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| 2 June 2016 | ESMA/2016/773 RF |

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| Reply form for the Discussion Paper on the Distributed Ledger Technology Applied to Securities Markets  |
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| Date: 2 June 2016ESMA/2016/773 RF |

Responding to this paper

The European Securities and Markets Authority (ESMA) invites responses to the specific questions listed in the ESMA Discussion Paper on the Distributed Ledger Technology (DLT) Applied to Securities Markets, published on the ESMA website.

*Instructions*

Please note that, in order to facilitate the analysis of the large number of responses expected, you are requested to use this file to send your response to ESMA so as to allow us to process it properly. Therefore, ESMA will only be able to consider responses which follow the instructions described below:

* use this form and send your responses in Word format (pdf documents will not be considered except for annexes);
* do not remove the tags of type <ESMA\_ QUESTION\_DLT\_1> - i.e. the response to one question has to be framed by the 2 tags corresponding to the question; and
* if you do not have a response to a question, do not delete it and leave the text “TYPE YOUR TEXT HERE” between the tags.

Responses are most helpful:

* if they respond to the question stated;
* contain a clear rationale, including on any related costs and benefits; and
* describe any alternatives that ESMA should consider

**Naming protocol**

In order to facilitate the handling of stakeholders responses please save your document using the following format:

ESMA\_DLT\_NAMEOFCOMPANY\_NAMEOFDOCUMENT.

E.g. if the respondent were XXXX, the name of the reply form would be:

ESMA\_DLT\_XXXX\_REPLYFORM or

ESMA\_DLT\_XXXX\_ANNEX1

***Deadline***

Responses must reach us by **2 September 2016.**

All contributions should be submitted online at [www.esma.europa.eu](http://www.esma.europa.eu) under the heading ‘Your input/Consultations’.

***Publication of responses***

All contributions received will be published following the end of the consultation period, unless otherwise requested. **Please clearly indicate by ticking the appropriate checkbox in the website submission form if you do not wish your contribution to be publicly disclosed. A standard confidentiality statement in an email message will not be treated as a request for non-disclosure.** Note also that a confidential response may be requested from us in accordance with ESMA’s rules on access to documents. We may consult you if we receive such a request. Any decision we make is reviewable by ESMA’s Board of Appeal and the European Ombudsman.

***Data protection***

Information on data protection can be found at [www.esma.europa.eu](http://www.esma.europa.eu) under the headings ‘Legal notice’ and ‘Data protection’.

# Introduction

Please make your introductory comments below, if any:

<ESMA\_COMMENT\_DLT\_1>

The Bank of New York Mellon Corporation (BNY Mellon) is a global investments company dedicated to helping its clients manage and service their financial assets throughout the investment lifecycle. As one of the world’s largest investment services and investment management firms, BNY Mellon welcomes the opportunity to respond to the ESMA Discussion Paper on Digital Ledger Technology Applied to Securities Markets (ESMA/2016/773).

BNY Mellon operates in Europe through: (i) branches of The Bank of New York Mellon (a New York state chartered bank) and (ii) directly established and duly authorised subsidiaries established in certain EU jurisdictions and branches of those entities operating in core EU member states. BNY Mellon provides services to clients and end-users of financial services globally. It is accordingly keenly interested to ensure financial markets operate fairly and consistently globally and that common standards ensure playing fields are kept level.

BNY Mellon is a significant participant in many of the industry initiatives relating to Distributed Ledger Technology (DLT), and accordingly BNY Mellon has a strong interest in this Call for Evidence.

Our responses to the individual questions set out in the Discussion Paper contain our views on a wide diversity of subjects.

However, in these introductory remarks, we would like to take the opportunity to highlight two important concerns.

The first is that DLT developments do indeed raise the question of appropriateness of current legislation and regulation. Securities markets are currently highly regulated; however, this regulation is built very largely on existing market models and on existing technology, and can have the effect of entrenching existing market models. Accordingly, there is the risk that existing regulation operates inappropriately in a new technological environment with possible effects such as impeding innovation and discriminating between different categories of market participant.

