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Survey: Determinants of Distributed Ledger Technology in Financial Institutions

Results of a 2018 Study among large global
Financial Institutions

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Survey: Determinants of Distributed Ledger Technology Adoption in Financial Institutions

Distributed ledger technology (DLT) could be one of the main drivers of change in the financial industry in the 21st century. Even though DLT is an early stage development, it is an intensely discussed topic in science and business alike. Highly appreciated by some, disregarded by others this paper gives a compelling insight into DLT adoption of financial institutions.

Executive Summary

- DLT will transform the financial industry by lowering the needs for reconciliation and the costs for transferring value and data.
- Prominent use cases in financial institutions that are already being implemented include settlement and clearing, trade financing and cross-border payments.
- Adoption is largely dependent on support from top management and availability of external support. Major institutions are more likely to engage with the technology early on.
- Permissioned solutions currently better satisfy requirements of financial institutions regarding performance, security, handling of confidential information and compliance to regulation.
- DLT enables new business opportunities and may require rethinking business models to resist disruption from industry outsiders.
- Experimenting with the technology now will enable financial institutions to better adapt to the changing infrastructure.
- Current developments in the distributed ledgers space may enable a shift towards public systems.

DLT in the Financial Industry

DLT is one of the main factors shaping the future of the financial industry. Consortia related to the topic have attracted large amounts of members over the past two years and permissioned enterprise DLT solutions have seen increased funding. The topic has reached a global scale with cryptocurrencies emerging as a new asset class.

The financial industry has been on the forefront of these developments and many of the largest players are founding members of some of the biggest consortia. A variety of proofs of concept have been successful and DLT is slowly moving into larger scale implementations in financial use cases (e.g. Marco Polo trade finance platform[1], ASX blockchain clearing system[2], Madrec reconciliation platform[3], we.trade[4]).

The Study

The study carried out to analyze and explain DLT engagement in global financial institutions. For this purpose, characteristics and specifications of the technology were identified first. Then, after uncovering the main differentiation between permissioned distributed ledgers and public blockchains, a
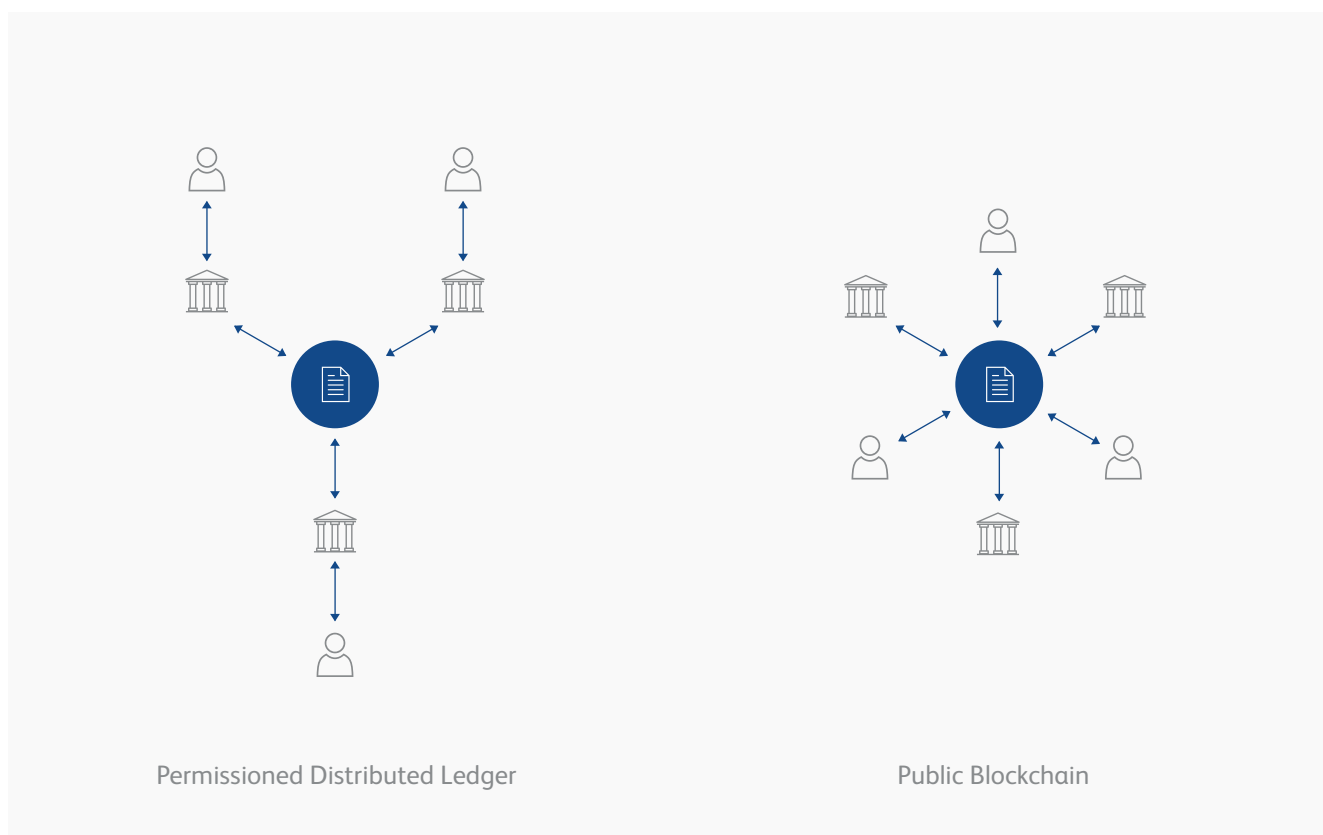

