-Token	Initial Token Offering (ITO)	Unit of account Cryptocurrency	Earlier sales in terms of time
	Utility-Token	Utility Token Offerings (UTO)	Digital coupon Promised benefits	Earlier sales in terms of time
	Security-Token	Security Token Offerings (STO)	Digital security Promised participation	Issuance of securities

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DIGITAL ASSETS AND CORPORATE FINANCE

CORPORATE FINANCE WORLD WITH & W/O BLOCKCHAIN

Criteria	Corporate Finance without Blockchain	Corporate Finance with Blockchain
Table of classification of financial instruments	External & internal financing	External financing (STO) Internal financing (ICO/ITO, UTO)
Accounting standards (IFRS/IAS)	IFRS 9, IFRS 15, IAS 32	IFRS 9, IFRS 15, IAS 32
Organisational process of issuing an asset	Typically 10 steps (e.g. term sheets, legal documents, marketing, listing)	Typically 10 steps (e.g. term sheets, legal documents, marketing, listing)
Technical process of issuing an asset	Investmentbank & Custody with key role	No Investmentbank & Custody needed any more

THE MAIN DIFFERENCE & ADVANTAGES ARE COMING FROM THE TECHNICAL PROCESS

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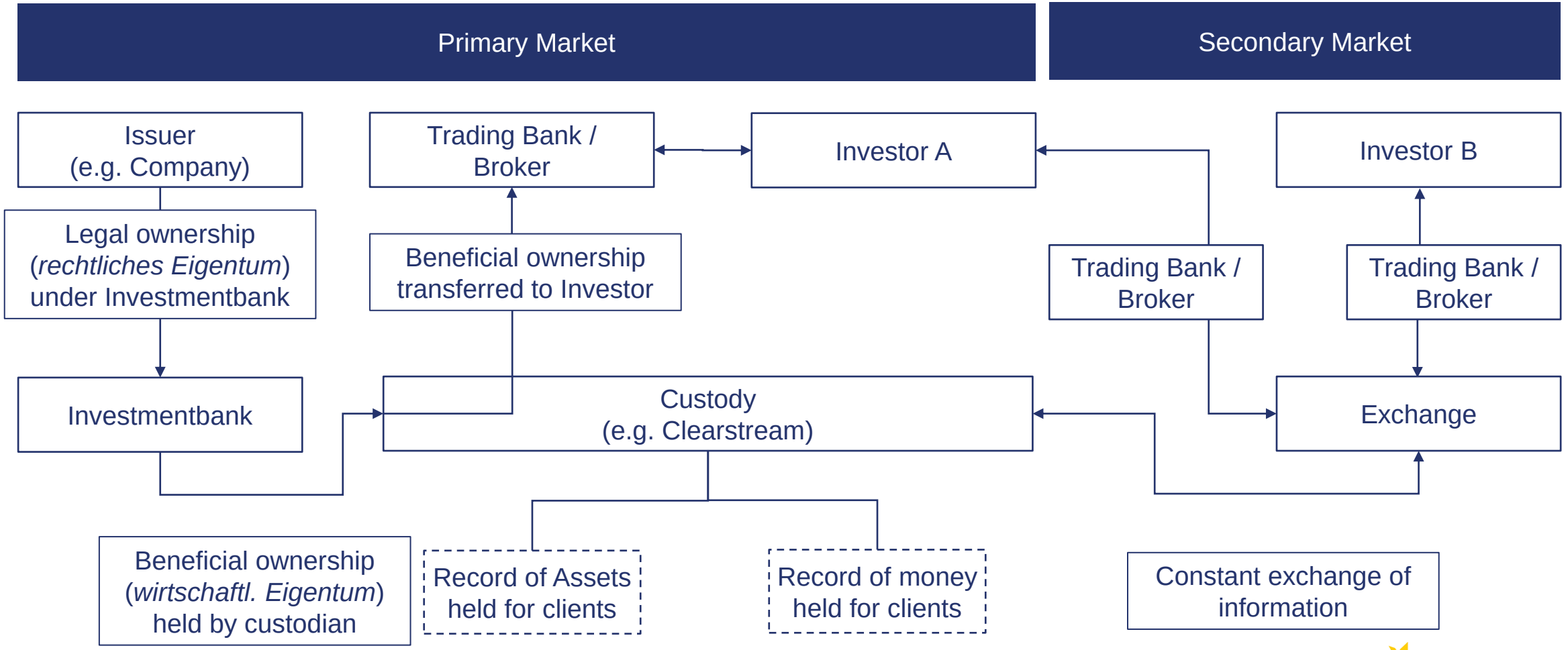
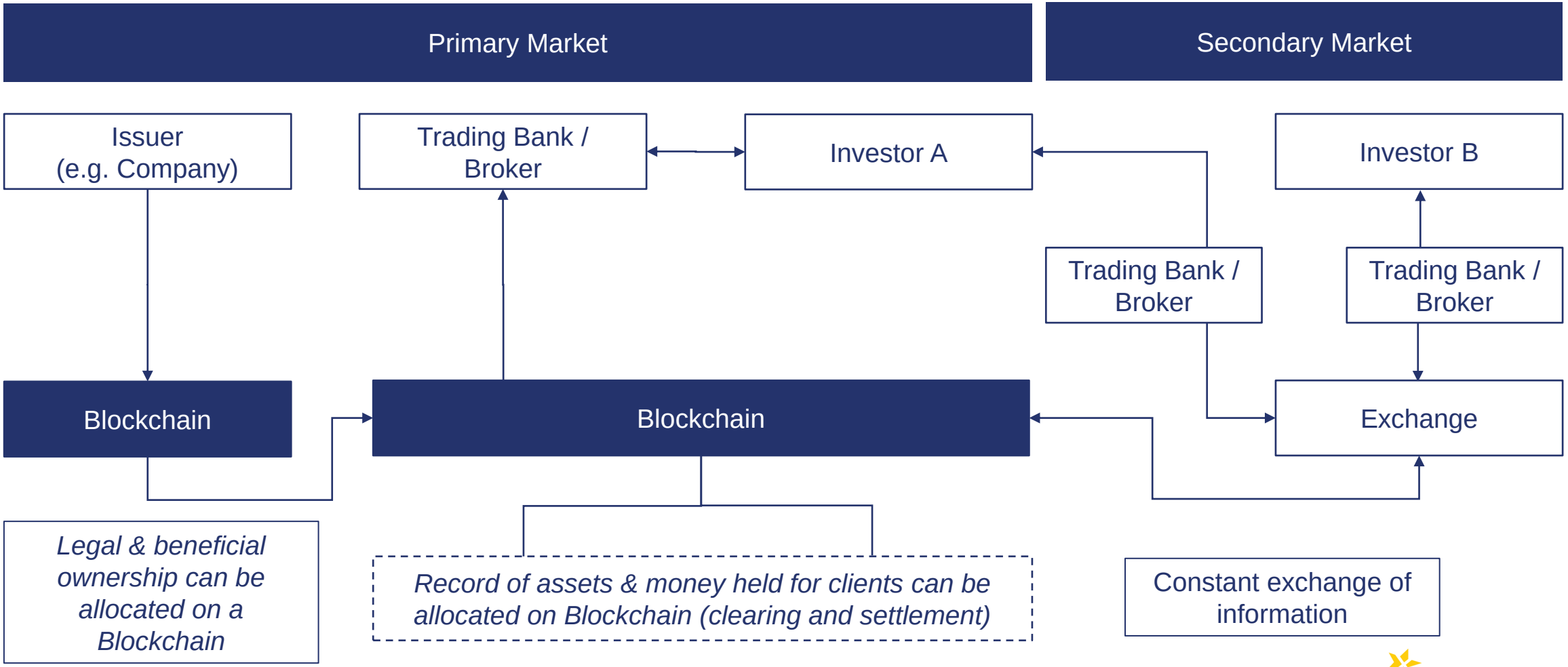
DIGITAL ASSETS AND CORPORATE FINANCE

