**GROUP 5**

**The Digitalization of the Letter of Credit**

**General benefits** of implementing a blockchain solution for the Letter of Credit imply thedigitalization of the process - the use of paperless documents could save up to $50 million per year[[1]](#footnote-2) -, more transparency and possibly better involvement of third parties (customs), the enforcement mechanism can be implicit in the chain, and a lot of improvements can be implemented (using IOT to check in real-time the quality and deliverance of goods).

Feel free to add comments or improvements, to make new proposals and adjustments, as well as to add criticisms or doubts, and to ask for more clarification for parts which may not be crystal clear.[[2]](#footnote-3)

1. **FINTECH COMPANY CENTRALIZED SYSTEM:**

Here the process is the same as described below, apart from point 4.

In this implementation, the Fintech itself checks the discrepancies between the buyer’s and the seller’s documents.

1. **VOTING SYSTEM IN LETTER OF CREDIT:**

This system consists in a proof of stake permissioned blockchain, hosted by a bank or by a Fintech.

**In short,** it works according to the following steps:

1. The applicant drafts the letter of credit (listing all documents the seller needs to provide, together with contract’s agreements) using a standard template provided by the fintech company and puts it on the blockchain. This is a smart contract that can be endowed by the amount of money of the transaction. (The seller can see the money, but can’t access it until the transaction is completed).
2. Once the letter of credit is finalized, the fintech company adds the respective parties to the permissioned blockchain. Blockchain could include not only the buyer, seller, and institutions but also third parties that can issue documents if needed (with different permission, according to privacy matters)
3. The seller and the third parties upload the documents in the blockchain.
4. Through consensus (obtained by majority voting), institutions permissioned vote on the blockchain about the compliance or discrepancy between the documents.
5. If there are no discrepancies, the blockchain notes that the document complies, and a smart contract would authorize the goods to proceed to the next step in the transaction. If there is a discrepancy the blockchain notifies the buyer, who decides whether to waive them or not.
6. In case the transaction is completed, the money in the smart contract would be sent to the seller’s account.

**More details:**

**Purpose.** Letting banks and financial institutions vote on whether documents provided by the seller are compliant.

**Adding users to the chain.** The host can add to the chain any financial institution capable and willing of verifying the seller’s documents. Their identity ideally is verifiable, to reduce the needed trust towards the host Fintech. The host can also add *other third parties* (e.g. Customs, U.S. State department of Agriculture[[3]](#footnote-4)), with varying levels of permissions, enabling them exclusively to look at some specific documents, protecting privacy of the parties involved.

**General Mechanism and Voting**. Once the letter of credit is issued by the buyer[[4]](#footnote-5), the seller will have time until the expiration date of the contract to upload the required documents. Each time a document is uploaded, a voting commences and financial institutions on the chain have to decide whether there are discrepancies. They have a variable amount of time, depending on the specifics, depending on the specifics, going up to 5-7 days[[5]](#footnote-6). Majority voting in that time window decides if the documents are valid.

**Enforcing Mechanism.** Once all is set and done, three scenarios may arise:

1) Documents are compliant, the money is sent to the seller and the transaction is concluded.

2) Documents are compliant but the goods shipped are not. Just like it works now, the purpose of the chain is over, it is up to the buyer to sue the seller, though here it may be easier for the buyer to collect all the documents for trial.

3) Documents are either not compliant or are not provided before the expiration date. Just as it works now, the buyer has some time to decide whether to terminate the transaction or to conclude it, prompting the seller to remedy to his mistakes, and eventually shifting the expiration date of the contract.

**Uploading the money**. To enable the smart contract to automatically enforce the payment once all the necessary documents are provided and are correct, the buyer needs to provide the money. This may be unpleasant for her, since a lot of her money gets frozen in the contract until this process reaches an end. Instead, in the current mechanism there is just a conditioned promise of payment from the buyer’s bank. Still, the blockchain solution allows for a stricter enforcement, and reduces the risk of all parties involved. Indeed, the banks do not risk anything in this system, while traditionally they face the risk of the buyer not paying them.

**Incentive system**. A fee is payed on transaction, possibly by both the buyer and the seller. Indeed, shared costs from the two parties ensure more collaboration, and the seller is the one benefitting the most from this system. This fee can be devolved to the banks as a reward for their voting. Notably, all banks who vote according to the majority get an equal share of the pre-specified fee. This ensures that financial institutions do not vote at random, because they get the reward only if they are in line with what the majority has claimed. To further ensure this, a system of trust can be implemented[[6]](#footnote-7), where the host Fintech can check for correct behavior and remove the right to vote in case of issues.

**Why would the buyer, seller, financial institutions and Fintech company participate in the mechanism?[[7]](#footnote-8)**

The first advantage for the **seller** is that she could participate in a fair mechanism, as the more decentralized the process is, the more she is independent from banks. This system also lets her benefit from a stricter enforcement of the contract.