Permissioned Distributed Ledger   Public Blockchain

Figure 1: Differentiation between Permissioned Distributed Ledgers and Public Blockchains

[1] https://www.marcopolo.finance/
[2] www.bbc.com/news/business-42261456
[3] https://www.coindesk.com/ubs-launch-live-ethereum-platform-barclays-credit-suisse/
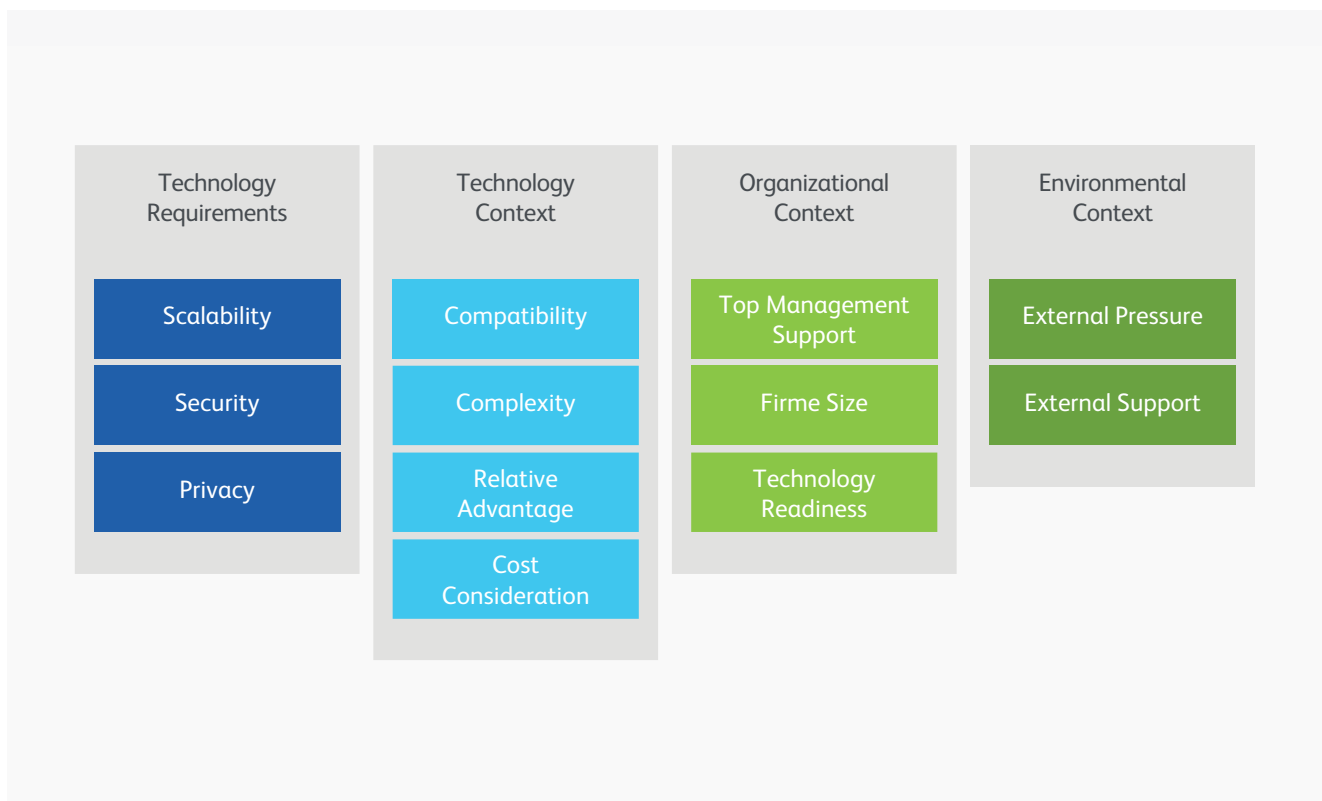[4] https://www.we-trade.com/

