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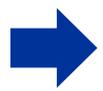
Distributed ledger and block chain technology: implications for post-trade *

Meeting of the Operations Managers Contact Group
Frankfurt, 12 October 2016

Klaus M. Löber
Senior Adviser
European Central Bank

* The views expressed do not necessarily represent the views of the ECB

Technological innovation as constant game changer



FinTech: innovation that could result in new business models or products with disruptive potential in the financial sector

**Blockchain
DLT**

**Cognitive
computing**

**Machine
learning**

**Robotics /
robo advice**

Biometrics

**Quantum
computing**

**Cloud
computing**



Big banks plan to coin new digital currency

August 23, 2016

FINANCIAL
TIMES



Blockchain Reaches a Tipping Point

August 5, 2016



CoinDesk
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Bank of England Explores Blockchain, Says Digital Currency is Far Off [coindesk.com/bank-england-b ...](http://coindesk.com/bank-england-b...)



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Aug 25, 2016



Blockchain Pitched as Way to Simplify FX Trading Databases

Aug 24, 2016



UBS leads team of banks working on blockchain settlement system

REUTERS

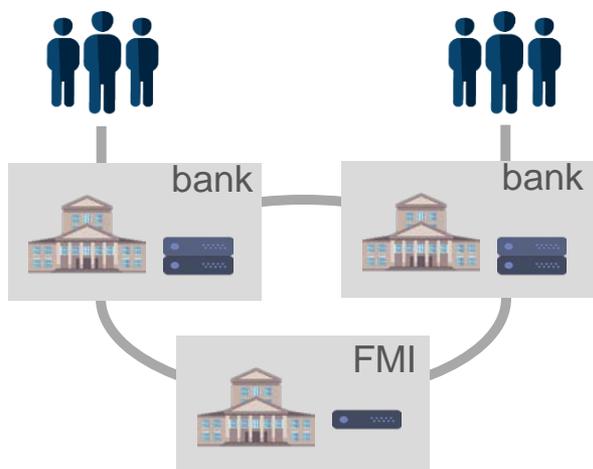
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Disruptive nature of digital innovation



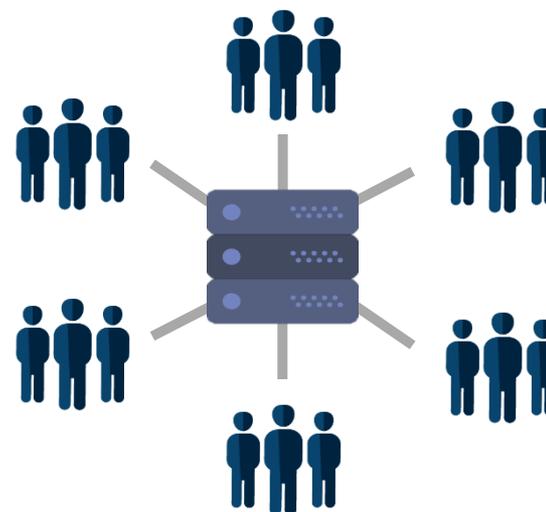
Disruptive potential of blockchain lies in the fact that it enables shared databases and trust is embedded through cryptographic proof

