The Distributed Ledger Technology Applied to Securities Markets

Reply to ESMA Discussion Paper

August 2016

# Possible benefits of the DLT applied to securities markets

## Q1: Do you agree with the list of possible benefits of the DLT for securities markets? Please explain, e.g., are these benefits unique to the DLT, are some more important than others, are some irrelevant?

First of all we fully agree with the list of the highlighted benefits of the DLT for securities market and truly admire ESMA’s effort in this direction.

The DLT/blockchain is essentially an Internet based notary service that maintains a log of all financial transactions and keeps track of the ownership of digital assets.

We think that the major breakthrough can be achieved for clearing and settlement process driven by the following DLT properties: Immutability, Permanence, Transparency, Ease of access, Protocol security, Availability (100% uptime), Resilience, Global reference data (timestamp, counterparty ID, transaction ID, asset ID).

Such properties, inherent to open DLT such as for example Bitcoin or Ethereum, allow market participants to transact without the need to trust any central intermediary and confide the shared ledger as a single source of truth.

In addition to immediate settlement with guaranteed DvP, shorten transaction finality cycle, lower transaction fees and the absence of a single point of failure, which are also true for the permissioned and consortium DLT, open blockchain protocols may bring greater transparency and inclusivity, eased access and strategic independence.

We believe that open DLT provides a lifetime opportunity to rewire the financial market infrastructure building more inclusive and resilient financial markets, and not just replicate the existing processes on a new technology platform.

## Q2: Do you see any other potential benefits of the DLT for securities markets? If yes, please explain.

Regarding counterparty risks we will have a much more transparent situation than today. The risk will not be eliminated from derivatives transactions but it will shift directly to the issuer of the security. You can include the risk profile of the issuer in the price of the traded security. For example a futures contract about 100 USD from Bank A might have a different price as the same futures contract issued by Bank B. Risk Management is directly done by the market participants. There is no need for a centralized trusted counterparty in between.

There is an additional big benefit if you use the DLT also for settlement in the foreign exchange markets. The liquidity will increase through incentives of intraday interests enabled by immediate settlement via DLT.

The current financial system infrastructure is batch-based in daily cycles with settlement at T+2 days from time of the trade and follows business processes that were defined, when there was no computer communication. This implies that interest rates on foreign exchange transactions are paid daily. The continuous settlement of trades on the DLT will pave the way for the development of an intraday interest rate market. The yield curve will start with one-second duration, not just at one day, as is the case today, and extend to ten or more years. The creation of an intraday yield curve will make financial markets more dynamic and adaptive to changing market environments and shifts in demand and supply.

This is relevant for current financial markets since more than 95% of transactions in the foreign exchange markets have a duration of less than 24 hours, implying traders in those transactions do not pay or receive any interest, circumventing any central bank monetary measure. The intraday processing allows for second by the second interest payments and extends the yield curve to ultra-short durations. This leads to a new degree of freedom for the central bank; depending on market conditions it can hike ultra-short-term interest rates in response to specific market conditions and leave the daily and longer-term interest rates at low levels that are relevant for long-term loans and pricing of capital assets, benefiting of the real economy. In this project we propose to analyse how high frequency market makers in foreign exchange markets skew their bid-ask prices with instantaneous interest rates that are also established through money market mechanisms.

The transparency of open DLT when the trade log has the resolution to participants ID will provide unique research opportunities:

* empirical market microstructure of digital assets marketplace;
* optimal market design;
* market participants ecology and behavioral studies;
* market abuse detection (wash trades, market price manipulation, etc.).

This will enable self-refined market quality and ouster the abusive behavior.

## Q3: How would the benefits of the technology be affected, in the case where the DLT is not applied across the entire lifecycle of securities (i.e., issuance, trading, clearing and settlement, safekeeping of assets and record of ownership) but rather to some activities only?

As it is correctly mentioned in recital 14 you can also define the ISIN in the security records entered in the DLT. This allows you always to link back into the “old world”. E.g. risk management and monitoring functions can be done within institutions independently from the used technology.

## Q4: Which activities (e.g., post-trading, other activities), market segments and types of assets in the securities markets are likely to be impacted the most by the DLT in your opinion? How is the DLT likely to modify the way securities markets operate? Please explain.

All activities, market segments and types of assets in the securities markets will be impacted by the DLT. Every financial instrument can become a listed security on the DLT in the form of a digital token of value. For example on the Bitcoin blockchain it is enabled through the so-called Colored Coin protocol. Colored coins follow the idea of ''coloring'' a specific Bitcoin - the issuer guarantees to hand out the underlying assets to the person, who returns the colored coin. For example, the ECB can issue a colored coin in the same way as it prints paper money; it would take a fraction of a Bitcoin and then insert the ''I Owe You'' statement of the ECB, like a regular bank note. The same mechanism can be used for any other financial claim. Colored coins are different in nature than crypto-currencies, because they have a specific issuer and are backed by a real financial asset.

In a shortly released discussion paper by the Bank of Japan they acknowledge that the colored coin protocol is the first established way to issue values on a DLT, but further standardization is still required:

“At present, when issuing values on the blockchain, the design of the colored coin, such as the virtual currency "Coinprism," is first established, and then other participants join to form the community. Nonetheless, in order that the values be used in a more versatile manner as "currency" or "securities," standardization through the work of ISO and cooperation among central banks might be necessary.” (<https://www.boj.or.jp/en/announcements/release_2016/rel160826b.pdf>)

## Q5/Q6/Q7: According to which timeframe, is the DLT likely to be applied to securities markets in your view? Please distinguish by type of activities, market segments and assets if relevant. How might your organisation benefit from the introduction of the DLT? If you are working on a concrete application of the DLT to securities markets please describe it (i.e., which activities, which market segments, which type of assets and for which expected benefits) and explain where you stand in terms of practical achievements in relation to your objectives.