MAIN DIFFERENCES: TECHNICAL PROCESS OF TOKEN-ISSUING



DIGITAL ASSETS AND CORPORATE FINANCE

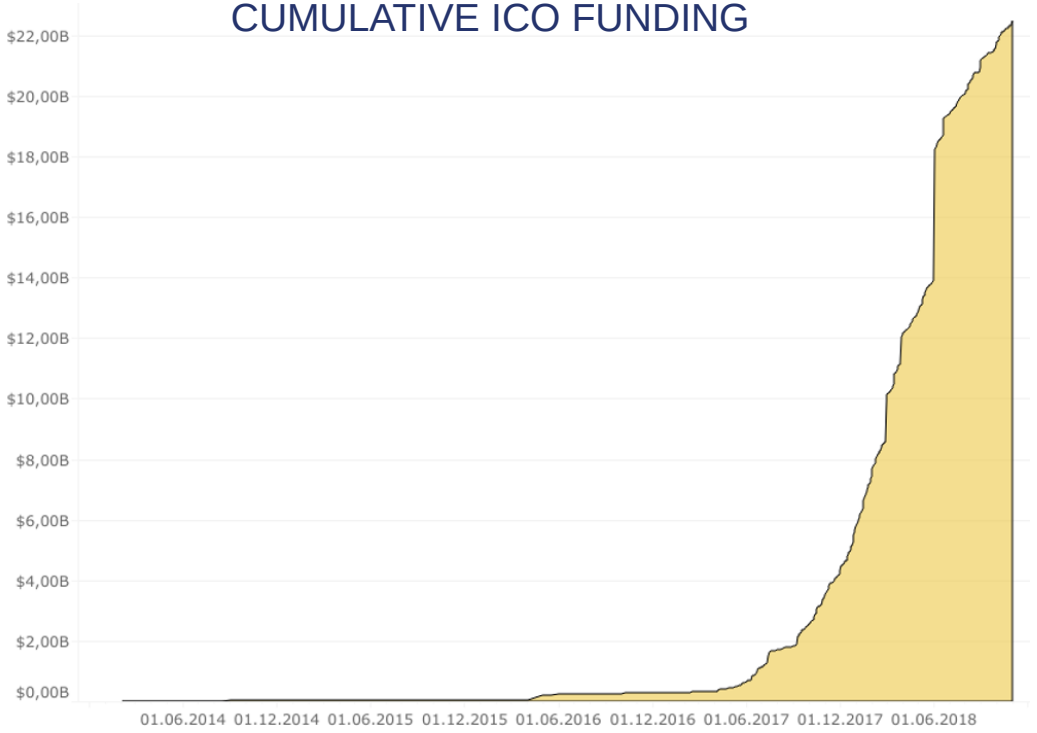
MAIN DIFFERENCES: TECHNICAL PROCESS OF TOKEN-ISSUING

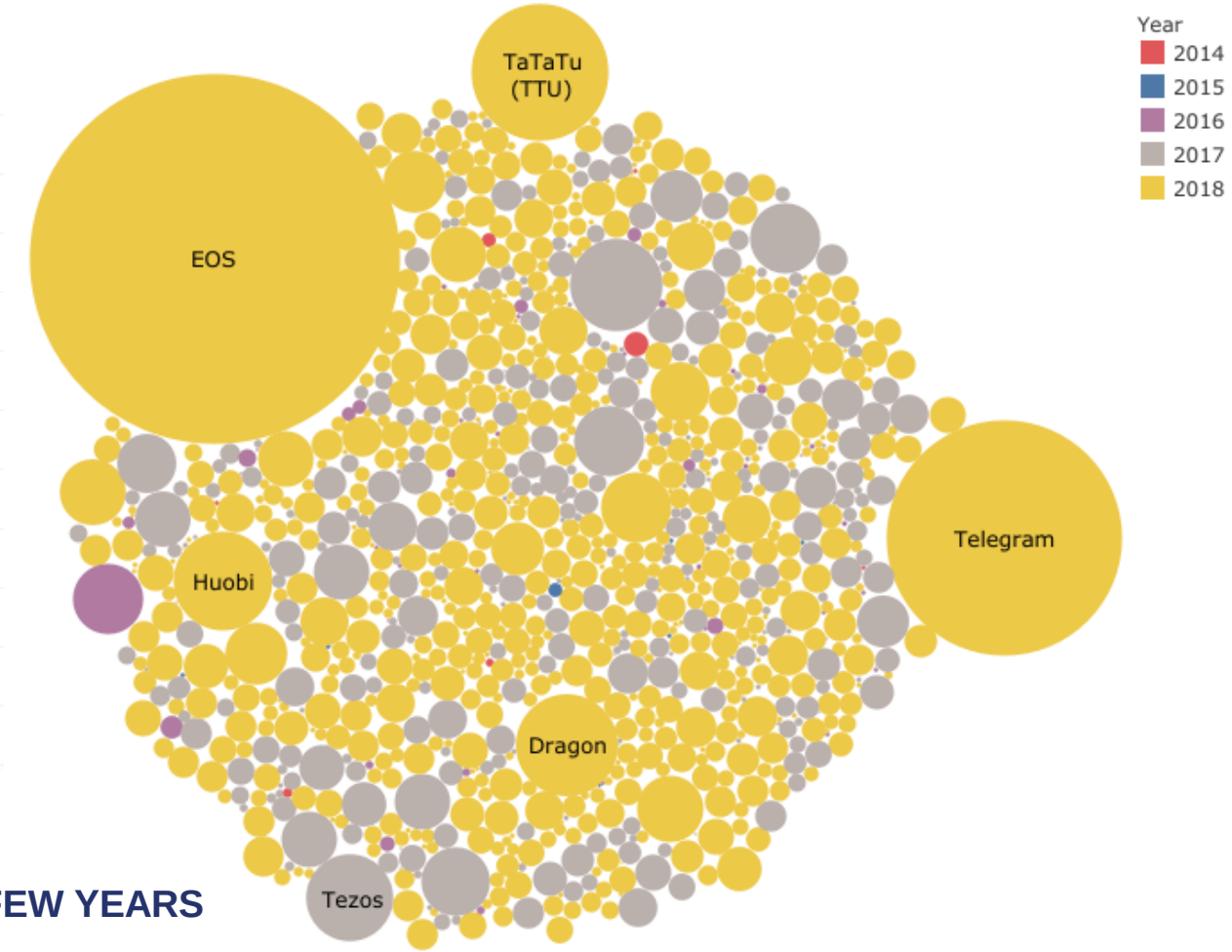


BENEFITS AND RISKS

THERE MUST BE SOME ADVANTAGES CONCERNING TOKEN FINANCING

CUMULATIVE ICO FUNDING





BIGGEST MOVEMENTS WITHIN THE LAST FEW YEARS

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BENEFITS AND RISKS

GENERAL ADVANTAGES OF TOKEN FINANCING

Lower transaction costs

Shared infrastructure (shared settlement layer)

Any time, from anywhere

Faster transactions

Programmable assets (Smart Contracts)

Issuers get direct access to investors

BENEFITS AND RISKS

PAYMENT-TOKEN/COIN	UTILITY-TOKEN	SECURITY-TOKEN