Today



trusted parties operating
centralised ledgers

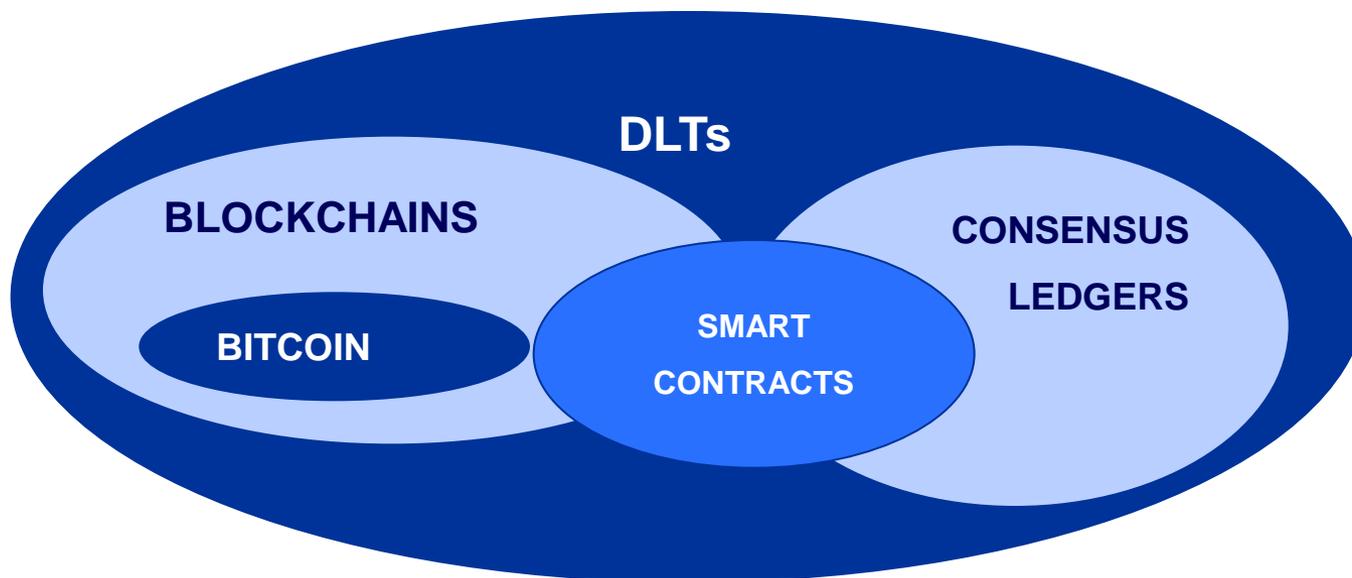
Tomorrow?



decentralised ledger with
trust as a built-in feature

Blockchains and distributed ledger technologies (DLTs)

- A distributed ledger is a *shared* database to record either *transactions* or *account balances* for a given set of assets and users
- DLT users can modify accounts in the distributed ledger and consider it as *authoritative even without central operator*
- The DLT landscape:



Restricted vs. unrestricted DLTs

Restricted DLT

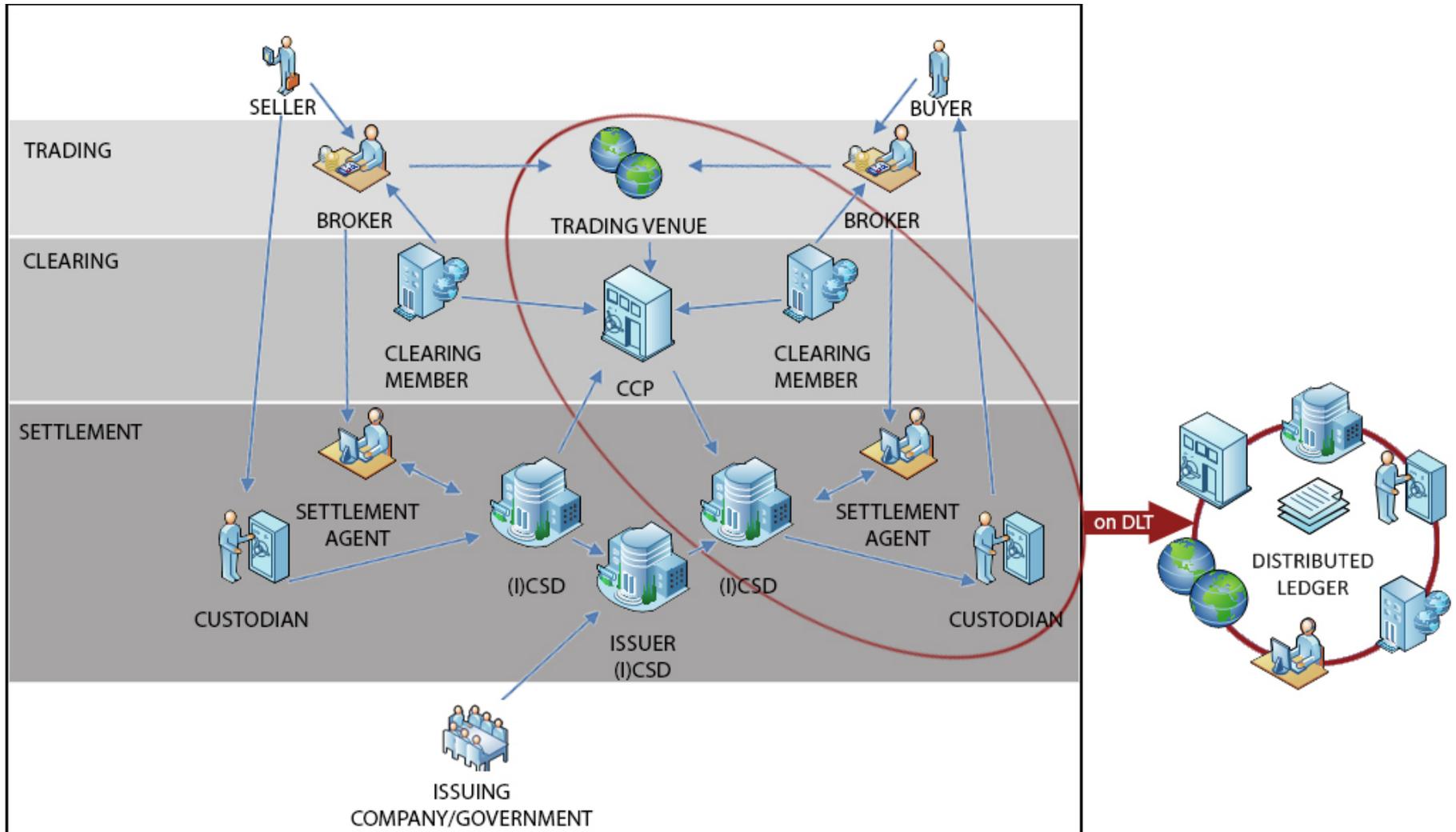
closed system among
identified and accountable
entities

