Faculty of Law, Economics and Finance of the University of Luxembourg

TECH & COMPANY LAW
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I.   Introducing the Class

II.   ABCD: Drivers of the Corporate Technologies

III.   Some Project Examples

I.   Introducing the Class

II.   ABCD: Drivers of the Corporate Technologies

III.   Some Project Examples

The Tech Multiverse

Crowdfunding

Digital Currencies / Bitcoin

Initial Coin Offerings (ICOs)

Robo Advisers

KYC Hubs/ e-ID

Auto Compliance

BigData

Cloud

Distributed Ledgers

Artificial Intelligence/ Algorithms

Digital Identity
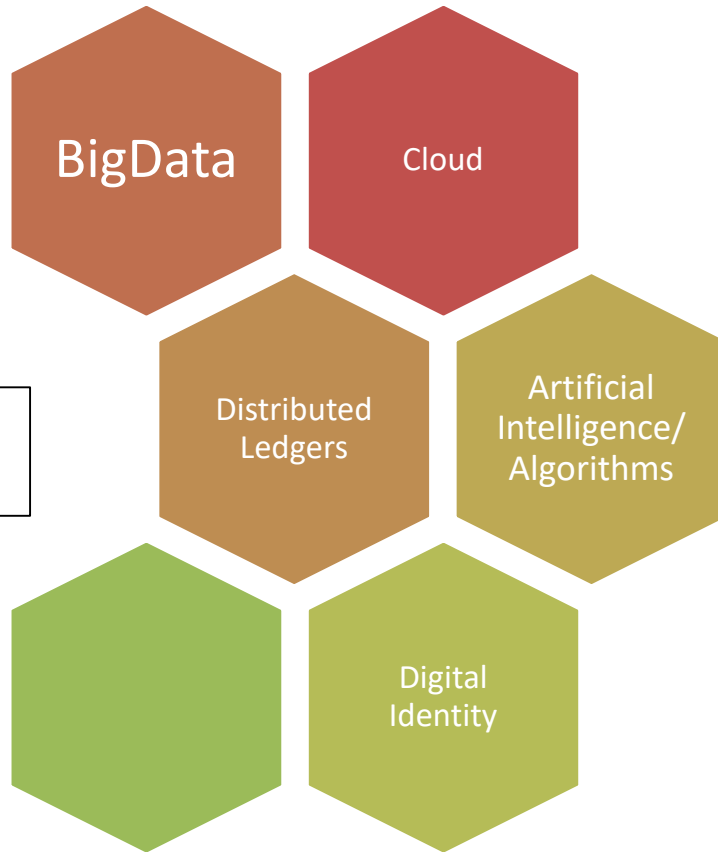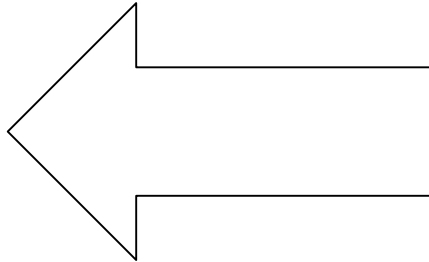
- Artificial Intelligence = software code
- Computer scientists: "AI = devices that perceive their environment and take actions without additional human intervention that maximize their chances of successfully achieving their task." => Mimicking human 'learning'.
- Independent data sorting and analysis following pre-programmed parameters
- Artificial intelligence puts the mass of data gathered in the Big data times to good use.

A = Artificial Intelligence

- Machine learning is a subset of AI that uses statistical, data-based methods to progressively improve the performance of computers on a given task, *without humans reprogramming the computer system* to achieve enhanced performance.
- The learning is achieved through breakdown of data in data particles and extensive "practice" with multiple feedback rounds through which the machine is told whether it has passed or failed a task.