▪ Completely **new financial product** ▪ **Reliable Market-pre-test** of business idea on which the coin/token is sold ▪ **Tradable on a secondary** with higher liquidity	▪ Completely **new financial product** ▪ **Reliable Market-pre-test** of business idea on which the coin/token is sold ▪ **Tradable on a secondary** with higher liquidity	▪ **Lower barrier of entry** (Platforms like TokenizEU established worked-on legal structures of conducting offerings, which brings down costs) ▪ **Fractional ownership** (Tokens can be fractionalized into smaller units)

BLOCKCHAIN BRINGS HIGH POTENTIAL FOR CORPORATE FINANCE

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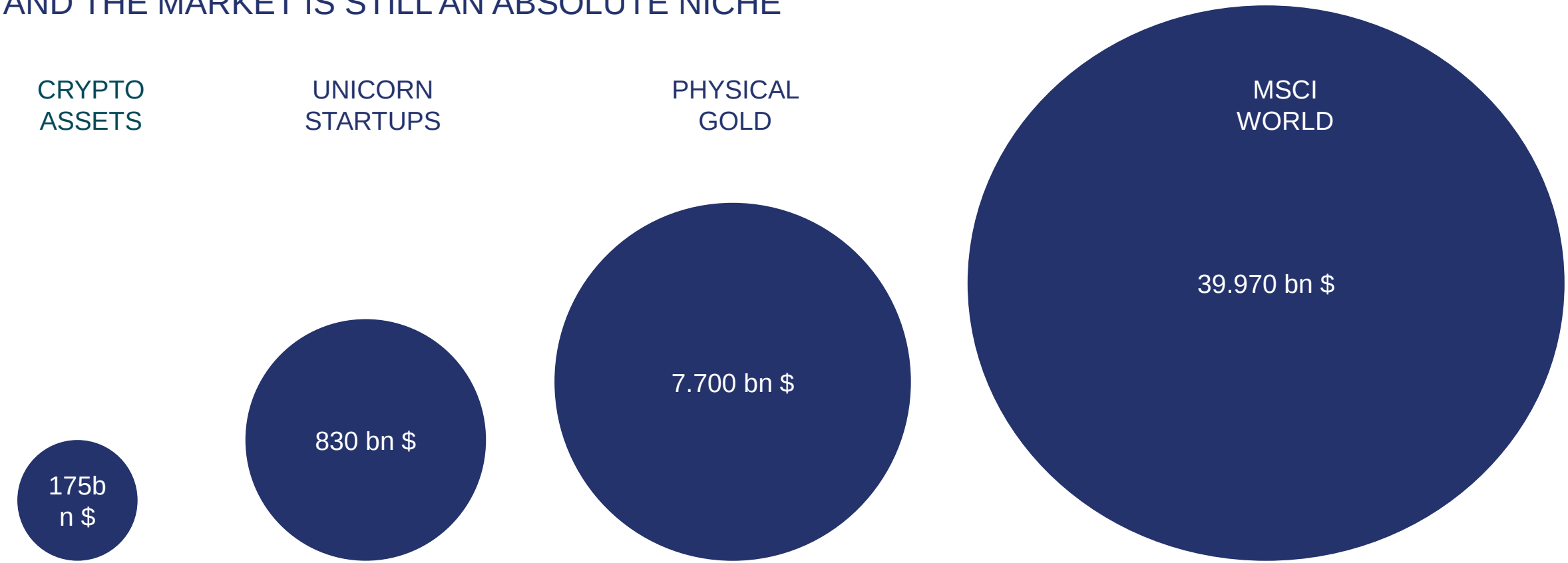
BENEFITS AND RISKS