Unrestricted DLT

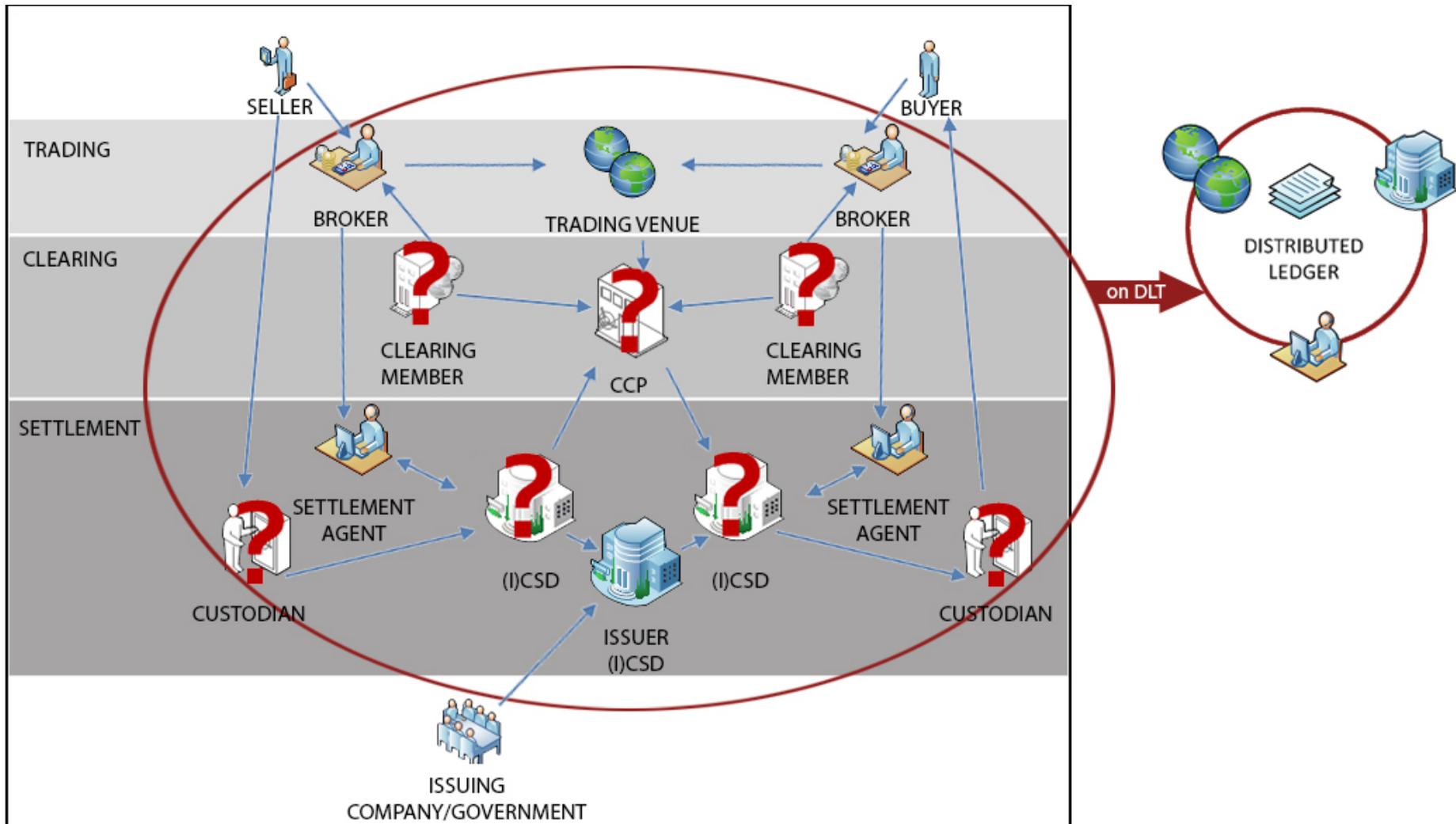
unknown entities can
propose/validate
transactions