Figure 2: Dimensions Influencing DLT Adoption Considered for the Study

review of technology adoption literature and the space of distributed ledger was conducted to find potential factors that may influence the decision to adopt DLT solutions in financial institutions. .

The following paragraphs present the main findings of this study and the associated survey that was carried out between January and March 2018.

Permissioned Distributed Ledgers and Public Blockchains

Before setting up the research model, two specifications of DLT that need to be addressed separately were identified. These are permissioned distributed ledgers, which may be used between trusted parties with already established business relationships and public blockchains, which are openly accessible and enable untrusted parties to come to an agreement about the state of a global ledger by incentivizing desired behavior through novel consensus mechanisms.

Figure 1 shows the basic differentiation between permissioned and public systems. Permissioned solutions include protocols such as Hyperledger[5] Fabric or R3 Corda[6]. Public solutions are for example the Bitcoin[7] and Ethereum[8] blockchain.

These specifications differ regarding their usage and perception in financial institutions, which is why this study aimed to find out which factors influence the adoption of them separately.

Research Model and Relevant Dimensions

To uncover dimensions influencing DLT adoption, a review of technology adoption in information systems was deducted aligning characteristics of DLT with similar situations in the history of adoption of information systems. Some of the considered contexts were for example the adoption of cloud computing, eCommerce and EDI.

Factors that were comparable to the context of DLT adoption were included into the model which was supplemented with current research problems in DLT, e.g. regarding confidentiality and privacy of information. Figure 2 shows the dimensions that were uncovered to potentially affect DLT adoption.

Survey and Sample

These dimensions were operationalized in a survey which span from January to March 2018 and asked members of large financial institutions about their organization's engagement and attitude towards permissioned and public DLT systems.

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[5] https://www.hyperledger.org/
[6] https://www.corda.net/
[7] https://bitcoin.org/
[8] https://www.ethereum.org/

The sample targeted the 50 largest financial institutions by assets from each continent taken from S&P Global Market Intelligence[9]. Potential participants were chosen due to their DLT expertise or position within the IT or innovation department of their organization. In total the survey received 56 meaningful answers, which were used to obtain results introduced in the following.

Information about Current and Expected Adoption

First observations of the sample show that engagement with DLT is higher regarding permissioned distributed ledgers. Around two thirds of participants already adopted or plan to adopt permissioned distributed ledgers, while the same is only true for around 10% regarding public blockchains. Adoption is expected to increase in both permissioned and public systems. 80% of participants predict to adopt a permissioned DLT system by 2023, while around a quarter expect to adopt public blockchains in some form by 2023 (Figure 3).

| Variable	Characteristics				
	N=56	Senior executive (C-level executive or vice president)	Decision maker (e.g. director or manager)	Other (e.g. specialist, developer, analyst)	
Job Position	Absolute	14	21	21	
	Relative	25%	37,5%	37,5%	
	N=56	Europe	Asia or Pacific	North America	Africa / Middle East	South America
Location	Absolute	40	5	9	1	1
	Relative	71,4%	8,9%	16,1%	1,8%	1,8%