Digitization of Business Processes
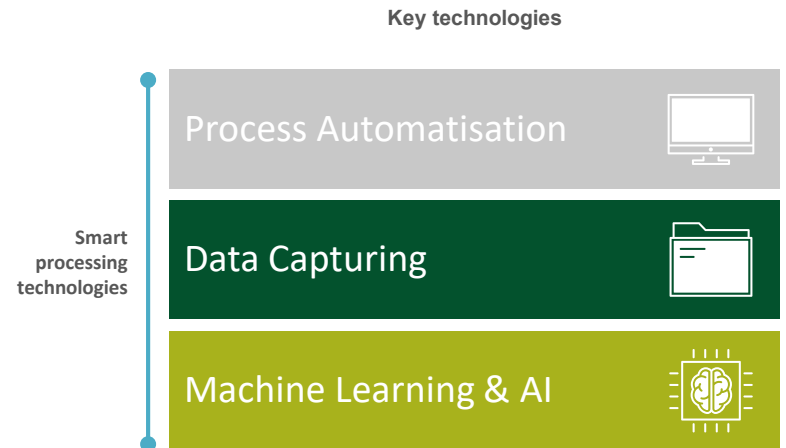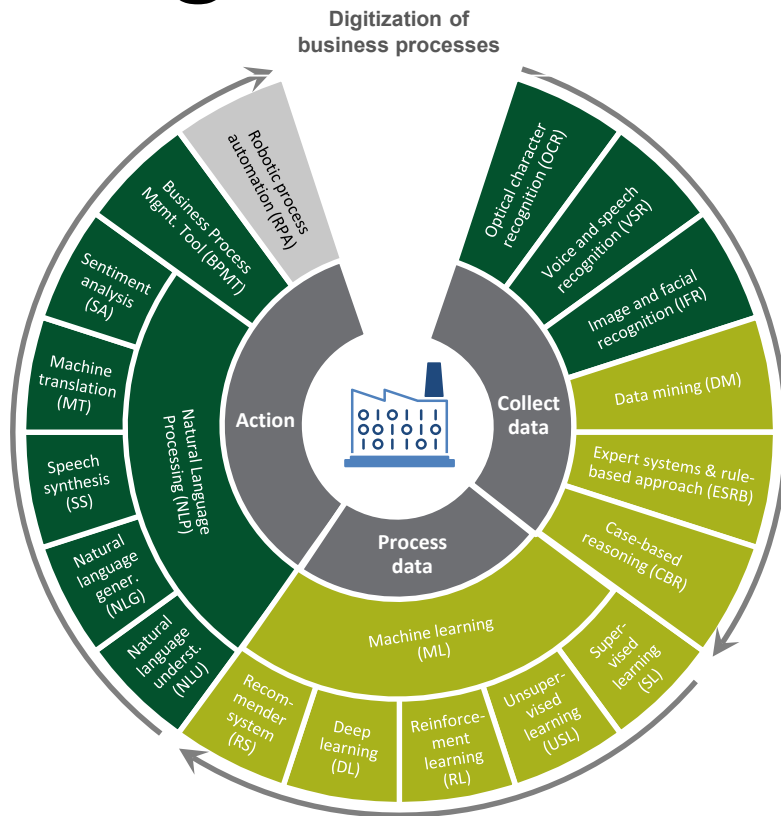
Use case for financial services: Risk Management

- Investment committee proposes investment
- AI searches for terms used for the firm description in the internet and particular data sources
  (eg. robo advisor AND Blockchain AND token AND ….)
- If these terms are used very often in combination in the last six months the AI signals "a trend" and asks the investment committee to check whether the deal is adequately priced.

Use case for financial services: Fraud detection

PayPal

- Automated compliance monitoring

- Real time analysis of payments in combination with deep learning

- Deep learning algorithms analyze thousands of data points (e.g. IP address, buying history,…) in real time

- Target: identity theft, phishing attacks etc.

- <u>Fraud rate reduced to 0.32 % compared to FIs standard of 1.32 %</u>

Limits of AI

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1. Data dependency

- algorithm only as good as the data it works with.

- **data may suffer from biases**: either due to data selection issues ('dashboard myopia') or data reflecting biases persisting in society at large (eg. STEM advertisement AI)

- **data quality may be poor**: machine learning depends on the training data used for "teaching" AI the patterns (eg. Enron compliance data used for training outlandish by today's standards)

- **data availability:** SME FS providers have few data, and large FS providers may be unwilling to share data with tech firms => where 'data is the new oil' tech firms may sell data or become competitors in the future

- **data of the past may not provide the answer:** random walk issue of future events

- algorithms do not "feel" and do not have "values"

- Training machines in ethics prone to fail since « norms are fuzzy »: Humans cannot tell why they feel in certain ways.

- Morally wrong algo-made determinations can seriously harm a a portfolio value for mispricing reputational risk (eg. Facebook's data handling)

3. Incomplete handling of compliance matters

- AI poor in filling the 'incomplete legal contract' with which the law governs firms and societies at large. Eg. "fair", "adequate", "just", "reasonable person" etc.
- AI poor in pricing risks of non-compliance related to such clauses
- Predictions in heavily regulated environments most likely wrong
- FS = heavily regulated environments

AI's

*Impact on Company & Financial Services Law*

- Fit & Proper Test of key personnel?
  - Still justified if AI is doing (part of) the job?
  - New qualifications for directors? ('techie')
  - AI as directors?
- Reconsider management liability
  - Why?
  - Code selection?
  - Insufficient code testing?
  - Trust in third-parties' programming skills?

- Authorization of AI?
  - Harmful for innovation
  - Regulators too slow
  - Self-learning algo today ≠ algo tomorrow
- Sandboxing AI?
  - Self-learning algo today ≠ algo tomorrow
- Use of AI vs Outsourcing Rules?
  - AI as (limited) Legal Personality?