The second is that existing regulation with its many prudential safeguards does ensure a high degree of safety and of investor protection. In a new DLT environment, regulators need to ensure that there are not regulatory gaps, and that the combination of new activities and existing regulation designed to regulate very different market models does not create an un-level playing field between existing “regulated” entities, and new “unregulated” entities.

<ESMA\_COMMENT\_DLT\_1>

##### 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?

<ESMA\_QUESTION\_DLT\_1>

Yes, overall we agree with the benefits set out in section 3. We believe that section 3.8 on costs is significant, given that this technology could have the potential to mutualise the delivery and maintenance costs of FI’s IT infra-structure across participants, generating significant cost benefits.

The clearing and settlement potential is clearly significant although DLT does not in itself make it easier for parties to transact across countries when taken in the context of differing regulatory and supervisory requirements, and restrictions on the transfer of information across national boundaries.

We agree that certain proponents have talked of combining clearing and settlement of transactions into a single step but believe this would be technically possible with current technology, and that the barrier to such a move is due to T+0 settlement actually reducing trading liquidity in the market.

We believe record of ownership and safekeeping of assets may be significant, along with the potential for instant credit worthiness verification of a counterparty, and the benefits that would bring to the area of counterparty risk. .

We consider that security and resilience opportunity using DLT is substantial, as covered in the paper. In terms of security, central authority structures in current securities markets already display high levels of security. The security benefits of DLT will be amplified if each node in a DLT system displays perimeter security at least on par with current central actors, and allies this with the inherent benefits of a distributed nature and the encryption of the data itself.

Understanding to what extent the articulated benefits are dependent on a distributed ledger framework versus how the same benefits may be achieved through other means is a key question industry participants must answer.

<ESMA\_QUESTION\_DLT\_1>

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

<ESMA\_QUESTION\_DLT\_2>

We are already witnessing that DLT is driving financial institutions to interact with each other in new and more collaborative ways – this in itself is a shift in approach and to be welcomed. Benefits are likely to include the sharing of common reference data to enhance resolution management, and the avoidance of multiple organisations duplicating essential but non distinguishing processes such as data scrubbing. DLT clearly has the potential to improve inter-operability between banks but equally, could introduce a new layer of fragmentation unless the collaborative approach is maintained.

<ESMA\_QUESTION\_DLT\_2>

##### 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?

<ESMA\_QUESTION\_DLT\_3>

A DLT system, which does not incorporate the full life-cycle of securities, risks further complicating the system by introducing an additional set of interfaces with off ledger systems and / or assets. Such an approach would introduce additional potential points of failure, thus adding in risk and cost which may cancel out expected savings from the technology. That said, we acknowledge that in the short to medium term, advances in DLT will require an iterative approach to solving specific problems with the technology in order to gain widespread acceptance.

<ESMA\_QUESTION\_DLT\_3>

##### 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.

<ESMA\_QUESTION\_DLT\_4>

Payments, Trade Finance, OTC Derivatives, and Credit Default Swaps are generally listed as those where DLT will first have an impact – where processes require transparency, are non-standardized or where trust currently fails. When some of the first DLT solutions are production-ready, there will be greater clarity on how and when DLT will impact securities markets.

<ESMA\_QUESTION\_DLT\_4>

##### 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.

<ESMA\_QUESTION\_DLT\_5>

We would suggest that implementation of DLT will be an iterative process incorporating many use cases and possibly new asset types as yet unimagined. In the short term, we believe that DLT is especially promising where sequencing matters such as trade finance or where added transparency would deliver significant benefit such as syndicated loans. For wider adoption, we expect that certain markets where there is less fragmentation and fully de-materialised securities offer the best possibility for implementation.

<ESMA\_QUESTION\_DLT\_5>

##### How might your organisation benefit from the introduction of the DLT?

<ESMA\_QUESTION\_DLT\_6>

BNY Mellon is cautiously optimistic about the potential of this technology. Given that development is so fluid at this stage, we believe we are well positioned to take advantage of any progress based on our work with industry consortiums and working groups. As there are multiple businesses within BNY Mellon that may be impacted by DLT, we operate a cross business line team of staff looking at this technology within the context of disruptive technologies generally and our overall digital program.