Table 1: Sample Characteristics
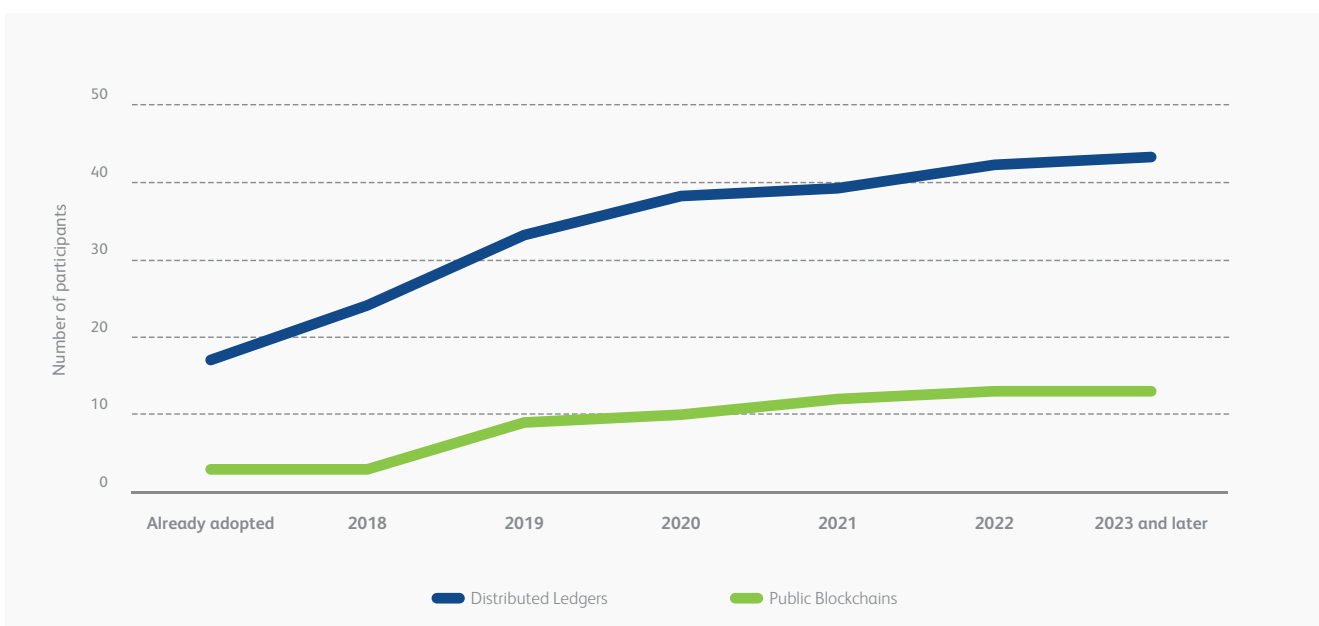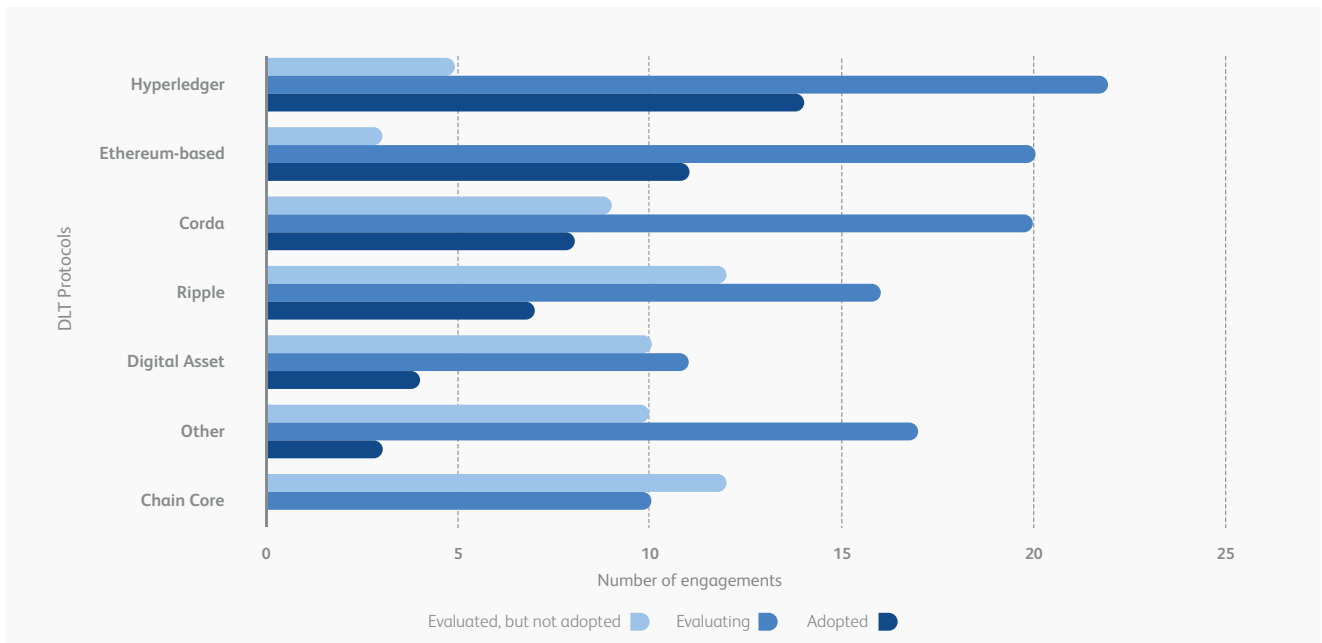