BigData = Data sets too large & complex for traditional apps
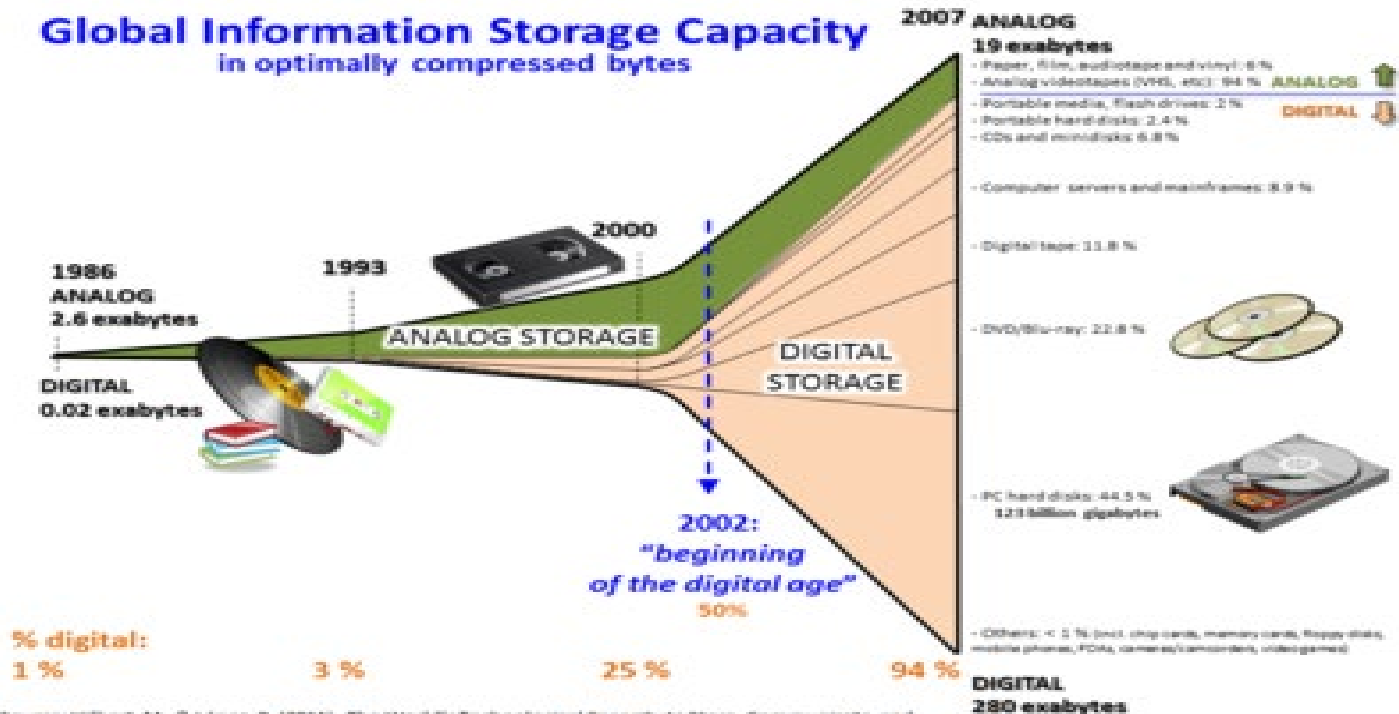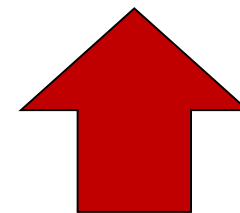
C = Cloud

- Decentralized storage of data
- Decentralized access of data
- Decentralized processing of data
- Economies of scale and scope
- Large-scale decentralization

Centralised   Decentralised   Distributed
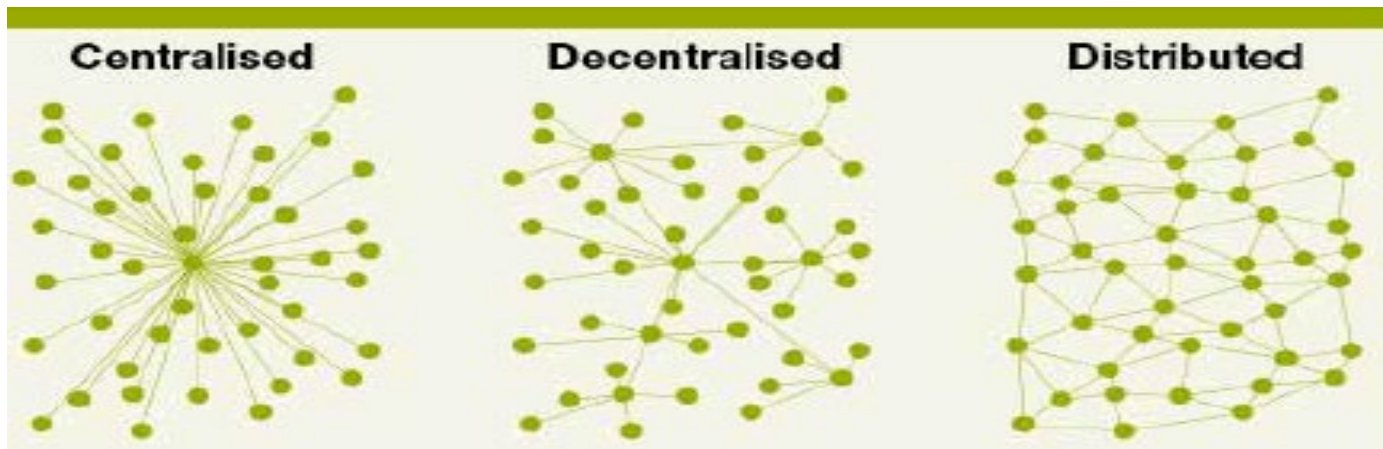
Passport,
Banking identity today