 <ESMA\_QUESTION\_DLT\_6>

##### 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.

<ESMA\_QUESTION\_DLT\_7>

We are well positioned to exploit our market position as the DLT solution matures and gains traction, and we are continuously exploring solutions that improve our efficiency, increase our growth or have potential to disrupt us or our clients. We have multiple use cases under proof of concept development, but this information remains proprietary until it is announced in the market.

<ESMA\_QUESTION\_DLT\_7>

##### 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.

<ESMA\_QUESTION\_DLT\_8>

The inter-operability question is an interesting one. DLT could solve inter-operability issues between banks if a collaborative approach is taken. It also has the potential to introduce a new layer of fragmentation if the approach to development becomes silo-ed. Inside organisations, it will be a significant challenge to integrate DLT with existing systems or processes, and so the most successful adopters of the technology are likely to be those organisations that truly understand the DLT capabilities, and can identify ways to implement the new DLT paradigm from the ground up as opposed to building into existing systems and processes.

We believe that the issue of governance is the key issue to be addressed on DLT. The concept of a ‘permissioned’ DLT requires far more granularity on expected roles and responsibilities and exactly where on the spectrum between open source and centrally run do we see DLT emerging for securities markets processes.

Legal developments in the DLT space are of significant importance to advancing the implementation of the technology. Current legal constructs only allow for a DLT recording the ownership of an asset in digital form, and do not allow for a DLT which houses natively issued digital assets, where the DLT asset actually comprises the property. Such legal issues highlight the need for DLT development to bring about changes to law and regulation – DLT will not simply be ‘shoe-horned’ into all our existing legal and regulatory constructs.

The concept of privacy would not adequately be solved by the use of encryption identifiers instead of names, but we are already seeing moves to rapidly deal with this potential issue through the use of techniques such as zero-knowledge proof algorithms.

The issue of settling in central bank money is a significant one. Due to the potential implications to the concept of commercial bank money, and the potential impacts on monetary policy of digitally issued central bank money, we do not anticipate seeing central bank issue fiat currency in digital form in the near future. Until that point, a reliable entity must provide the link, but whether or not that implies some form of pre-funding model with associated negative impact on liquidity is as yet unclear.

We also believe that it is premature to try and predict all challenges based on a vision of DLT too closely linked with bitcoin’s blockchain. Alternative frameworks may emerge that allow for controls and repudiation of transactions.

<ESMA\_QUESTION\_DLT\_8>

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

<ESMA\_QUESTION\_DLT\_9>

One of the most significant challenges is likely to be around an analysis of the cost / benefit of DLT implementation and whether use cases are compelling in that regard. Given other constraints, including obligations linked to regulatory change, there will need to be a compelling business case for DLT projects, and the promise of cost savings or additional revenue with a suitable timescale to attract the extra funding.

Legal harmonisation of DLT would be required for successful implementation across multiple jurisdictions, with examples of areas to consider being property law and settlement finality. Even if a supra-national body can come up with official taxonomy and rules in the DLT space, it requires a standard interpretation of any such rules across multiple jurisdictions.

<ESMA\_QUESTION\_DLT\_9>

##### Which solutions do you envisage for these challenges and where do the current initiatives stand in terms of practical achievements to overcome them?

<ESMA\_QUESTION\_DLT\_10>

The technological problems are likely to be the more straightforward to overcome. Advances over the last 12 or 18 months have seen positive changes in scalability, privacy, and robustness of applications. Given the amount of funding and venture capital flowing into the space, and the proliferation of DLT software developers, we expect to see the technical answers to the technical challenges continue to evolve.

Work to progress governance and standards seems to be concentrated on the industry consortia. R3 CEV and the Hyperledger Project coordinated by Linux Foundation seem to be the most representative of those efforts, but increased regulatory engagement and development of applicable legal constructs will be key.

<ESMA\_QUESTION\_DLT\_10>

##### 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.

<ESMA\_QUESTION\_DLT\_11>

In the main, we agree with the key risks discussed in the paper.

