Blockchains Architecture, Design and Use Cases
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Lecture - 32
Blockchain in Financial Service – II (Compliance and Mortgage)

Hello everyone and welcome back to the next lecture of our Blockchains course. We have been discussing use cases in the financial services industry and today we are going to specifically look at 2 aspects of financial services; compliance and mortgage, like these are both very important aspects of financial services today and we will look at how blockchain can make a difference to both of these use cases.

So, financial services so, one important aspect of it is compliance.

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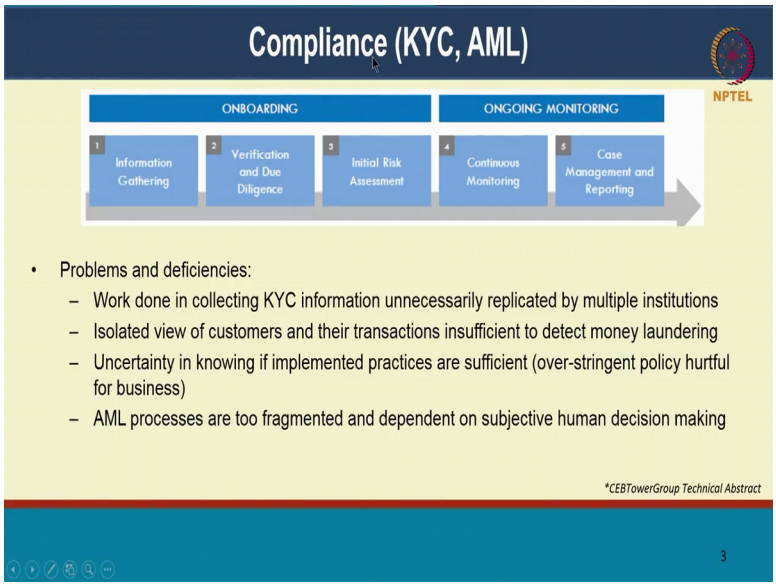

So, today there is a process called KYC, Know Your Customer process. So, if you have ever opened a bank account or if you have got a postpaid connection with a telecom company, you would have gone through this KYC process. So, what is this? So, this process is a regulatory requirement it is a mandatory requirement for many aspects of our daily industrial work.

So, working with banks or working with telcos and many places where KYC is applied and why do we have this? So, it is a regulated requirement to ensure that we have a good knowledge of every organization has a good knowledge of it is customers and it can help use that information to help prevent fraud or money laundering or things of those ones. What does that know your customer it says what is the process? The process really is about collecting personal information.

So, this could be information about your identity so, when were you born, what is your address, where do you live, what do you, where do you work maybe, whether you are if you are a student, you may be that those details of course, age and all of those aspects. And apart from that they might collect other aspects what is your financial standing for instance if you are opening a bank account.

And all the all these processes are there are guidelines that the let us say the regulatory authority will provide to the banks and the banks have to come up with the process of collecting this information whenever they are opening an account and this process is slightly different based on the type of account you are opening.

If you are opening a savings account whereas you are opening let us say a mutual funds account or you are opening a stock trading account, all of these may have slightly or a credit card all of these have slightly different processes slightly different sets of information that they seek right.

So, for the from the perspective of the bank all of this processing is purely they are doing this purely because the regulator requires them to do it do this and they incur a good amount of a there is high amount of cost going through this process right and for individuals more than individuals for corporates, the process is much more stringent. So, as a corporate entity if I am going to open a bank account then the process I need to go through is much more stringent right.

So, for the banks all of this is just pure cost, they are not going to get any revenue or no one is going to pay them money for going to through this process. And in fact, it is actually a bit worse because if they have a very stringent process they take too long to implement this then another bank that might have a very loose process and they have a very streamlined process, customers would go to the bank that has a more streamlined process that does not have so much paperwork to do right.

So, the banks there is actually an incentive to not do as much for if not do as much in terms of KYC right. So, both if they do too much it is more cost for them and it is also customers are want to going to run away right. If you are too stringent if it takes you let us say one month to go through this process we will go to a bank that take that does it for you in 2 days right.

So, it is also a way it is they might lose customers because of that. So, banks you want to do just enough so, that they pass the regulatory norms now that is from the bank side point of view. What is it for the our end customers like you and me today let us say when I go to SBI and open a bank account they asked me for let us say 10 documents identity, address proof and all of those things.

I give all of that to them and SBI has gone through the KYC process all good at my bank account is opened, tomorrow if I want to open a bank account with let us say HDFC, HDFC will ask me for the same set of documents again I have to give them the same copies I have to go through the same process all over again.

So, for me as an end customer it is a waste of time it is a waste of effort and it is a laborious repeated process for me as well. So, everyone in this ecosystem has a problem here as an end customer I would like to just do this process once and if the banks can share those information then I am happy when I go to another bank in this consortium I do not have to repeat this process again hopefully right or maybe they only ask for the incremental information that they need.

Maybe I have opened a savings account with SBI they have a bunch of information, when I go and open let us say a credit card with HDFC, they should be able to get the information that I have already given to SBI and maybe they need just 2 other things from me for opening a credit card credit card account and they should just ask me for that extra information right.

So, that way I can reduce the redundancy in the system that exists today right and same thing for the banks for both SBI and HDFC, if HDFC can get documents from SBI where their customers have gone to SBI first and vice versa. If SBI can get documents from HDFC whenever customers go to HDFC first then the ecosystem can share the information amongst themselves and can reduce the overall redundancy inefficiency that exists in today's world correct.