AND THE MARKET IS STILL AN ABSOLUTE NICHE



BECAUSE OF ADVANTAGES TOKENISATION IN FINANCE WILL FORGE AHEAD

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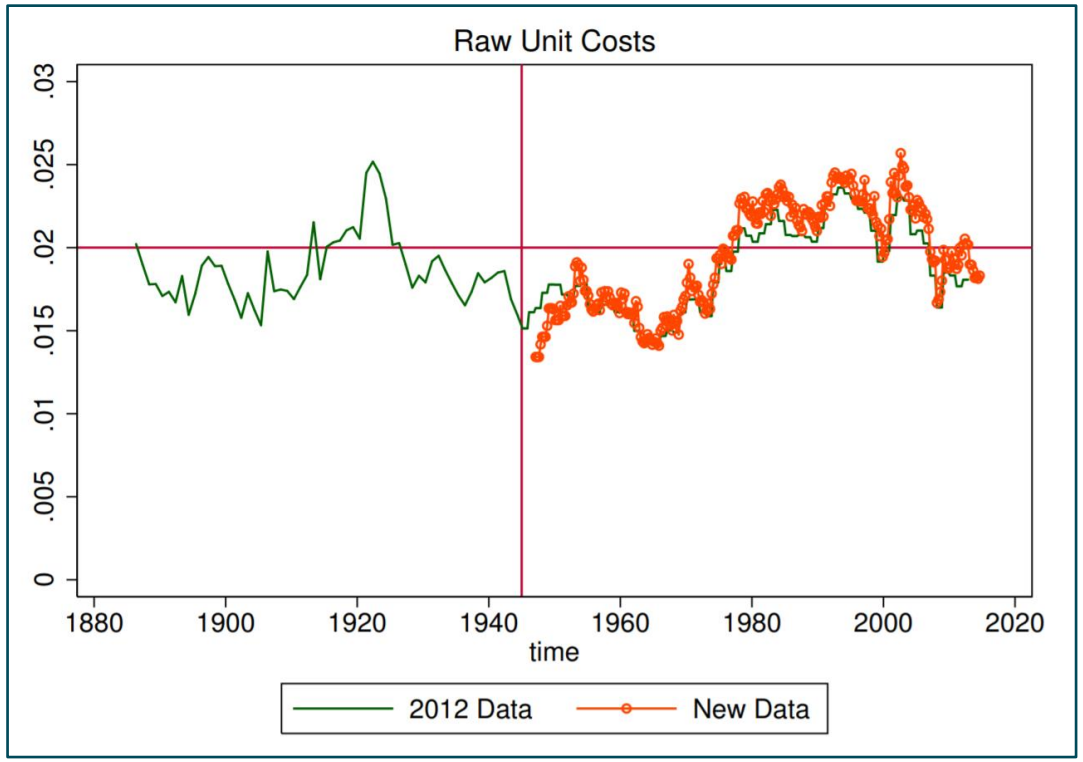
BENEFITS AND RISKS

ESPECIALLY COST REDUCTION IS A MAJOR TOPIC



MAIN FINDING IS …

- that the unit cost of financial intermediation in the U.S. has remained around 2% for the past 130 years
- similar unit costs in other major countries (Germany, U.K., France)
- Improvements in information technologies until now have not been passed through to the end users of financial services

THERE IS A FINTECH OPPORTUNITY AT THE MOMENT

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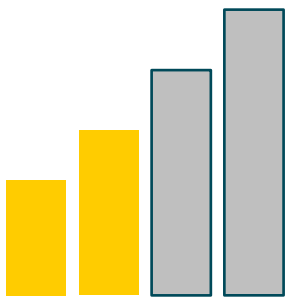
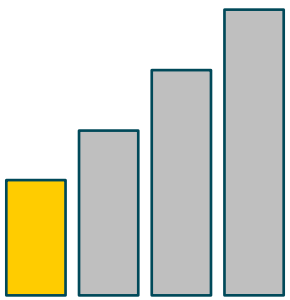
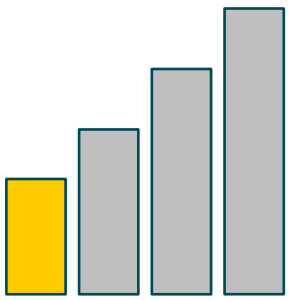
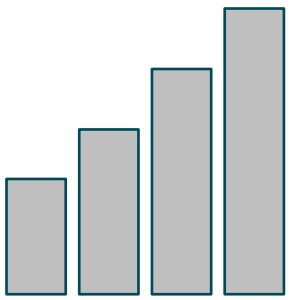
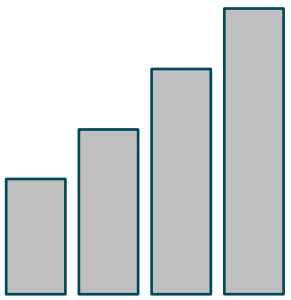
BENEFITS AND RISKS

BUT THERE IS STILL A LONG WAY

KEY ROLE	Primary Market	Secondary Market	Custodian / Clearing	Regulation Standards	Standardization
MATURITY					

THERE ARE SOME CATCHING-UP TO DOS CONCERNING TOKENISED CORPORATE FINANCE

SUMMARY AND QUESTIONS

KEY LEARNINGS

Definition of ICO

- **The most ICOs** should be **correctly named ITO**, because of issuing tokens on existing blockchains like Ether (and not on own blockchain)

Corporate Finance

- **Token Issuing** fits well into our **existing models** explaining Corporate Finance
- Accounting Standards (balance sheet) Table of classification, process of issuance

Still a niche market

- The **market of tokenisation** is still underdeveloped with a **huge potential**
- **Non digital assets could be digitalised in the future**

Innovation Power

- Tokenisation brought up some **new financial products**
- But the **real potential** comes **technically**: lower transaction costs, shared infrastructure and internationalisation