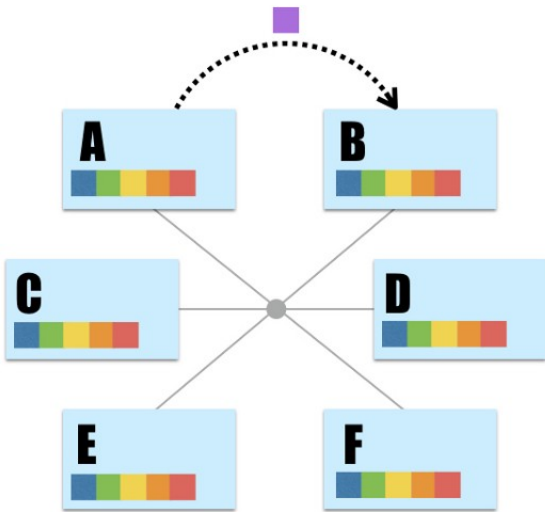Distributed Ledgers – from the 15th century Polynesian Islands

Mechanics of a Blockchain

Transaction

A and B want to enter into a "transaction"
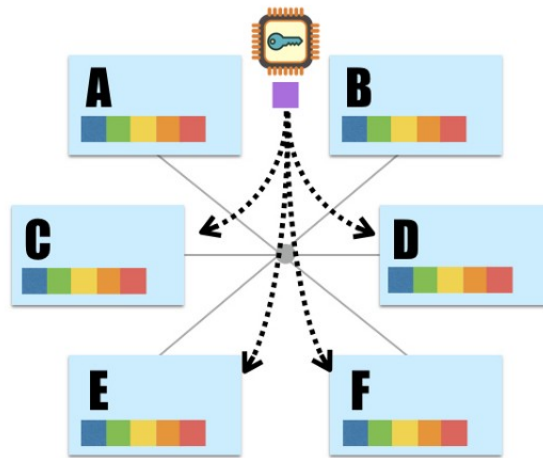
A and B use "private" and "public" keys/signatures to securely share the "transaction with other nodes in the network
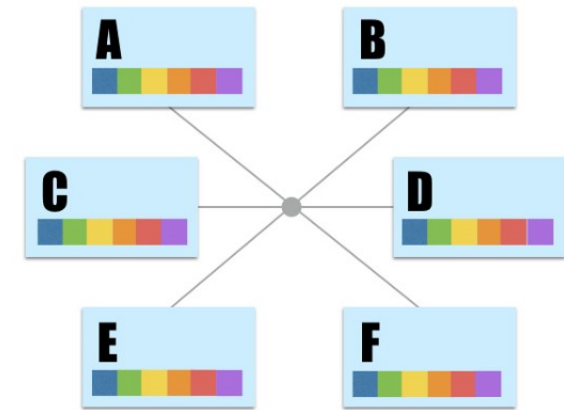
Once the "transaction" is confirmed, it will be added as a "block" to the blockchain

With kind permission by Prof. Erik Vermeulen

VARIANTS

Permissioned vs Permissionless Blockchains

- Know your peers? Anonymity? +/-

- Governance? Hierarchy ⇔ Random
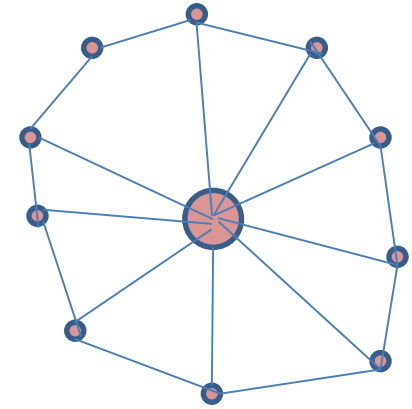
Consensus Model

- Proof-of-stake

- Proof-of-work
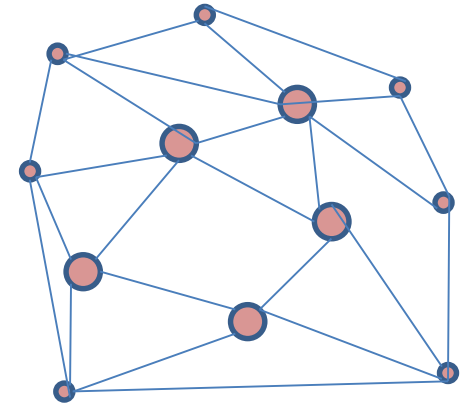
A BC IS A SOLUTION TO ...

✓ **The <u>trust problem</u> when storing data: did anyone manipulate the data stored?**

✓ **The access problem where multiple devices need <u>simultaneous access</u>**

✓ **<u>Permanent</u> storage due to linkage in a block**

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(-) **Turning inaccurate data into accurate data ('garbage in, garbage out')**

(-) **Governance issues in computer interaction (code renovation etc.)**

(-) **Data privacy as to data stored on BC (⇔ data stored in external wallet)**

(-) **Privileged and confidential data when node participation is permissionless.**

POTENTIAL APPLICATIONS

- ✓ **Titel registers (identity, land etc.)**
- ✓ **Clearing & Settlement**
- ✓ **KYC/AML utilities**
- ✓ **Virtual currencies (Bitcoin)**
- ✓ **Initial Coin Offerings**
- ✓ **Delivery Chains**
- ✓ **Green FinTech Sustainability Proofs**
- ✓ **...**

KYC Utilities:
www.ssrn.com/abstract=3224115

ICOs
https://ssrn.com/abstract=3072298

C.
Legal Issues of BC/DLT

1. LIABILITY IN A BC CONTEXT

⇒ **Why liability?**

WEAK SPOTS OF DL−1: NOT ALL DISTRIBUTED

- **Transaction data the second prior to storage**

    - Corrupt transacting parties

    - Just two

- **Bitcoin: Breaking into the Wallet**   ?