We see the first significant change in 1-5 years. In attempt to rewire the current financial system Lykke builds a global Internet exchange, where all financial instruments will be traded and exchanged against each other, whatever their asset class or the size of transaction. Every financial instrument will be a listed security in the form of a digital token (colored coins) and all transactions will be logged in a universally accessible distributed ledger, a decentralized notary service that ensures immediate global consensus about completed transactions and asset ownership. The ledger includes a wallet, so that every owner of a digital coin has his own private key protecting his ownership. There will be an intraday interest rate market and yield curve. Market participants will be able to buy and sell colored coins of different issuers and change counterparty risk at any time. The number of traded financial instruments will grow exponentially, transaction volumes will skyrocket and liquidity will be ample.

Lykke aims to become the global marketplace and establish itself as the backbone of a new and highly sophisticated banking architecture that is not plagued by the deficiencies of the present system. Lykke exchange and all its tools and services are open source; the transparency of technology is ideal for research.

# Key challenges and possible shortcomings

## Q8/Q10: Do you agree with the analysis of the potential challenges? Please explain, e.g., are some more important than others, are some irrelevant in your view. Which solutions do you envisage for these challenges and where do the current initiatives stand in terms of practical achievements to overcome them?

### Interoperability with existing systems

Securities that are booked in the DLT can be traded just in a separate marketplace, like Lykke exchange. It can be integrated in existing systems as any other new marketplace. And the integration back so existing systems can be done via ISIN as today.

### Need to settle in central bank money

Colored Coins are issued also for central bank money, backed up with fiat money in the deposit of the issuer. All transactions will be processed simultaneously in a so called atomic swap transaction (within 1 transaction the colored coin of a specific security will be exchanged against another). The solution to this issue is already up and running.

## Q9: Do you see any other potential challenges? If yes, please explain.

### Regulatory and legal issues

Two unsolved questions in our view:

* How do Colored Coins fit into the existing legal framework? Is a Colored Coin itself a (intermediated) security? Can you treat Colored Coins in the same way as other securities?
* Is the DLT accepted as transaction log? When is the settlement final?

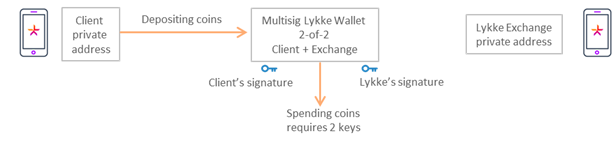
# Key risks

## Q11/Q12/Q13: Do you agree with the analysis of the key risks? Please explain, e.g., are some risks more important than others, are some irrelevant in your view. Do you see any other potential risks? Please explain. How could these risks be addressed? Please explain by providing concrete examples, especially for the risks potentially affecting your organisation.

### Cyber risk, fraud and money laundering

At Lykke Exchange orders are collected and matched by a semi-trusted exchange. Matched orders are settled on the Bitcoin DLT, where each successful trade between parties appears as an *atomic swap transaction*. Unfilled and expired orders are discarded. The exchange does not take possession of the traded coins, but needs to be trusted to match trades correctly. Assuming a basic level of trust in the trader - which could for example be established by providing collateral - trading can take place as fast as the communication between trader and exchange permits, with a subsequent settlement on the DLT.

Lykke Exchange uses 2-of-2 multisignatures address wallets to deposit trader’s coins. 2-of-2 multisignature address requires two signatures to spend coins from it - both trader’s and exchange’s signatures.



MultiSig wallet provides the following advantages:

* Deposit does not mean trust: Exchange cannot spend coins without trader's key. Even if the exchange is compromised and the exchange’s key is stolen, the trader will not lose his coins. The second key is required to spend deposited coins.
* Coins flow control: On the other hand, exchange's signature is required for each transaction. Deposited coins cannot be transferred outside the exchange without exchange being aware of it.
* Green nodes network: Identified clients only (KYC) - are allowed to trade. A trader is able to spend deposited coins whether for trading inside the exchange or for withdrawal. A trader cannot transfer the coins outside the exchange green nodes network if it's not allowed by the issuer.
* In case of emergency exchange provides offchain refund transactions.

In case of theft or technical error Colored Coin (digital asset) can be discontinued. The holders of the discontinued Colored Coin may be transferred with the newly issued coin. The invalid colored coins are excluded from trading by configuring the matching engine of the exchange. The operations with the discontinued asset can be blocked in the multisignature wallets.

### Market volatility

DLT will not increase market volatility in times of stress but will stabilize it, because the liquidity will be multiplied through straight through processing and the option of intraday interest rates.

# About Lykke

<https://www.lykke.com/>

Lykke is building a single global marketplace for all financial instruments to level the playing field and provide access to everyone. Our marketplace utilizes the blockchain technology pioneered by Bitcoin to offer immediate settlement and direct ownership.

Lykke was founded by Richard Olsen in Zurich. We received our initial seed funding in 2015 and the Lykke shares are issued in the form of colored coins. All our software is open-source.