- Unrestricted DLTs do *not* allow to:
 - punish *illicit* behaviour
 - ensure *compliance* with KYC, AML, and ATF provisions
 - use *efficient* validation methods
- Financial institutions are focusing on restricted DLTs
 - *Governance, authentication and accessibility* will be key issues

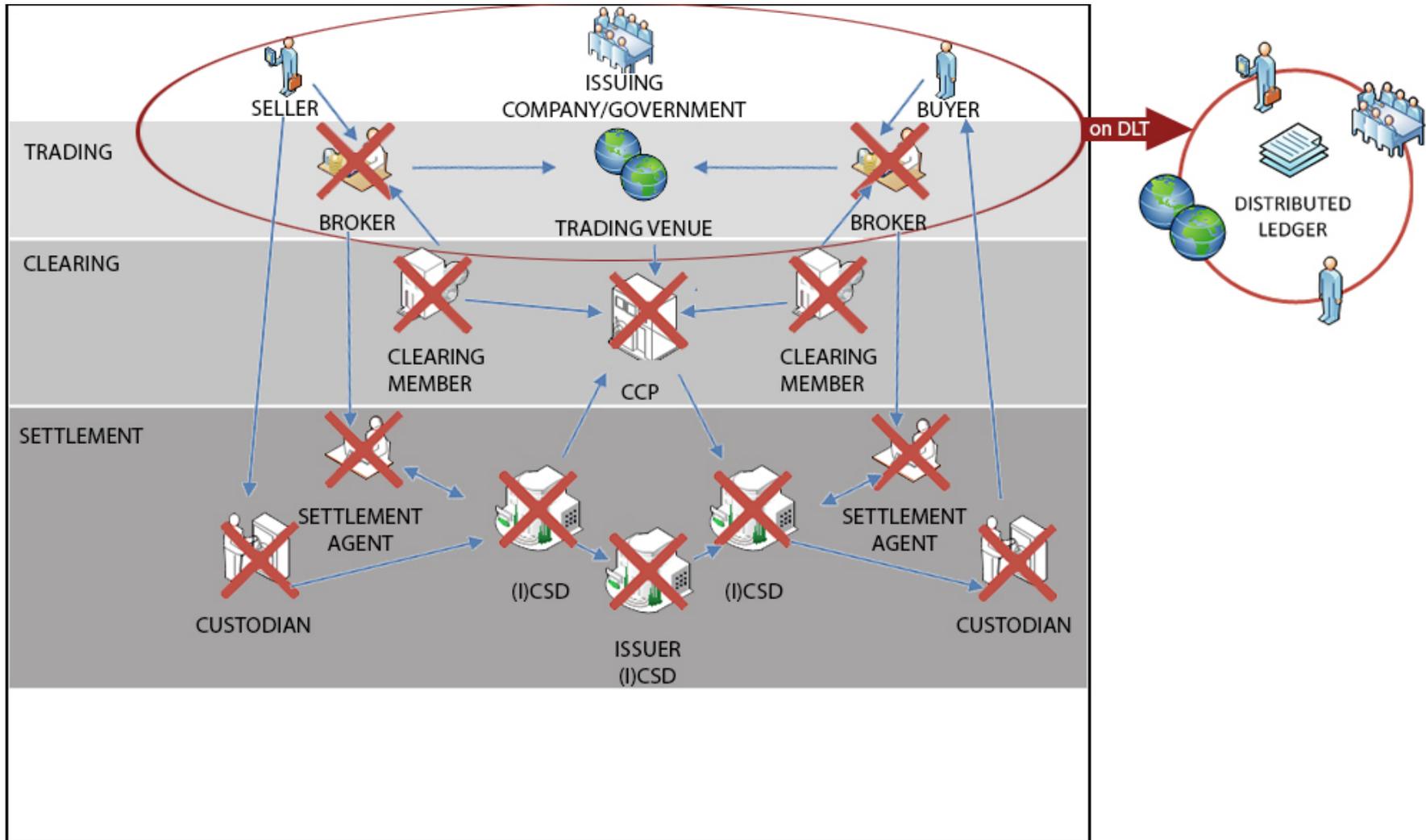
Scenario 1: DLT to improve cluster efficiency