    - Examples Mt. Gox, DAO, others

    - Treatment: spreading losses over all nodes: 75 Mio / 17 Mio.

- **Governed ledgers: Breaking into the ledger hierarchy**

    - „Ordinary" hacker attack

WEAK SPOTS OF DL–2: TECH VULNERABILITIES

- **Brute force attack with quantum computers**

  - If consensus = 50%+ of nodes (N), N/2+1 nodes must be corrupted.

  - Harder than centralized ledger, but possible

- **Infect BC software update with malware**

  - Permissionless DL ≠ governance, adoption process irrational / random

  - Code may serve different than expected, bugs hard to fix

WEAK SPOTS OF BC–3: PERMANENT TRANSPARENCY

- **Violation of data protection rules**

  - Protected private data may be spread via the BC; GDPR: 4% of turnover

- **Violation of confidentiality requirements**

  - Once stored via DLT information may loose privileged status in court

    (depending on DLT participants); violation of contractual / banking secrecy

- **Legal obligation to ‚delete' (rather than remanufacture) transaction**

  - ‚Delete'impossible; Ex: Copyright infrinctions: injunction to remove?

- **All steps visible for all**

  - Implicit cooperation of competitors? Antitrust issues!

1. LIABILITY IN A BC CONTEXT

If there are liability events specific to DLT/BC
$\Rightarrow$ Who picks up the bill?

2. POTENTIALLY LEGALLY RELEVANT ACTIVITIES

- ❑ **Decision to start**: download BC scripts / software
- ❑ **Decision to participate**: connect computer to internet, switch on – off, run validation processes, install updates
- ❑ **Other decisions:**
    - ❑ decision to invest computing power (proof of work concept)
    - ❑ decision to contribute and maintain a certain stake (proof of stark concept)

BC participation is not an accident, but result of wilful action.

Legal concepts to cover BC Participation

Company / Partnership / Association Law	Contract Law	Tort Law, Law of Delict

COMPARATIVE VIEW

- Which legal concept applies differs from country to country.

    - Partnership law concepts have a stronger support in Germanic legal systems (incl China, Japan), contract and tort law concepts are stronger in anglo-american countries.

- Result could differ.

    - Ranging from joint liability to proportional liability.

    - Depends on specific DLT design

    - ⇒ **In all jurisdictions ground for liability if there is cooperation among several nodes!**

3. CONFLICT OF LAWS

- Legal divergence across the globe

 - Active vs. Passive: From Blockchain laws to private law doctrine

  - Business vs. consumer friendly approaches

  - Details difficult in XB BC: who among all nodes is the service provider, partner etc?

- Choice of law & *courts* does matter

  - Enterprise choice of law clauses may cover tort liability in certain cases

  - Involvement of consumers to result in local standing and local laws

TOWARDS THE DLT LTD.

DLT Ltd.

❏ Liability risk presses towards concentrating the ledger in one holding entity or one outsourcing partner, or limit use and risks of DLT to one financial group of very high standing.
❏ Outsourcing, data protection and confidentiality rules determine to what extent others can participate.
❏ 'One world BC' unlikely and undesirable in a business context.
❏ Coordination among several permission BCs by blockchain + smart contracts, with partitioned servers?
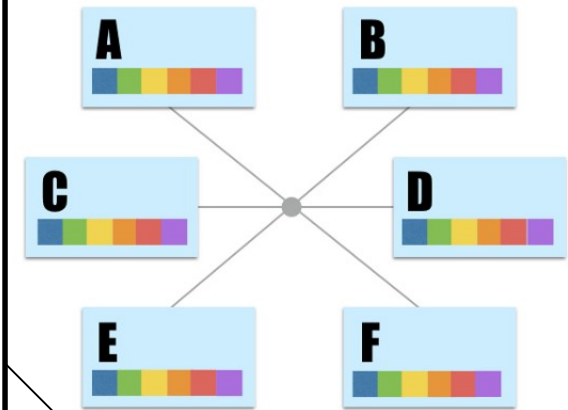
D.