Figure 3: DLT Adoption Timeline

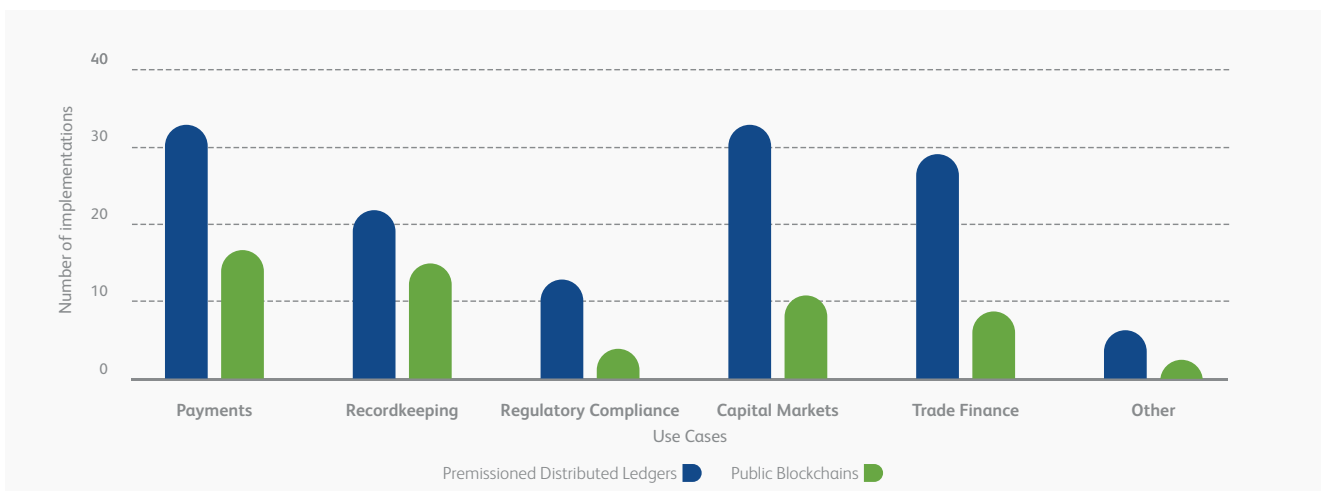Figure 4: Engagement with Permissioned Distributed Ledger Solutions

Figure 5: DLT Use Cases

Engagement with DLT Protocols

Financial institutions seem to evaluate a variety of protocols before deciding to adopt one. Especially Corda, Hyperledger and Ethereum-based permissioned solutions are often adopted in financial institutions, with Hyperledger and Ethereum-based protocols seemingly achieving particularly high adoption after evaluation compared to Corda, where the number of participants that decided not to adopt the technology after evaluating it is relatively higher (Figure 4). Regarding public blockchains the engagement is less pronounced and mostly focused on Ethereum and Bitcoin (not pictured).

Financial institutions engage in a variety of use cases with DLT, currently the use cases that are already being implemented to a higher degree relate to payments, capital markets and trade finance (Figure 5).

Regarding payments especially cross-border transactions are a prominent use case. In capital markets, smart contracts promise to automate financial agreements and tokenization (digitally representing assets on a distributed ledger) may effectively reduce clearing and settlement time to zero. In trade finance, one of the most important applications lies in the automation and secure financing of supply chains using a single record for sensitive information such as identities, traded assets, etc.

One areas that is being explored somewhat slower is regulatory compliance. DLT could be used to improve regulatory reporting, but this requires involvement from regulators and governments, which have been moving slowly and are, according to this research, not pressuring financial institutions to use a distributed ledger yet.

Other use cases in which distributed ledgers are already used mostly relate to recordkeeping, an example is the verification of documents[10].

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[10] https://www.kbc.be/particulieren/en/verifieer.html

Results of the Research Model

Validation of the research model showed that permissioned distributed ledger adoption may be better explained using the factors introduced by this study. This could be related to the overall less pronounced engagement with public blockchains and the implications that adopting public smart contract and payment platforms may have on business models of financial institutions.