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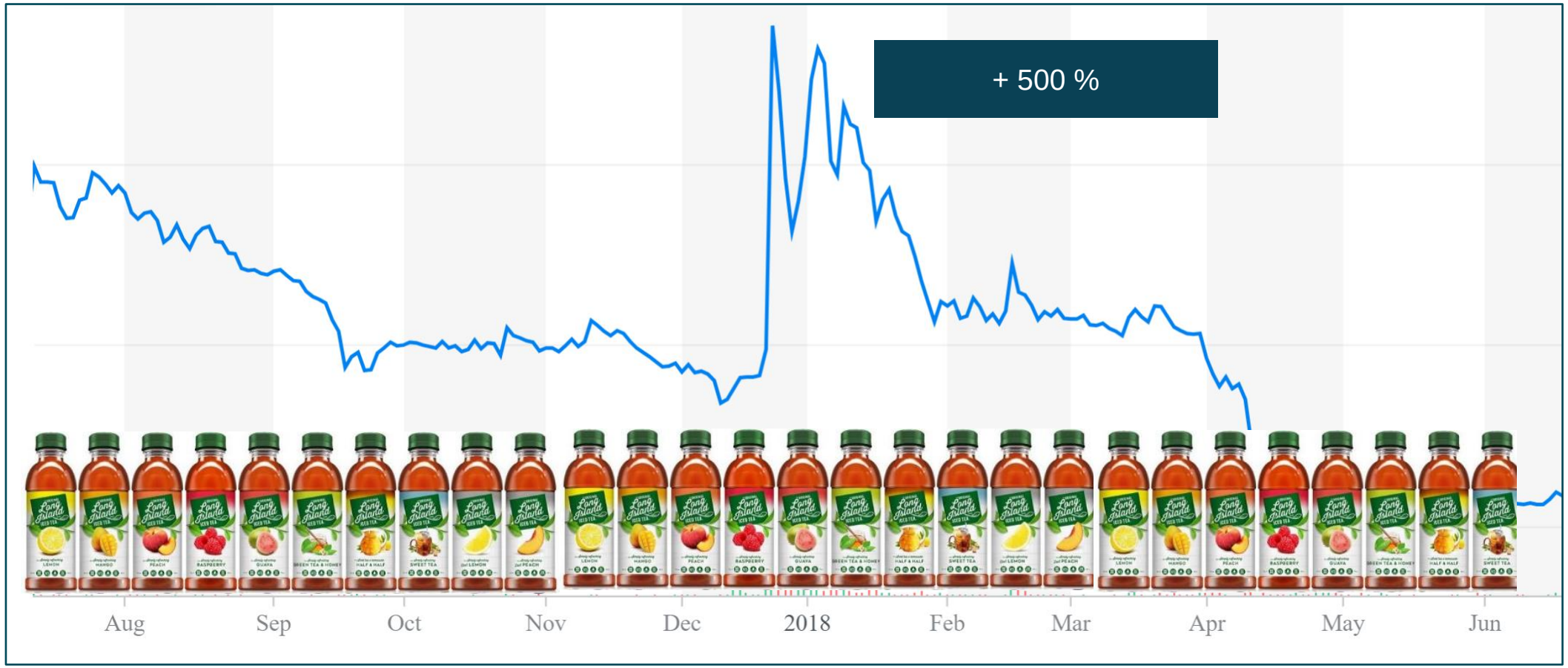
SUMMARY AND QUESTIONS

FUNNY TAKEAWAY FOR YOUR WEEKEND: PRICE CHART OF LONG ISLAND ICED TEA CORP.



SUMMARY AND QUESTIONS

FUNNY TAKEAWAY FOR YOUR WEEKEND …

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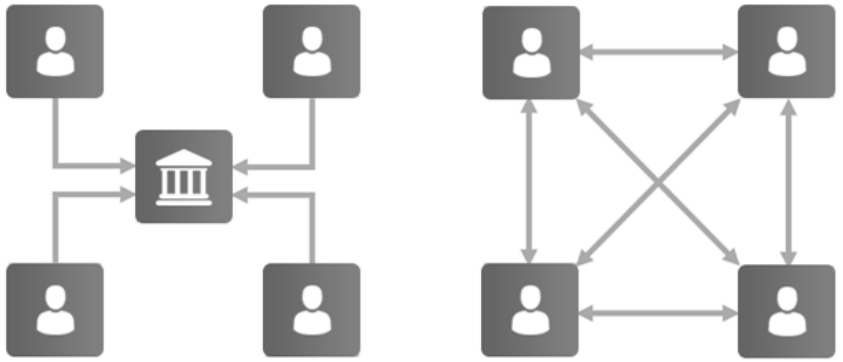
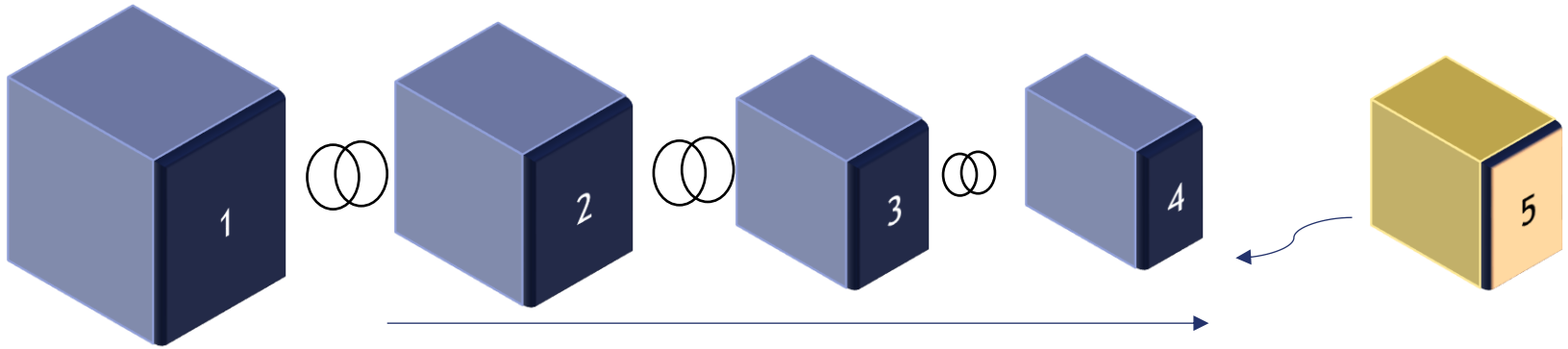
3 Security Aspects in a Digital Asset Environment

TRADING OF DIGITAL ASSETS

Basis: Blockchain Technology

- Blockchain is a decentralised system that links several users by the underlying distributed ledger technology.
- The decentralised database links each user and enables insights into every transaction within that blockchain.
- Every user ownes an identical duplicate of the database.
- A specific amount of transactions are stored in blocks. Each block gets furthermore added to a previous block that is currently the last block within the „chain of blocks“.
- Information that is stored in a block can not be changed afterwards.