Innovative Potential of BC&DLT:
A brief look at Smart Contracts

1. INFORMATION VIA DLT

✓ **Same information stored on all nodes**

✓ **Same information *available* on all nodes**

✓ **Reduced information asymmetry**

✓ **Reduced costs relating to information asymmetry**

    ✓ eg margin payments (T2S => BC application)

    ✓ eg information intermediaries (Delaware/Lux BC-based Shareholder ID)

1. INFORMATION VIA DLT

(-) The end of privacy?
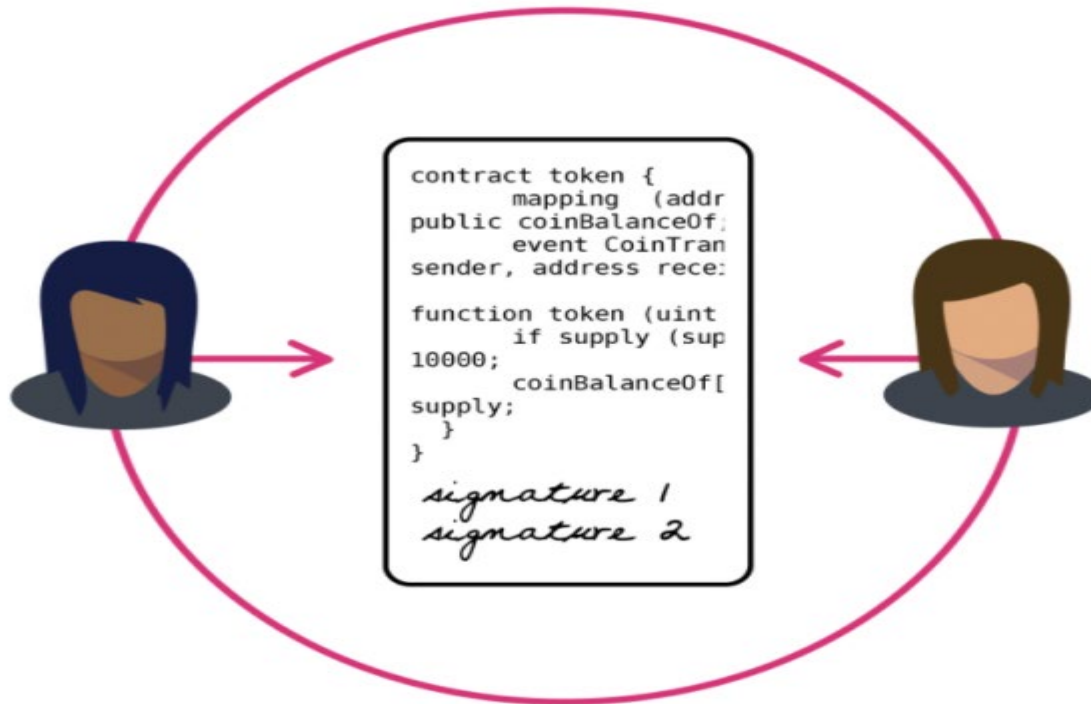
(-) Cooperation vs. competition law?

(-) Accuracy of data stored? => systemic risk?

2. The Power of «Smart Contracts »

✓ **Automated execution of pre-set standardized transactions**

✓ **Strict „if – then" coding**

✓ **Avoid human intervention => human mistakes**

✓ **Limited choice**

✓ **Reduced transaction costs**

Standard Contract: relationship of parties enforced by <u>law</u>

Smart Contract: relationship of parties enforced by <u>code</u>

Source: https://www.coindesk.com/information/ethereum-smart-contracts-work/

2. THE POWER OF «SMART CONTRACTS »

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- ✓ **Limited Choice**

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2. THE POWER OF «SMART CONTRACTS »

(-) „Smart Contracts" neither „smart" nor „contracts"

(-) Are smart contracts sufficiently smart for the real world?

(-) Choice of law clauses ‚implicit in code' not universally acceptable

(-) „Perfect" coding? (-). Fixing necessity

(-) Code is <u>not</u> law. Limits of law ⇔ limits of the code?

(-) Contracts necessarily „incomplete" => costs / benefits. Smart contracts same. =>

„personalization of contract law"? Certain mass contracts.

Smart Contracts: Theses

Law adds a layer of complexity to smart contracts/code, but ...

1) Code needs law to secure its legitimacy/

Smart Contracts need private law embedding

- Example 1: protected factors=> minimum income vs foreclosure

- Example 2: relevance of « errors »