In terms of cyber risk, the DLT concept of having multiple points of entry versus a single point of failure is an improvement so long as each node has the security features of current centralised databases, and a hacker would have to control a majority rather than just one node. However if validation is done by less cyber aware institutions than the central intermediaries of today, then the benefit or otherwise depends on the relative positive and negative effects of lower security of individual nodes vs having a number of validating nodes rather than just one.

A promised advantage is that current databases contain raw data, un-encrypted. If you penetrate the outer security, you have full access. In DLT, the data itself is encrypted and you can still put a security fence around it. What that allows you to do really for the first time, is responsibly share and mutualise transactional information.

When we consider the security of the DLT tool, we must bear in mind that some of the encryption tools and techniques are not new and are already in use today in areas such as government data security and so are tried and tested at this point. One of the risks which is frequently overlooked however, is the technology and cryptographic evolutions which may render one of the schemes used to protect the data inoperant in the future and would expose confidential information. Developments in quantum computing already point to the potential for this type of development.

Loss of and control of private keys is an area which needs some thought. Given that the ownership of a private key implies the ownership of the assets then it is still unclear as to how large organisations would manage private keys. Some form of custodian system for private keys could be an option.

We believe that any DLT deployment in securities markets will involve a permissioned system, and so believe that the concept of dishonest nodes taking over the network and altering the consensus process (section 5.1) is not practical so long as the byzantine fault tolerance is set sufficiently high.

On the risk of unfair competition we believe that regulators need to ensure that existing regulation does not impede innovation. But regulators also need to ensure that there are not regulatory gaps, and that the combination of new activities and existing regulation designed for regulating very different market modes does not create an un-level playing field between existing “regulated” entities, and new “unregulated” entities.

<ESMA\_QUESTION\_DLT\_11>

##### Do you see any other potential risks? Please explain.

<ESMA\_QUESTION\_DLT\_12>

It is likely that additional risks will be identified as new DLT platforms or solutions start emerging.

<ESMA\_QUESTION\_DLT\_12>

##### How could these risks be addressed? Please explain by providing concrete examples, especially for the risks potentially affecting your organisation.

<ESMA\_QUESTION\_DLT\_13>

We believe that the risks associated with DLT require regulatory and legal involvement. In order for the regulatory and legal discussions to be productive, we expect that organisations will need to take specific use cases or proposals to legal counsel and regulatory bodies. The most effective route we have seen for addressing risk scenarios thus far, is through the various industry consortia who are compiling common areas of interest for discussion and clarification.

<ESMA\_QUESTION\_DLT\_13>

##### Do you think that the DLT will be used for one of the scenarios above? If yes, which one(s)? If no, please explain?

<ESMA\_QUESTION\_DLT\_14>

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<ESMA\_QUESTION\_DLT\_14>

##### If the DLT is used for one of these scenarios, how compliance with the regulatory requirements attached to each scenario could be ensured?

<ESMA\_QUESTION\_DLT\_15>

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<ESMA\_QUESTION\_DLT\_15>

##### Do you think that the DLT will be used for one of the scenarios above? If yes, which one(s)? If no, please explain?

<ESMA\_QUESTION\_DLT\_16>

Whilst it is possible that DLT systems could in the future act as securities settlements systems and be adopted in some form by existing CSDs acting under SFD, or that DLT could act as settlement internaliser under CSDR, we believe that such scenarios are too far off to predict. More likely in the short to medium term is that DLT could be used in scenario 1.0 / 1.1. We are already seeing examples of this approach in the US, notably Nasdaq’s Linq platform for DLT issued private securities.

We do believe however, that DLT is a new paradigm and that it will most successfully emerge not by attempting to replace current settlement systems, but by implementing new types of products, services and transactions. Such an approach may mean that existing regulations may not be sufficient or appropriate and there may need to be new regulation emerge.

<ESMA\_QUESTION\_DLT\_16>

##### If the DLT is used for one of these scenarios, how could compliance with the regulatory requirements attached to each scenario be ensured?