TRADING OF DIGITAL ASSETS

- Public Key, Personal Wallet and Private Key

Public Key

- Access to see the content of the wallet
- Analogy: ISIN to see the price of a stock

Software to store

e-Wallet

Private Key

- Access to the wallet
- Analogy: Access code for a debit/credit card at a ATM

TRADING OF DIGITAL ASSETS

Challenges and Security

- The private key has to be kept secure
- Whoever gains the private key, gains access to the whole wallet

- Double spending possibility
- Risk of spending the same coin twice

- Errors in the source code enable an easy access for hackers and lead to serious consequences

Social Engineering

- Sim-Card fraud shuts down the two factor authentification system

Phishing

- Duplication of exchanges enables hackers access to data

Exit Scam

- Shut down of ICO Projects due to collected cryptocurrencies

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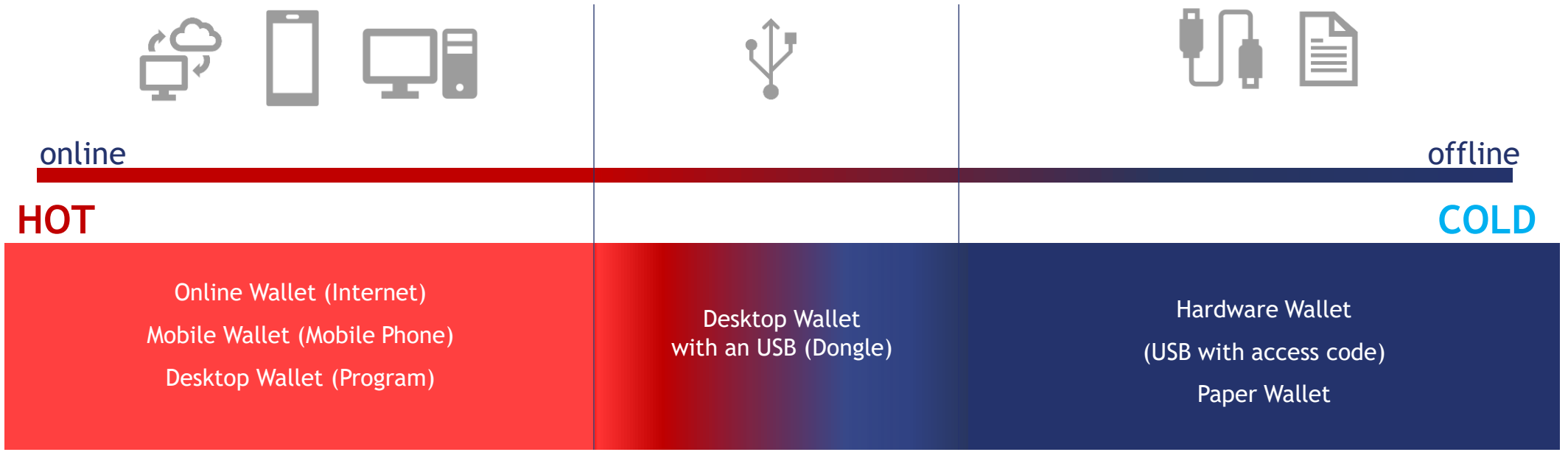
TRADING OF DIGITAL ASSETS

- Solutions – different types of wallets



TRADING OF DIGITAL ASSETS

- Solutions – multi signature wallets

Multisignature (Multisig) defines the process of the necessity to use more than only one key in order to authorise a transaction.

The genereal reason of Multisigs, is to split the responsibility of Bitcoin ownership

- Multisig wallets increase the security, especially within the business environment
- Analogy: Four-eye-principle

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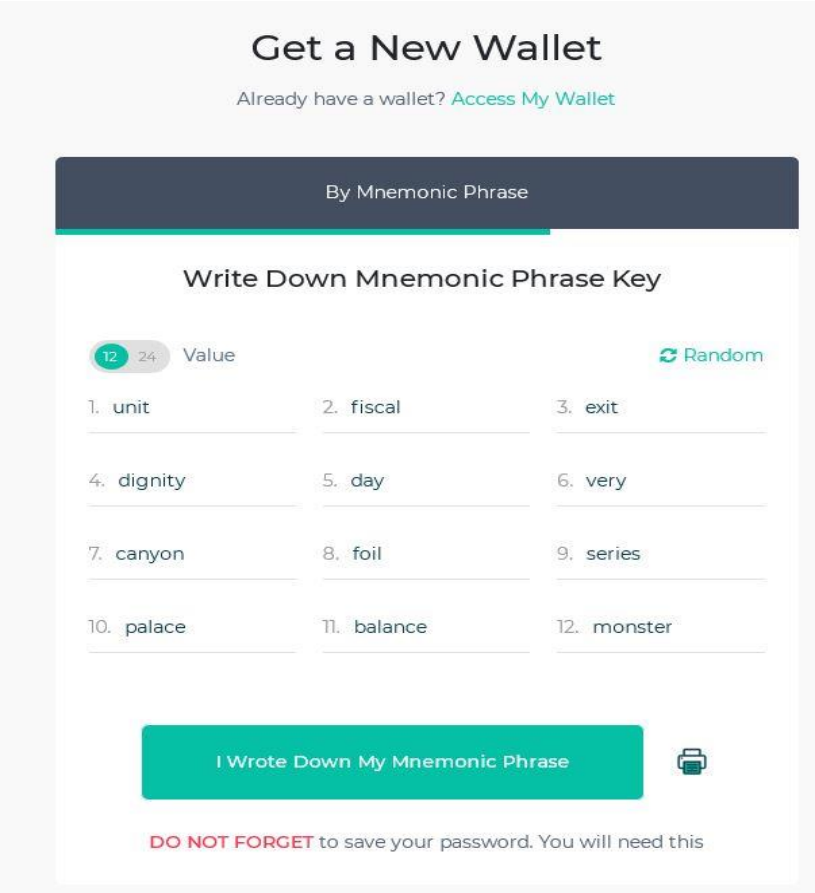
TRADING OF DIGITAL ASSETS

- Solutions – recovery mnemonic phrase

- Recovery Mnemonic Phrase is the possibility to re-create a lost private key



4 Regulation of Digital Assets

MOTIVATION

Eva Kailin (Member of the European Parliament)

We do **not** want to **stop innovation**," she explains. "The resolution[1] is a roadmap to support this very exciting technology. We [the European Parliament] have shown that we are **open-minded**." (…)

"By its nature, blockchain technology doesn't recognize borders," she says. "**It's unstoppable. You will be disrupted** if you don't try to understand it. Instead you need to **see the potential**."

