**General benefits** of implementing a blockchain solution**:** digitalization 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 (e.g. customs), the enforcement mechanism can be implicit in the chain, a lot of improvements and possibilities are possible (e.g. 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.

1. **FINTECH COMPANY CENTRALIZED SYSTEM:**

The process is the same as describe below apart from the point 4. In this implementation, the Fintech company hires institutions to check the discrepancies between the buyer’s and the seller documents, or it is internally provided.

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 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. Through consensus (obtained by majority voting), institutions permissioned vote on the blockchain about the compliance or discrepancy between 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, 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.

**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[[2]](#footnote-3)), 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[[3]](#footnote-4), 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 on the validity of the documents and whether or not there are discrepancies. They would have a variable amount of time, depending on the specifics, going up to 5-7 days[[4]](#footnote-5). Majority voting in that time window decides whether or not 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 everyone is happy 2) documents are compliant but the goods shipped aren’t good (pun intended). Just like it works now, the purpose of the chain is over, it’s up to the buyer to sue the seller, though here it may be easier for the buyer to collect all necessary proof to show to the judge 3) documents aren’t compliant or aren’t provided before the expiration date. Just as it works now, the buyer has some time to decide whether to waive from the transaction or to continue with it, prompting the seller to remedy to his mistakes, and eventually shifting the expiration date of the contract.

**Uploading the money (pain point)**. To enable the smart contract to automatically enforce the payment once all necessary documents are provided and are correct, one needs to put money in the contract. This may be unpleasant for the buyer, since a lot of his money becomes frozen in the contract until this long process reaches an end. In the current mechanism, instead, there is just a conditioned promise of payment from the buyer’s bank. Still, the blockchain solutions allows an even more strict enforcement, and reduces the risk for all parties involved (e.g. the banks don’t 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 ‘win’ the majority voting, get an equal share of the pre-specified fee. This ensures that financial institutions don’t vote at random, because they get the reward only if they are in line with what the majority is saying. To further ensure this, a system of trust can be implemented[[5]](#footnote-6), and/or the host Fintech can check for correct behavior, but, most importantly, one can make votes visible. This last idea would make it so that financial institutions lose their credibility if they behave badly, eventually facing a great loss for a single small reward.

**Why would the buyer, seller, financial institutions and Fintech company participate in the mechanism?[[6]](#footnote-7)** The advantage for the **seller** is that he is able to participate in an even ‘fairer’ mechanism, as the more decentralized the process is, the more the independence of banks is guaranteed. This system also lets him benefit from even more strict enforcement. The advantage for the **buyer** is that he is able to 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 is probably beared by the buyer himself, so he may be able to pay much less, also because of the general benefits of this system (less paperwork, transaction costs etc.). He may also benefit from IOT applications and future refinements of this prototypical system. 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 do now on a single transaction, the fact that they face no risk here, and the fact that they have access to every transaction in the system (instead of having to compete with all other banks to have a client choose them for the whole process), makes the whole thing still profitable to them, allowing also for some costs cuts. They may even be forced to joining the mechanism, as most ‘little’ banks would be better off by choosing this system, reducing the market share of banks not joining it. On top of that, for small-medium businesses apply for a letter of credit might be difficult and banks would not profit much from the transaction. For this reason, this process would allow smaller businesses to enter international transactions. The **Fintech** company may be a regular bank, benefitting from what just described. Furthermore, it can get some value from the data it gains, it may ask banks or users for some subscription fees, it may take some part of the transaction fees, it might even take part in the voting process as a regular bank, though I would not encourage this. Overall it faces little costs (mostly marketing costs in the initial phase), so it’s easy to have profitability, and the variance of the potential rewards is huge, since it’s a niche sector with lots of money involved.

**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. These two should be relatively easy to implement, especially the latter, since there are few security issues (the most painful Solidity thing) given that only the host would be able to access some of those functions.

**Pros, Cons, and other considerations and thoughts**.

**Pros** -> The process is faster, cheaper, more transparent and paperless. Smaller business can participate in the transaction and democratizes merchant banking, avoiding the polarization of big banks. It provides a working platform for a relatively new documentary transaction, that is Non-Bank Letter of Credit[[7]](#footnote-6384), 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.

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. Check ibidem. *p.972* for some info on third parties involved [↑](#footnote-ref-3)
3. 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-4)
4. Ibidem p.975 [↑](#footnote-ref-5)
5. 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-6)
6. On top of the general advantages described at the beginning of this document [↑](#footnote-ref-7)
7. 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-6384)