Scenario 2: market-wide adoption



Scenario 3: peer-to-peer



Impact of digital innovations

- **Segregation of the two key features** of digital innovations:
 - *the **assets side** (e.g. Bitcoins) - typically not a liability of any entity nor backed by a public authority)*
 - *the **technology** used - in particular the use of *cryptography* and *distributed ledgers*, allowing transactions in the absence of trust between the parties and without the need for intermediaries*
- **Potential of technology to induce changes** in
 - *trading* (exchange function)
 - *transfers* (*payment, clearing* (margin settlements, instant recordings) and *settlement services* (collateral and liquidity management, matching))
 - *reporting* (incl. regulatory reporting, identity management)
 - *holding* of assets (records of ownership, asset servicing)

Impact of digital innovations on the financial ecosystem

Possible scenarios

- In the customer-to-bank domain
 - Incumbent banks cooperate with FinTech companies
 - Banks are disintermediated by FinTech companies
 - “BigTechs” enter the market
- In the infrastructure domain
 - FMIs embrace new technologies and cooperate with FinTech companies
 - Traffic is moving away to new initiatives
 - Crowding out / disappearance of some FMIs

Issues to consider

Perceived potential

- Higher speed and immutability of records
- Lower costs through streamlining of processes
- Automation of certain processes
- Enhanced resilience
- Cross-border reach

Challenges

- Business model sustainability and consumer protection
- Consumer experience and usability/market adoption
- Security
- Scalability and efficiency (latency, costs)
- Data privacy/pseudonymity

Monitoring and assessment of impact

- ***Digital innovations based on blockchain/DLT*** may have disruptive implications for financial markets and its participants and thus are ***monitored by central banks and prudential authorities***
- As part of the shift in focus towards new and disruptive innovations, the emergence of ***digital currencies have been frontrunning developments in other field***
- ***Regulatory bodies and central banks*** assess these developments, eg. recent reports
 - by the ***CPMI*** on *innovations* (2012) the role of *non-banks* (2014), and on *digital currencies* (2015) and
 - by the ***ECB*** on *virtual currency schemes* (2012, 2015) and *distributed ledger technology in post-trading* (2016)