<ESMA\_QUESTION\_DLT\_17>

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<ESMA\_QUESTION\_DLT\_17>

##### Do you think that the DLT will be used for safekeeping and record-keeping purposes? Please explain, with concrete examples where appropriate.

<ESMA\_QUESTION\_DLT\_18>

From a technology perspective, there are compelling reasons for using DLT for record keeping and safe-keeping. DLT could technically enable the reduction of layers in a vertically integrated ownership structure. A single digital asset could contain details of ownership at multiple levels eg. Client > Fund Manager > Global Custodian > Sub Custodian. These levels of ownership could be concealed / revealed using concepts such as side chains or sharding on DLT. In a fully digitised securities world, the DLT promises to bring beneficial owners closer to the transactional platforms, and have closer control over assets, and more direct access to markets. However, the role of intermediaries is not simply driven by technological constraints and the legal and functional aspects of intermediaries should not be underplayed when considering ownership structures in safekeeping.

<ESMA\_QUESTION\_DLT\_18>

##### If the DLT is used for the safekeeping and record-keeping of ownership, how could compliance with the regulatory requirements be ensured?

<ESMA\_QUESTION\_DLT\_19>

As with any of the potential uses of DLT, we believe that the requirement is for strong and common standards and governance models to emerge. A DLT system for securities, whether in issuance, post trade, safe-keeping etc, will require significant granularity on standards and governance in relation to the technology stack, and business processes. We acknowledge and agree with ESMA’s point that harmonisation of safe-keeping rules, property law, ownership law across national boundaries and different supervisory bodies will be key, as will tackling issues relating to the transfer of information.

<ESMA\_QUESTION\_DLT\_19>

##### Do you think that the DLT will be used for regulatory reporting purposes? Please explain, with concrete examples where appropriate.

<ESMA\_QUESTION\_DLT\_20>

Yes, we would anticipate that a DLT structure could provide functionality whereby the regulator could ‘plug in’ to the technology and view the full transactional and ownership history. This would have the benefit of giving regulators first hand views of the data at source.

This view must be balanced with the fact that the existence of a key which allows full access to data by regulators would create a potential vulnerability to exploitation and jeopardise the whole security of the system. Leakage of that would negate any efforts which have been done to protect the privacy of the information.

<ESMA\_QUESTION\_DLT\_20>

##### If the DLT is used for regulatory reporting purposes, how could compliance with the applicable regulatory requirements be ensured?

<ESMA\_QUESTION\_DLT\_21>

TYPE YOUR TEXT HERE

<ESMA\_QUESTION\_DLT\_21>

##### Do you think that the DLT could be used for other securities-related services than those already discussed, in particular trading and issuance?

<ESMA\_QUESTION\_DLT\_22>

We have seen issuance of private securities on the Nasdaq Linq platform and the issuance by Overstock subsidiary T0 in the US of a corporate bond, proving that issuance is technically possible on the blockchain, but these are limited scope projects and there is no clear view of who would carry out the notary function in digital issuance, nor have we an answer as yet on property or ownership law for digital assets which would need to be clarified.

Given some of the limitations previously discussed around governance, legal and regulatory implications of DLT usage, we consider that data optimisation relating to securities servicing is a strong contender for DLT solutions in the near term. The issuance of corporate actions notifications, or the distribution of smart contract friendly code containing market data feeds are examples.

<ESMA\_QUESTION\_DLT\_22>

##### Do you see potential regulatory impediments to the deployment of the DLT in securities markets?

<ESMA\_QUESTION\_DLT\_23>

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<ESMA\_QUESTION\_DLT\_23>

##### Should regulators react to the deployment of the DLT in securities markets and if yes how? If you think they should not do so please justify your answer.

<ESMA\_QUESTION\_DLT\_24>

We believe that the regulators approach thus far could be summarised as ‘do no harm’ and that this approach affords start-ups and financial institutions to innovatively explore the capability of the technology. As the space develops, it will require regulatory participation on an active basis, with regulators willing to get hands on experience of the solutions and products being proposed. The regulator cannot assume that existing regulation and laws will always be appropriate in governing DLT solutions.

<ESMA\_QUESTION\_DLT\_24>