The main influences on adoption of permissioned ledgers according to this research are support by top management for the technology, the size of the firm and the availability of external support. Top management support is reflected by general interest and willingness to invest funds and resources in the development

of the technology. The size of a firm seems to influence the likelihood of adoption with bigger firms being more likely to already engage with the technology. This could be attributed to the availability of slack resources and high skilled domain-specific personnel. Additionally, the access to strategic and technical external support in navigating development and implementation of DLT seems to significantly influence the decision to adopt DLT.

Additionally, public blockchains fulfill requirements of financial institutions to a lesser extent compared to permissioned distributed ledgers. This is true regarding both technical aspects such as privacy (PR1), scalability (SC1) and security (SE1) (Figure 6), but also with respect to organizational and environmental factors, such as compatibility with firm values (CM1) and operations (CM2) (Figure 7).
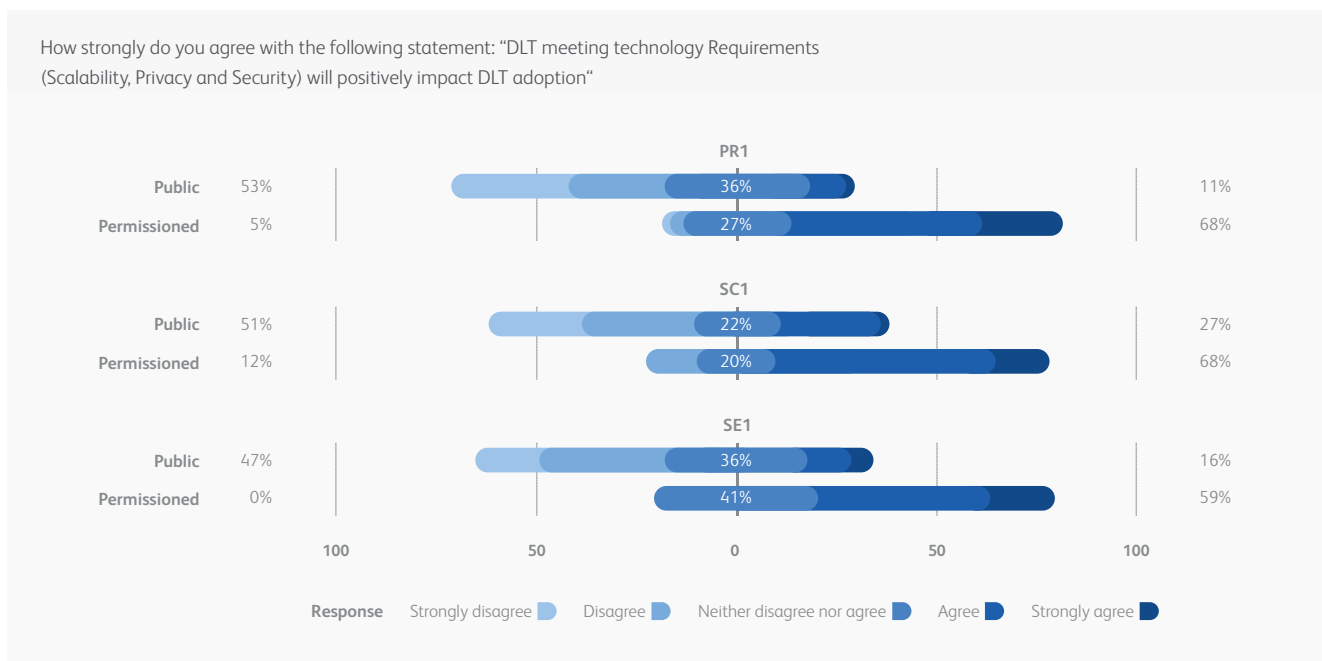