Source: Ripple (2019): What's on the Regulatory Horizon for Digital Assets in the E.U.?
1: European Parliament resolution on distributed ledger technologies and blockchains: building trust with disintermediation (3 October 2018)

European Securities and Markets Authority (ESMA)

ICOs are **highly speculative investments**. ICOs, depending on how they are structured, may fall **outside** of the **regulated space**, in which case investors **do not benefit from** the **protection** that comes with regulated investments. ICOs are also **vulnerable to fraud** or **illicit activities**, owing to their anonymity and their capacity to raise large amounts of money in a short timeframe.

Source: ESMA (2017): ESMA alerts investors to the high risks of Initial Coin Offerings (ICOs)

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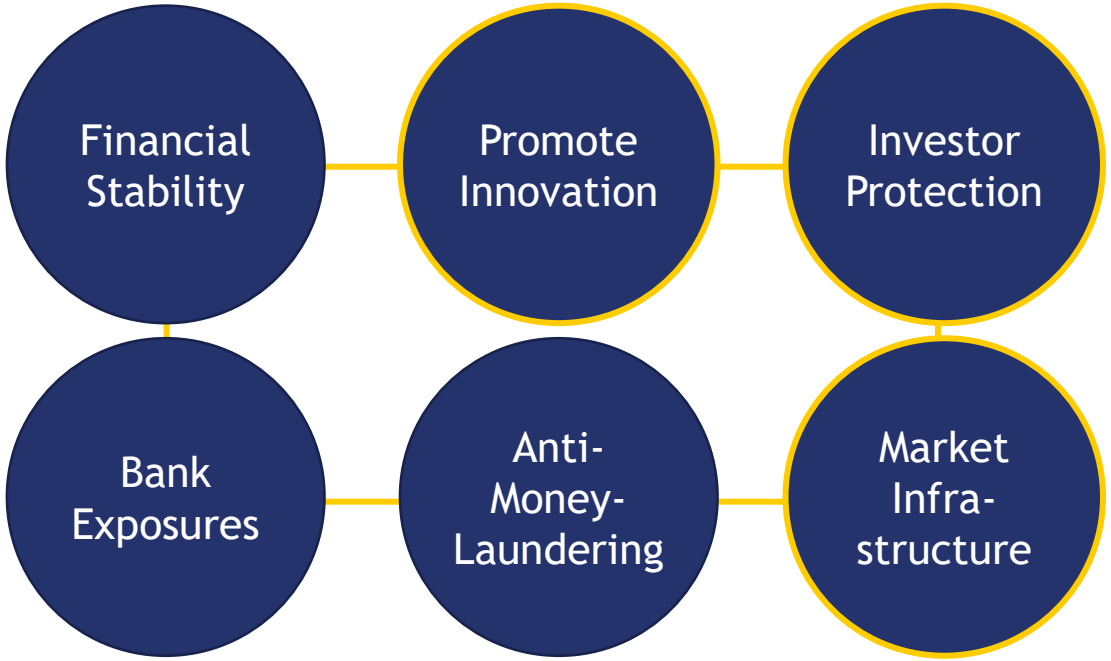
OPEN REGULATORY QUESTIONS

Policy makers and regulators are working on a number of fronts, directly addressing issues arising from digital assets. Examples are …

How to adapt **new rules without hindering innovation**?

Do digital assets pose a **immediate threat to the financial stability** of the euro area?

What is an appro-priate **risk management framework** for financial institutions?



Which regulatory gaps need to be addressed to **ensure sufficient investor protection**?

Which rules are necessary to **ensure orderly primary and secondary markets** and **custodian services?**

What is the best way to combat **illegal activities** such as money laundering?

Focus in the following

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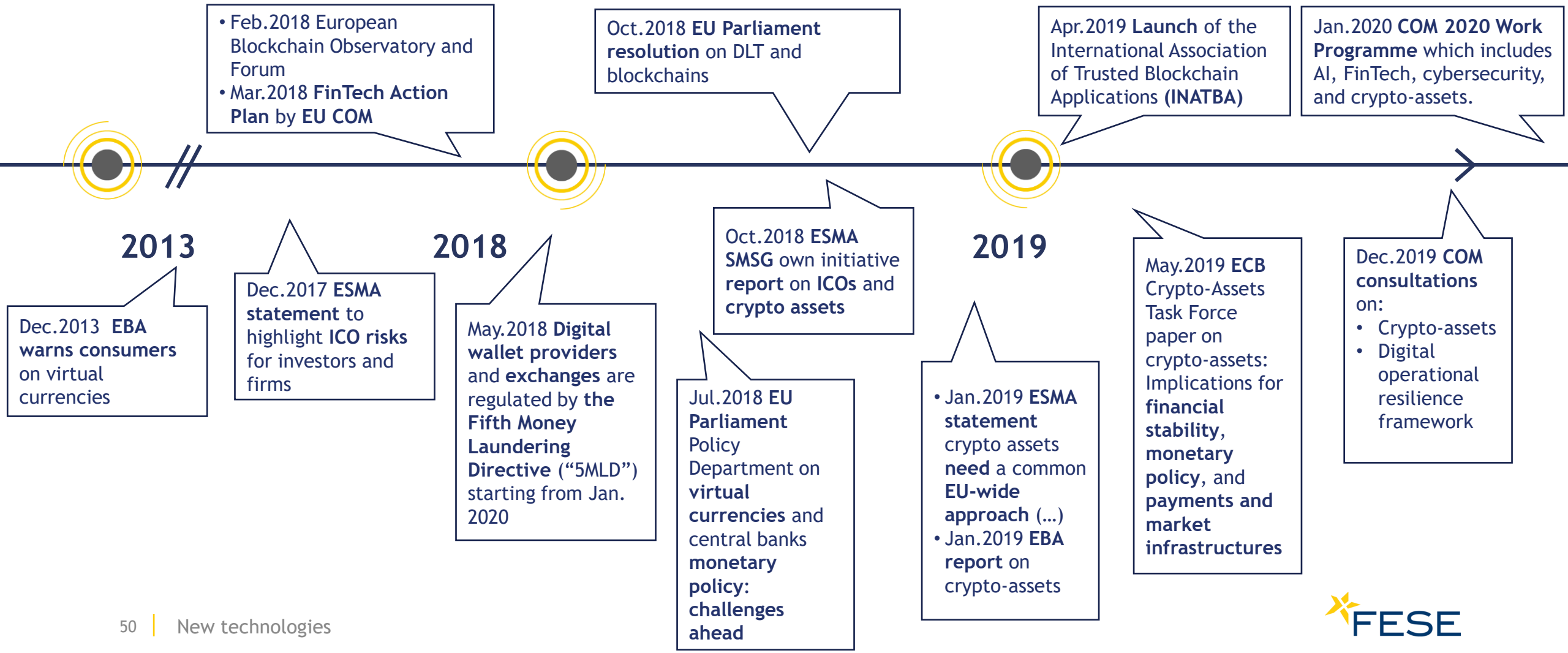
- Incomplete -
for discussion only