The advantage for the **buyer** is that she could pay a lesser fee. Current fees go up to 20% of the transactions, because banks take some degree of risk in paying first, and then asking the money back from the buyer. In this system, the risk is leveraged and minimized, and the reduction in paperwork and transaction costs further reduce the implied costs. She may also benefit from IOT applications and future refinements of this prototype.

The **banks** profit from the fact that they face no risk at all in this system, yet they earn money for simply checking some documents. While they earn much less than they would on a single transaction, the fact that they face no risk and that they have free access to every transaction in the system - instead of competing with all the other banks - incentivize their presence while cutting costs. More smaller banks would be better off by choosing this system, reducing the market share of big financial institutions in the merchant banking sector.

The **Fintech** company may be a regular bank, benefitting from this system. The major revenues for the Fintech would derive from the commissions obtained during the transaction. The system implies little costs (mostly marketing and implementation costs in the initial phase). Profitability seems to be consistent with this proposal, and the potential rewards are huge, since it would uncap an extremely wealthy niche sector.

**Privacy**. Each user can see only the documents which are supposed to be seen. Furthermore, some personal information may be blurred and protected.

**Practical considerations**. Our prototypical code implementation ignores some of the practical intricacies entailed in this proposition. It is consistent with the first idea for this project with two complementary smart contracts: the first implementing the voting mechanism and the second allowing the host to add banks into the system.

**Privacy**. Each user can be made able to see only the documents which he is supposed to see. Furthermore, some personal information may be blurred and protected.

**Practical considerations**. Our prototypical code implementation could ignore some of the practical intricacies, and work by having pretty much the same system as in the first idea, but complemented by 2 other smart contracts: the first implementing the voting mechanism, the other for having the host add banks into the system and endow them with a token for each voting.

**Pros and Cons**

**Pros**   
The process is faster, cheaper, more transparent and paperless. Smaller businesses can participate in the transaction and it also democratizes merchant banking, avoiding polarization of big banks. It provides a working platform for a relatively new documentary transaction, that is Non-Bank Letter of Credit[[8]](#footnote-9), avoiding banks to bear the credit risk during the transaction and enhancing the trust between the parties.

**Cons**   
The lack of the intermediation of a bank on behalf of the buyer implies that the buyer has to freeze a certain amount of money for a relatively long period of time. Nevertheless, once the documentary sale is concluded, the buyer is legally the owner of the goods traded, which means that the buyer is legally entitled to exchange them before coming into physical possession of them. On top of that, being the banks only responsible for the compliance process of the documents, the buyer and the seller cannot benefit from the legal advising services provided by banks. The tokenization of the assets of the buyer might also work as a possible solution to this problem.

Possible Auction Process (to be discussed)

1. The applicant drafts the letter of credit (listing all documents the seller needs to provide, together with contract’s agreements) using a standard template provided by the fintech company and puts it on the blockchain. This is a smart contract that can be endowed by the amount of money of the transaction. (The seller can see the money, but can’t access it until the transaction is completed).
2. Once the letter of credit is finalized, the fintech company adds the respective parties to the permissioned blockchain. Blockchain need not be limited to the buyer, seller, and institutions but also include third parties that can issue documents needed (with different permission, according to privacy matters)
3. The seller and the third parties upload the documents in the blockchain.
4. Based on the necessity to be processed fast by the network, the buyer proposes a certain fee to be paid to a bank in the network. The higher the fee, the higher the chance to be processed before. So, a bank decides which transaction to process based on the relative fee, on a first comes first served principle, and provides the feedback.
5. If there are no discrepancies, the blockchain notes that the document complies, and a smart contract would authorize the goods to proceed to the next step in the transaction. If there is a discrepancy the blockchain notifies the buyer, that decide whether to waive them or not.
6. In case the transaction is completed, the money in the smart contract would be sent to the seller’s account.

1. *Larson 2018, p. 957* [↑](#footnote-ref-2)
2. We used this as a shared document to brainstorm together remotely, so this phrase was meant for us [↑](#footnote-ref-3)
3. Check ibidem. *p.972* for some info on third parties involved [↑](#footnote-ref-4)
4. In this system, the buyer is mostly responsible for drafting the Letter of credit, check ibidem. p.972. This may be mitigated by having the financial institutions in the chain vote also on the Letter of credit appropriateness. Though, we discourage that because it may go against the independence principle [↑](#footnote-ref-5)
5. Ibidem p.975 [↑](#footnote-ref-6)
6. For some examples, check the literature related to T. W. Amirali Salehi-Abari, “The Impact of Naive Agents in Heterogeneous Trust-Aware Societies,” 2009 [↑](#footnote-ref-7)
7. On top of the general advantages described at the beginning of this document [↑](#footnote-ref-8)
8. Look at <https://medium.com/@nilutjain/can-a-non-bank-issue-a-letter-of-credit-%EF%B8%8F-e029840812e0> to understand the process [↑](#footnote-ref-9)