Figure 6: Differences in Perception of DLT Protocols Fulfilling Privacy (PR1), Scalability (SC1) and Security (SE1) Requirements
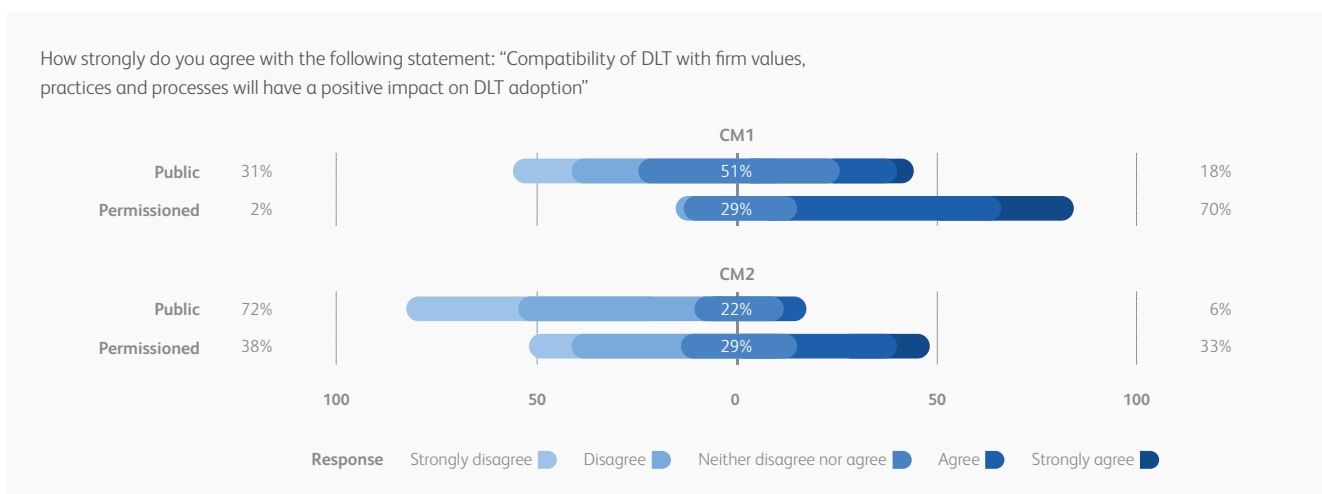

Figure 7: Differences in Perception of DLT Protocols Compatibility with Firm Values (CM1) and Operations (CM2)

DLT Adoption Matrix

In an effort to better classify institutions regarding their engagement with DLT, the following adopter matrix to distinguish between four levels of DLT adoption was created. These levels may be summarized in an increasing order regarding the engagement with distributed ledger technologies as objectors, beginners, conservative adopters and open-minded adopters (Figure 8).

Figure 8: DLT Adopter Matrix

Further Insights about the Future of DLT

In addition to uncovering factors that influence DLT adoption, the study asked participants about their perception regarding the future of DLT. In general, participants seem to anticipate a relatively high impact on the current financial infrastructure (Figure 9).

Comparing between adopters, which are defined as institutions that plan to adopt or already adopt some kind of DLT and non-adopters (see also Figure 8), non-adopters seem to expect an even higher impact, which might be related to less realistic expectations compared to institutions that already engage with the technology.

Respondents' Sentiments

Additionally, the questionnaire collected respondents' sentiments regarding the future of DLT. These confirm the notion that DLT will have a transformational impact given that more effort is put into factors like collaboration, regulation and standardization. Participants see securities trading and trade finance as the areas that will be affected most due to automation and disintermediation of processes. Overall, participants predict a brighter future for permissioned solutions, as they see them as more likely to pass regulatory requirements.

Three participants stated that they expect the adoption process to move slowly if collaboration between industry players, regulatory involvement and counterparty demand do not accelerate. Another participant stated that standardization would be needed, but that it is unlikely to happen. Yet another respondent argued that competitive forces and differing incentives will complicate adopting a single DLT standard, which will undermine the ability of financial intermediaries to resist disruption from public blockchains.

This sentiment that financial institutions and DLT are not mutually exclusive was shared among some participants. A few wrote that by embracing the new technology, re-imagining processes and collaborating with one another, industry players will realize synergies and thus profit from the technology, while simultaneously providing transparency to regulators and investors.

Concluding Remarks

Current research in the distributed ledger space may enhance the technological capabilities to process larger amounts of confidential data, e.g. through implementations of sharding[11] or zero-knowledge proofs[12]. This might enable a shift towards public blockchains. Currently, we see distributed ledgers in the financial industry using both purely permissioned frameworks and public protocols that allow for the creation of separate permissioned distributed ledgers. In the next step, we may see private or consortium ledgers build upon public frameworks using the public blockchain for netting and timestamping or to resolve disputes arising inside such a system (e.g. using Plasma[13]).

Additionally, cross-chain protocols that will enable the communication between different distributed ledgers (e.g. Interledger[14], Cosmos[15] or Polkadot[16]) may further enable participants to reap the benefits of both worlds, for example by maintaining an internal permissioned network for an organization while still being able to trigger events on a shared, public ledger. Finally, in the distant future where regulatory, throughput and confidentiality issues have been completely solved an interoperable, global, fully public "internet of blockchains/value" may become feasible.