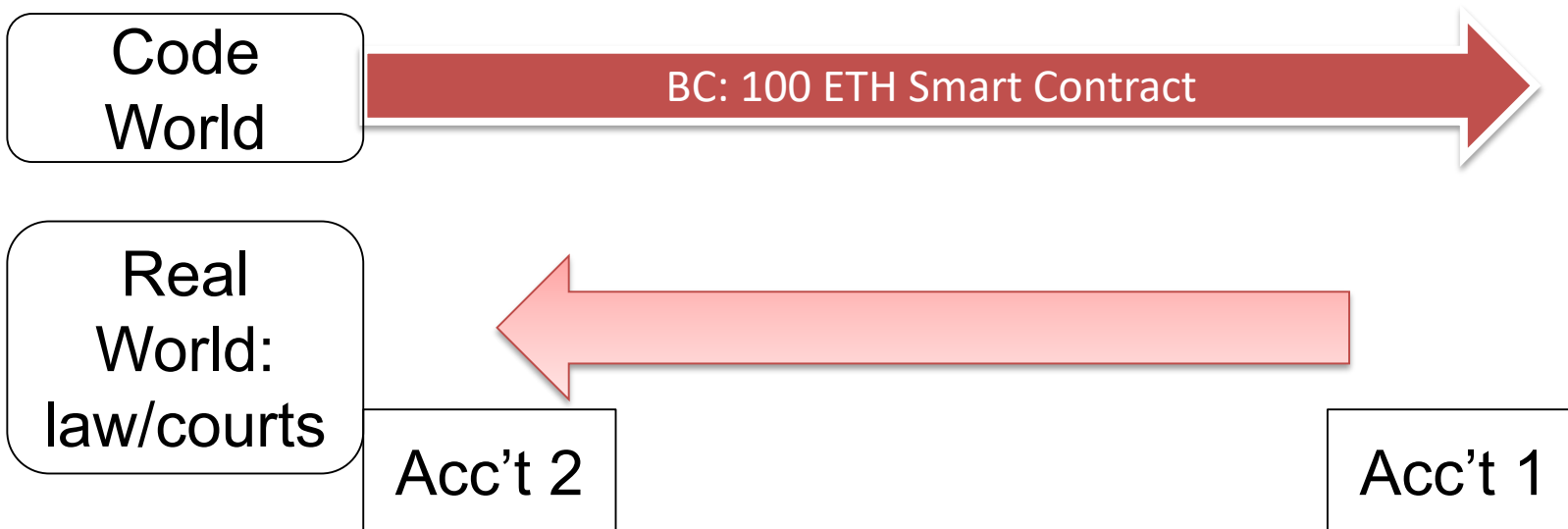- Example 3: choice of law & courts

2) Law needs work arounds for BC idiosyncracies

- **Example: immutability=> ≠ annulment, but reverse transaction**
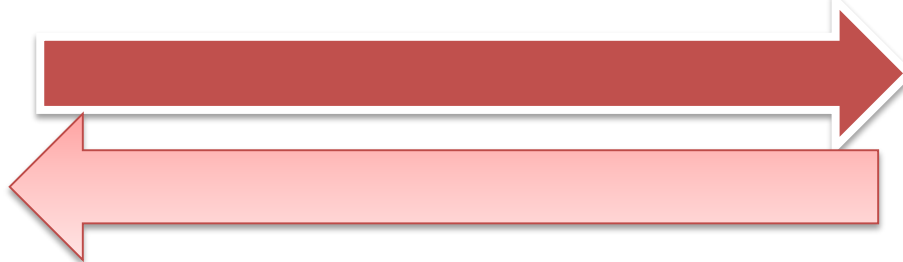
SMART CONTRACTS: THESES

3) Law enables maintenance of code efficiency through reversal in the real world

Code World	BC: 100 ETH Smart Contract →

| Real World: law/courts | ← |

Acc't 2   Acc't 1

Luca Enriques & Dirk A. Zetzsche

Volume 72, Issue 1, 55-98

This Article introduces the term Corporate Technologies ("CorpTech") to refer to the use of distributed ledgers, smart contracts, Big Data analytics, artificial intelligence and machine learning in the corporate context and analyzes the impact of CorpTech on the future of corporate boards. We focus on the tech manifestation of agency problems within corporations and identify—after considering possible market, governance, and regulatory solutions—elements of a governance framework for the CorpTech age. In particular, we take on a prediction often found in the literature, namely that CorpTech has the potential to solve a number of corporate governance problems for good and even make boards of directors redundant. We argue that this claim is based on what we call the "tech nirvana fallacy," or the tendency of comparing supposedly perfect machines with failure-prone humans. The inherent features of technology and corporate governance reveal that even well-programmed CorpTech leaves the core issue of corporate governance—conflicts of interest among the relevant corporate stakeholders—untouched. In the Corptech age, the key question becomes: "is the human being that selects or controls the firm's tech conflicted?" If so, CorpTech itself will be tainted. In fact, the problems arising from the transition to a CorpTech-dominated governance environment may, in the short-term, make things even worse: insufficient understanding of the promise and perils of CorpTech and over-confidence therein may even aggravate agency problems within firms.

Full Article

- Coining « CorpTech » as a Legal Term
- Developing a Tech-oriented CG framework
- Adressing super-tech optimism

Enhancing virtual governance: comparative lessons from COVID-19 company laws

Dirk A. Zetzsche [ID] [a,b,c], Linn Anker-Sørensen [ID] [d,e], Roberta Consiglio[a], and Miko Yeboah-Smith[a]

[a] Faculty of Law, Economics and Finance, University of Luxembourg, Luxembourg [b] Centre for Sustainable Governance & Markets, University of Luxembourg, Luxembourg [c] Center for Business and Corporate Law, Heinrich-Heine-University, Düsseldorf, Germany [d] University of Oslo, Oslo, Norway [e] Head of Decentralized Finance, Ernst & Young, Oslo, Norway

ABSTRACT

This article documents elements of COVID-19-inspired company legislation on digital participation of shareholders in general meetings in 22 countries and analyses to what extent such legislation can function as a blueprint for law reform. Lawmakers need to strike a balance between ensuring a smooth general meeting (from management's perspective) and protecting shareholders' rights. COVID-19 legislation with regard to shareholder interventions has lacked this balance. Further, crisis legislation, adopted in haste as it was, could not reflect the fundamental shift towards institutionalized shareholdings. Once adopted, there is a risk that the hasty choices made during COVID times will stick, resulting in suboptimal regulation of shareholder meetings. The crisis legislation on meetings should thus be revisited, reflecting three paradigm shifts in corporate governance, namely the form of the meeting (virtual instead of in-person), its temporal dimension (multi-day process instead of a specific meeting day), and the institutionalisation of ownership, which allows investors to deploy resources and technology unavailable to most individuals.