EUROPEAN INITIATIVES

Policy makers and regulators have taken great interest in these new markets



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Commission Consultations

- **EU regulatory framework for crypto-assets**
  - Classification of crypto-assets
  - Crypto-assets that are not currently covered by EU legislation
  - Crypto-assets that are currently covered by EU legislation
    - MiFID II – MAR – SSR – Prospectus R – CSDR – EMIR – (…)
- **Digital Operational Resilience Framework**
  - ICT and security requirements
  - ICT and security incident reporting requirements
  - Digital operational resilience testing framework
  - Oversight of third-party providers
  - Interaction with the Security of Network and Information Systems (NIS) Directive
  - Potential impacts

➢ **Deadline: 19th March 2020**

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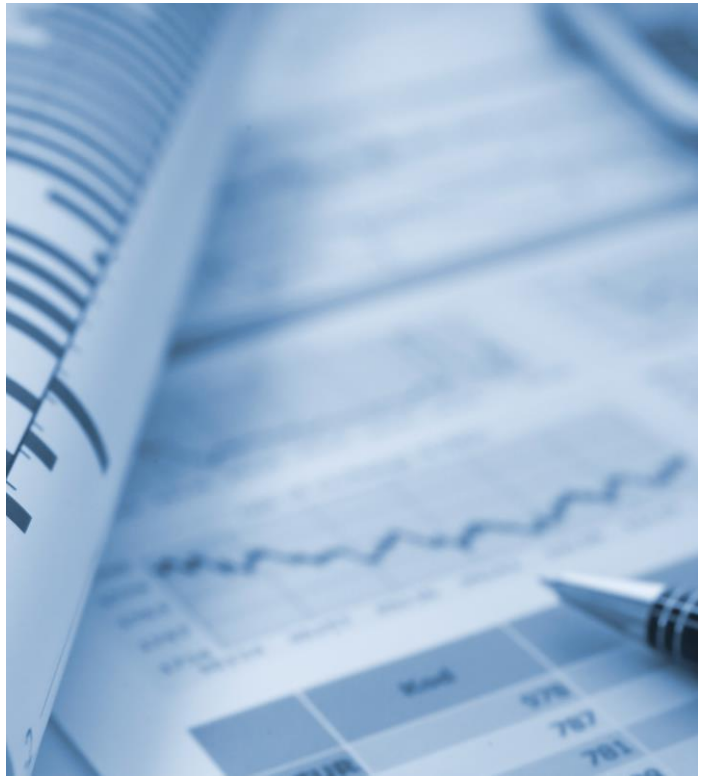
Commission Work Programme 2020

New Initiatives

- **A European approach to Artificial Intelligence**
  - White Paper on Artificial Intelligence (non-legislative, Q1 2020)
- **Digital services**
  - Digital Services Act (legislative, incl. impact assessment, Article 114 TFEU, Q4 2020)
- **Increasing cybersecurity**
  - Review of the Directive on security of network and information systems (NIS Directive) (legislative, incl. impact assessment, Article 114 TFEU, Q4 2020)
- **Digital finance**
  - Action Plan on FinTech including a Strategy on an Integrated EU Payments Market (non-legislative, Q3 2020)
  - Proposal on Crypto Assets (legislative, incl. impact assessment, Article 114 TFEU, Q3 2020)
  - Cross-sectoral financial services act on operational and cyber resilience (legislative, incl. impact assessment, Article 114 TFEU, Q3 2020)



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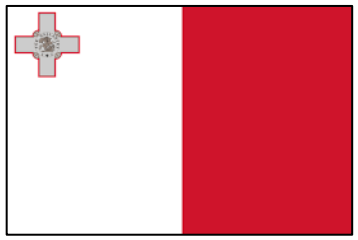
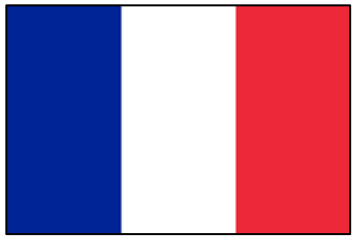
NATIONAL INITIATIVES

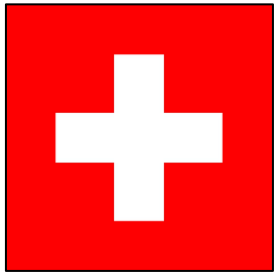
How DTL, ICOs and digital asset trading are regulated in various European countries - some insights into crypto regulations



New regulatory framework: Innovative Technology Arrangements and Services (ITAS) and Virtual Financial (VFA) Act



Framework for ICOs and digital assets services providers by the Action Plan for Business Growth and Transformation (PACTE)



Swiss government suggests amending existing laws in a bid to enhance Switzerland's status as a blockchain-friendly country

Currently consulting on regulatory reforms

Thank you!

Q&A

Annex

LIST OF SOURCES

- BlockSize Capital (2019): Asset tokenization – the future of capital markets, STO-Day, Frankfurt am Main, 17. April 2019
- Cohen/Smith/Arulchandran/Sehra (2018): Automation and blockchain in securities issuances, in: Butterworths Journal of International Banking and Financial Law
- Comistar Global (2019): Security Token Offerings (STO) VS Initial Public Offerings (IPO), URL: https://medium.com/@Comistar/security-token-offerings-sto-vs-initial-public-offerings-ipo-6a8885ee721a
- ICO Tracker (2019): ICO Tracker, URL: https://www.coindesk.com/ico-tracker
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- Perridon/Steiner/Rathgeber (2009): Finanzwirtschaft und Unternehmung, 15. Auflage, Vahlen Verlag
- Philippon (2017): The FinTech Opportunity, BIS Working Papers No 655
- PWC (2019): IFRS für die Praxis. Rechnungslegung von Krypto-Assets und zugehörigen Transaktionen

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