Relating this development to the adopter matrix introduced in Figure 8, the evolution of DLT adoption is moving from the objector phase to the beginner phase when concerns about the benefits of the technology in general are removed. Successful
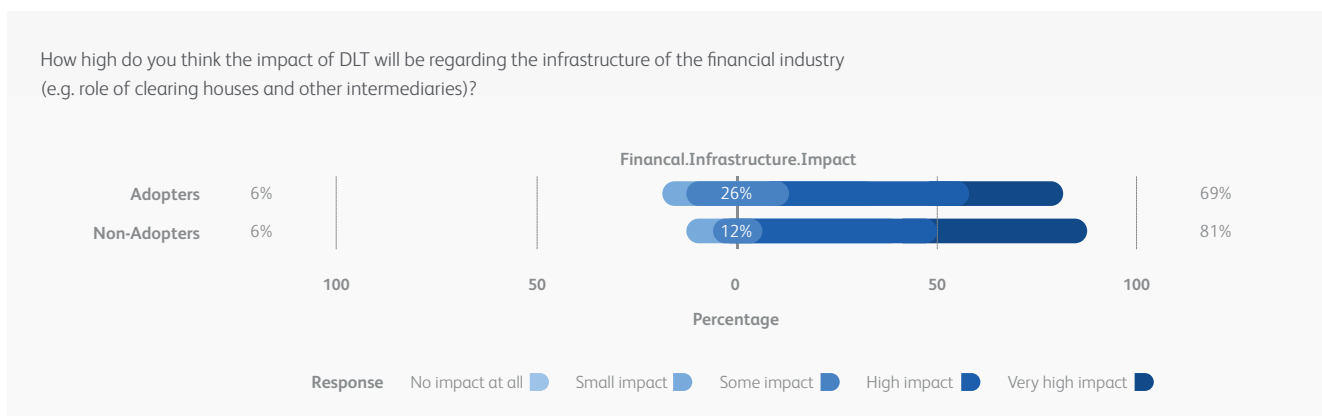

How high do you think the impact of DLT will be regarding the infrastructure of the financial industry (e.g. role of clearing houses and other intermediaries)?

Financial.Infrastructure.Impact

Adopters	6%	26%	69%
Non-Adopters	6%	12%	81%

Percentage

Response   No impact at all   Small impact   Some impact   High impact   Very high impact

Figure 9:   Evaluation of the Impact DLT will have on the Current Financial Infrastructure

[11] https://github.com/ethereum/wiki/wiki/Sharding-FAQs
[12] https://venturebeat.com/2017/12/16/what-zero-knowledge-proofs-will-do-for-blockchain/
[13] https://plasma.io/
[14] https://interledger.org/
[15] https://cosmos.network/
[16] https://polkadot.network/

experimentation, compliance to existing regulation and collaboration between industry players will then allow financial institutions to move into the segment labeled conservative adopters, with institutions leveraging the technology and realizing benefits, a stage that a large part of surveyed institutions seem to have reached already.

Finally, once public networks mature and enable secure and cheap processing of large amounts of confidential data, innovative financial institutions might move into the segment labeled open-minded adopters to reap benefits of public networks. This final step is assuming that public networks will pass regulatory scrutiny and that financial institutions see public networks as adding benefits to their business, which probably does involve largely reinventing operating models. Arguably, should public blockchains achieve what they are promising, the technology might disrupt large parts of the current financial system with or without adaption of financial institutions.

Concluding, DLT is a value-enhancing technology in the financial services context that provides both risks and opportunities to incumbents in the financial industry. The study showed that the technology is widely being implemented and uncovered factors that influence the decision to adopt the technology in financial institutions differentiating between public and permissioned protocols. Additionally, the future of DLT was analyzed relating answers given by survey respondents to current developments and research in the space of distributed ledgers. This analysis showed that while there is a risk of disrupting parts of traditional business, adapting to the changes and engaging with DLT does provide financial institutions with new opportunities to create and provide value in the emerging decentralized economy.

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Contact

Dr. Robert Bosch
Partner
robert.bosch@bearingpoint.com

Moritz Plenk
Manager
moritz.plenk@bearingpoint.com

Daniel Münch
Senior Business Consultant
daniel.muench@bearingpoint.com