**Question 1.**

Delivery Versus Payment (DVP) is the system that uses third parties such as banks and clearinghouses to help manage the financial securities’ delivery. In this workflow, all transactions will need to go through a long process involving many parties to verify the correctness of the data so usually the settlement date might be 2 or 3 days (T + 2, T + 3) after the exchange payment happened. In this system, banks or clearinghouses will act as Custodian of investors to guarantee that all investors will be received what they already paid for or get all the payment that they supposed to get no matter who is on the other side of an exchange process.

A Blockchain-based system on the other hand does not need third parties on the settlement process since the system itself does not centralize any transaction, so every transaction is public to every user on the system. It is impossible to edit or make an invalid transaction since you will need to edit more than 51% of the record of every user in the system before the new transaction begin (which is almost impossible for the real-world transaction). So, without going through multiple parties for many verifications the settlement process could be a lot faster and cheaper at the same time compared to the traditional DVP flow.

For the corporate action processes of DVP, all need information is manually extracted from the source and after that, a third party still needs to serialize all the data in order to have a correct calculation when the corporate decide to take action. With this flow the level of automation is low and the error rate is quite high all these leads be an inefficient process.

On the other hand, since data inside a Blockchain is already valid could be trusted without a complicated verification needed (Since everyone has the same public ledger). So, the process will be more efficient by nature because all involved parties will get trusted information faster.

Even the concept of DVP and Blockchain is completely different but they still have some similarities in terms of securities movement anyway. With DVP, it is obvious that third parties such as a bank will not only verify transactions but also help deriver securities as well. For Blockchain by the concept it might look like all third parties is not needed at all in the process, but in the real world, A Blockchain system still needs a third party to act as a custodian in order to protect and deliver some type of securities such as electronic contracts or real-world certificates. Since by concept Blockchain was designed to put only small data inside each transaction not big documents. With this limitation, third parties are still needed on both systems anyway.

DLT-based services are not a new thing in the IT industry, Blockchain is one of the technologies using DLT- based services as well. If you look at the concept of Blockchain it sounds really interesting since the transaction fees are a lot cheaper than the traditional centralized system and also faster process with better accuracy as well (since no one can edit the data inside the Blockchain system). But why the traditional centralized transaction system is still existing and dominate the financial securities sector until now?

One of the main problems with Blockchain is that the data of the whole public ledger could be huge (Bitcoin have 303GB in Q3 of 2020) since every user will be able to hold the public ledger that means, if you make a system that contains a big Blockchain data, you will have to pay big number for the storage (cloud or physical) even though each transaction cost is cheaper but the overall cost of the system might not since the storage’s cost is getting bigger every day. Some people said that peer-to-peer networks could solve this issue since each user will be responsible for the storage by themselves. But from my perspective, for the normal non-IT users, setting up a peer-to-peer network in their personal computer is too much effort needed.

As long as we still cannot solve the problem of DLT based services. We still need to balance the usage of both of the systems to match our requirements and make better experiences for users in the system.

**Question 2.**Sample of joint view on their assets

A picture containing table

Description automatically generated

In order to accomplish a joint view design above, we will need to create modules that could help generate all necessary data inside the view. Below is the list of all needed modules.

- Net worth

This module is providing a calculation of a Net worth data from all assets of the user. To give both total number and also a chart of user’s Net worth for a specific period of time.

- Assets (Ex. Cash, Stock, Bond etc.)

This module is containing all financial asset’s data of the user including both current price and total number of each asset.

- Statement of Assets

This module will contain statements of each asset for generate statement data per user’s request.

- Transaction

This module will contain all transactions history of each assets for both Net worth and Statement module to using it.

- User data

This module will store all of each user data for the other module to use it for a correct calculation.

- Market Value of each asset

To comparing and calculating current assets value we will need the current market value for each asset as well.

**Question 3.**

In order to implement Blockchain into the system, Banks and Markets need to consider some regulatory that will help them run their business smoothly without unnecessaries legal issues.

The first one is data’s access right to be edited or forgotten. The nature of a Blockchain system is immutable data and read-only access, that means once your transaction is made, it would be on the system forever. In some cases, if your data could not be edited or forgotten after a certain period it might clash with some existing regulation. For example, with the European Union’s General Data Protection Regulation, the right to be forgotten is one of the key elements which conflict directly with the immutability of a Blockchain system.

Second is the responsibility of the owner of the system. By nature in a Blockchain system, if anyone can hold 51% or more of computers in the system, they can do whatever they want with the transaction (In theory this is really hard to happen but still). So, if this happened, there would be no one responsible for this, since in a Blockchain system everyone is responsible for the data in the system. You will not know who to blame for this, since you have to blame everyone by the nature of the system. Compare with a traditional centralized system, if some error happened the owner will need to be responsible for this error and the owner will need to compensate all affected users following the regulation of the place that the system is running at.

The last one is the prevention of crime. Normally, a Blockchain system is using the concept of a private and public key in order to make a transaction to a specific wallet. Since there is no central party to verify the identities of each participant in the transaction. In general, anti-bribery and corruption legislation will require a business to be able to identify each participant to prevent the potential of an illegal transaction, but in a Blockchain system, it might be complicated to do this with the natural concept of Blockchain itself. Also, with Blockchain’s immutable concept, even we can verify an illegal transaction that already happened we might not be able to edit the transaction to stop a potential crime that might use money from the transaction.

With all the above reasons, two additional complexities need to solve in order to create the system in Question 2.

First, since there is no one actually responsible for the data in the Blockchain system, so if the users find some strange or errors relate to their data in the system, they will not know who to blame with and also with the immutable concept the owner of the system will not be able to easily fix the problem as well.

Second, since there is no centralize owner of the Blockchain system, if some user makes a transaction that might be sending some assets to a potentially Crime organization, it would be really hard to verify this with Blockchain’s wallet concept (to identify the actual profile of the counterparty) and also even we can do that after the transaction was made, we might not be able to fix that as well.

In conclusion, if any organization want to start to implement Blockchain with their system, they should consider all actual pros and cons between it with a traditional centralized system very carefully not just make a decision because of just cheap and immutable transaction concept that many people keep saying since you might end up with paying more than you should for cover all the weakness that came with the Blockchain system more than other systems.