Implications of distributed ledger technology and blockchain

- Current debate is still very much **focussed on the technological aspects**
 - ⇒ *irrespective of technology deployed*, certain functions will always have to be performed by regulated entities (*be it the incumbent or new ones*): this limits potential disruption
- Financial industry is a **network industry**
 - ⇒ *technical standardisation, harmonisation* of business rules and *sound governance* arrangements are needed for digital innovation to succeed
- How to **link cash leg with securities leg?**
 - ⇒ *delivery versus payment* model in a DLT environment has its limitations without nexus to central bank money
- **Fundamental unresolved issues**
 - ⇒ *Legal underpinning, regulatory treatment,...*

Selected governance and regulatory aspects

- **Governance**

- who is in charge of setting or changing the *rules/protocols*
- who controls *access*
- who is responsible for the *operational design and risk management*

- **Regulatory compliance**

- who is responsible for performing *KYC* duties (e.g. exchanges or wallet providers)
- who is accountable for *money laundering and terrorist financing*
- who is responsible for *investor protection, data secrecy and privacy rules*
- how can *consumer protection* be safeguarded
 - digital services are not well understood by consumers (but not only by them)
 - digital assets are typically stored in digital vaults or wallets which can be hacked and the units of value can be stolen

Selected legal issues

- the *nature of assets* represented in digital form on a distributed ledger
- the *legal status of the ledger* and of the “*rules of system*”
- the *legality and enforceability of the records* kept on a distributed ledger (“public trust”)
- the *identification and authentication* of users/parties to a transaction (e.g. to prevent access by unauthorized participants or minors)
- the *rights and obligations* of the parties to a transaction executed through entries on a distributed ledger or via blockchain
- the *liability* for operational vulnerabilities (cyber resilience, protocol control, etc.), losses, fraud or theft

Impact on regulatory authorities

⇒ Existing **legislation and regulation may be affected**

- *carve outs and fragmentation of existing rules*
- requirements in existing legislation/regulation to *use specific types of central infrastructure (eg FMIs) and access points (eg banks)*
- operational and prudential requirements for *regulated entities* (intermediaries, counterparties, service providers)

⇒ How should regulation take into account **rapid technological developments**

- dedicated *new rules* or *adapting* existing regulation?
- *technology neutral, supportive, restrictive,...*
- *collaborative* or *top-down*

⇒ **Regulators to adapt own frameworks** for data access and reporting

- «*RegTech*»

Regulatory approaches

Innovation originally led by non-banks, increasing take-up by financial institutions

- *commercial or competition* reasons (fees, seigniorage, promotion of other business services, simplification or integration of services)
- *non-profit motives* (experimentation, ideological motivations, or facilitating financial inclusion)

Regulatory response are driven by a **variety of motivations**, eg consumer protection, prudential and market organisation rules – consequently the tools used vary:

- *Information/moral suasion* (eg warnings)
- *Regulation of specific entities* (eg wallet providers, exchange platforms)
- *Interpretation of existing regulations* (eg taxation)
- *Accommodation* (eg sandboxes)
- *Prohibition* (for certain types of entities or instruments)

Implications for central banks

Operational role

- assessing potential of digital innovations for efficient and safe central bank infrastructure services for settlement of payments and securities
- assessing impact on monetary operations and central bank money issuance

Catalyst role

- facilitating private sector efforts to improve market efficiency
- promoting work on standardisation and interoperability, countering the risk of silos and proprietary solutions

Oversight, supervisory and financial stability role

- assessing possible impact of technology adoption on overseen/supervised entities and their business models and the financial markets at large
- adapting central bank frameworks for data collection and handling

Involvement of regulatory standard-setting bodies

- ***Global sectoral and cross-sectoral analysis and evaluation***
 - monitoring *developments and evolution* of digital schemes
 - impact on services and financial institutions
 - *security and operational (cyber) resilience* of products and services
 - relevance for *AML / TF*
 - *legal aspects*
 - impact on *financial intermediation*
 - relevance for *financial inclusion*
 - wider impact on *financial stability*
- ***Assessment of need for global regulatory guidance*** (risk-based approach)
- An ***ad-hoc coordination group*** has been established as facilitator of information sharing and coordination between global standard-setting bodies (BCBS, CGFS/MC, CPMI, FSB, IAIS and IOSCO)