International

Taxing Data-Driven Business: Towards Data Point Pricing

**Dirk A. Zetzsche**[*]
and **Linn Anker-Sørensen**[**]

Technology as solution to taxation issues: valuation algorithms

Datafied business models avoid traditional taxation in many respects since data, being among the important value drivers of datafied business, are neither adequately priced nor accounted for in the firm's accounts. From a tax perspective, ignoring the value of data is inconsistent with the data economy paradigm, where it has been claimed that "data is the new oil". The stringent legislative response to datafied business models the authors propose herein is to assign a financial value (a "price") to each data point collected, herein referred to as "data point pricing". If the raw material (data) is thus priced, its use and transfer can be traced by applying traditional accounting methods. Certainly, data point pricing is no panacea; the inherently political question of who holds taxation rights in a cross-border context remains. Yet, data point pricing would make the locus of an important part of value creation transparent and facilitate the application of traditional tax assessment and transfer pricing methods to data-driven business models. As well as bringing about taxable measures, data point pricing yields beneficial side effects in the fields of antitrust law, financial regulation, data protection, anti-money laundering and criminal enforcement. Data point pricing thus has value even where taxation rights are allocated by way of a multilateral arrangement on the basis of the OECD statement of 1 July 2021.

1. Introduction

The taxation of data-intensive conglomerates has created significant unrest among policymakers around the globe.[1] The (apparently) advantageous tax deals enjoyed by firms like Apple, Google, Microsoft and others have made headline news in the world's leading newspapers. At the same time, parliaments,[2] governmental organizations such as the OECD[3] and academics[4] around the world have discussed a number of possible solutions to this controversial situation.

Thank you!

ISBN 9789403509105 (with chapters on sustainable funds, digital asset funds)
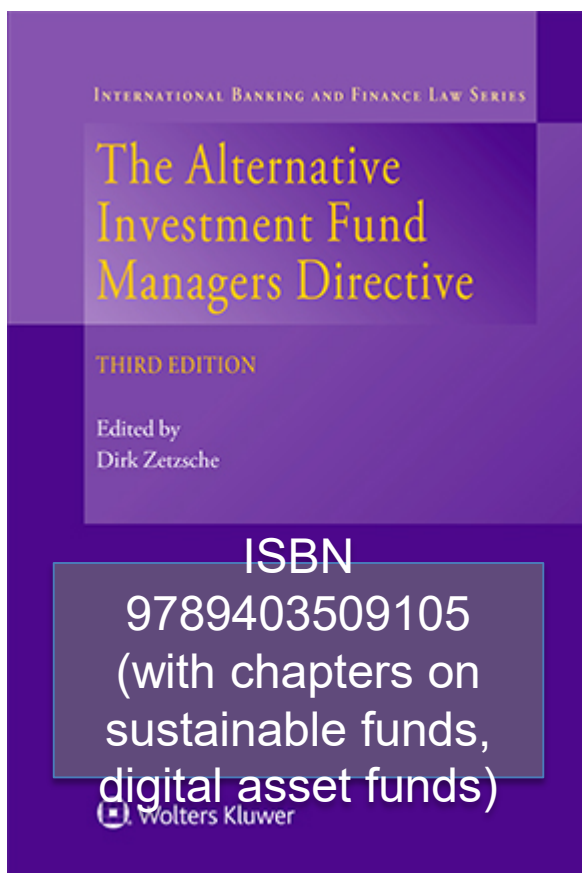
Prof. Dr. Dirk Zetzsche, LL.M.

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University of Luxembourg

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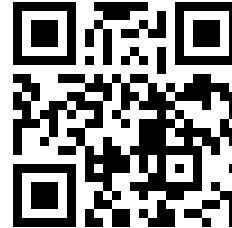
Recommended Readings on Fin/RegTech

TechFin / Data-driven Finance
www.ssrn.com/abstract=2959925

FT4FI (report to AFI)
www.ssrn.com/abstract=3245287

FT4FI vs SDGs
https://ssrn.com/abstract=3245287

Distributed Ledgers / Blockchain
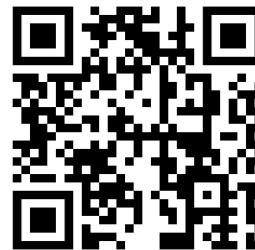www.ssrn.com/abstract=3018214

Regulatory Sandboxes
www.ssrn.com/abstract=3018534

ICO Goldrush
www.ssrn.com/abstract=3072298

Digital ID/KYC Utilities
www.ssrn.com/abstract=3224115

Against Hard Interest Rate Caps and Pro FinTech / RegTech
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