So, that is that is the whole KYC process and once the KYC process is done there is a lot of processes that happen for AML, AML is anti money laundering and again there is a whole lot of due diligence that is done for every transaction that you perform there is actually an anti money laundering set of processes that happen to make sure you are not doing something suspicious or fraudulent right.

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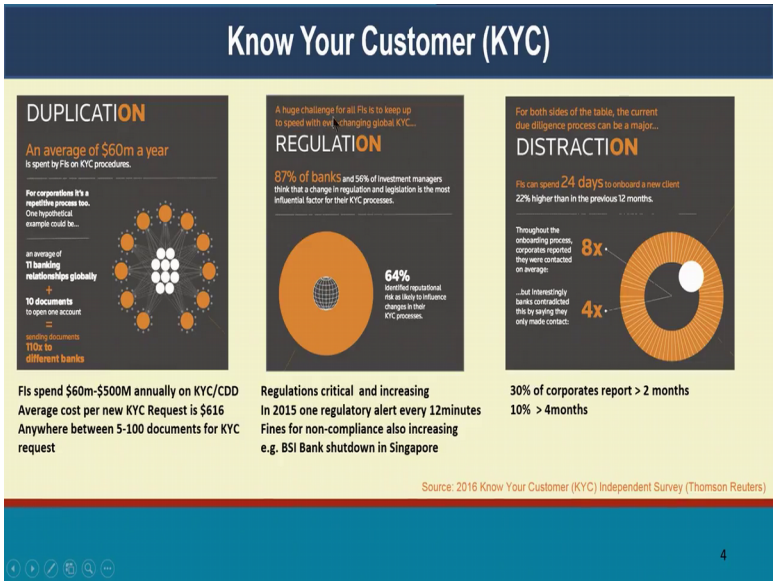

This is what I mentioned here right. So, what are some of the pain points today know your customer process. There is a lot of duplication for both the banks and for the end customers we would like to remove that and today basically it is a multiplicative factor right if I have to open accounts with 10 banks and each of them require 10 documents then I am repeating this 100 times over right.

So, this is a multiplicative factor here and today the estimate is bank spend between somewhere between 60 million and 500 million annually in going through this KYC process right and anywhere between 5-100 documents and I said like I said it is lot more for corporate customers than for individual customers.

And this is all because of regulation we want to prevent fraud and a change lot of banks believe that a change in regulation or legislation is the most influential factor for their KYC process and these regulations and the policies keep changing almost on a monthly basis.

So, the bank the regulator will say I want this addition like for instance we are all going through this aadhaar process today, the regulator says you have to link your aadhaar with your bank account right that is debated still, but let us say the regulator has said you have to link your aadhaar with your bank account. Then all the banks have to go through this process all the individuals have to go through this process and they have to make sure they are compliant and these regulations change on a daily basis.

So, and there is a cost of non - compliance as well if the regulator finds that this particular bank is not following norms they will penalize them and sometimes that penalization can be in multiple millions of dollars right and there have been many such cases worldwide. And a lot of the times people also believe that it is a distraction because even the individual information is changing regularly, maybe I changed my address, I changed my phone number, the regulatory process requires that banks the owners is on the banks to make sure the records are up to date. So, if I change my address within 3 months the banks the owners is on the banks to make sure they updated addresses in there.

So, all this becomes a distraction from them from their usual the regular banking business so, that is also a problem. So, for instance some of the numbers we have write here today to on board a new corporate client on average it takes about 24 days right that is a huge amount of money in today huge amount of time and money in today's world.

And it is 22 pies the cost is 22 percent higher now than 12 months before. So, this cost is also growing with time and the banks are not getting any benefit for this right they are just being compliant. So, how can we address this with blotchy and this is again a big place a big differentiator that blockchain can bring in where we have a shared KYC solution.

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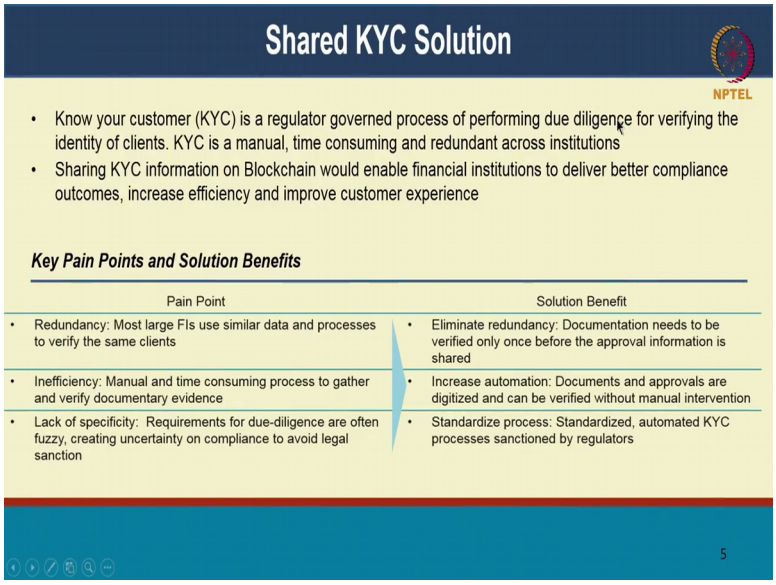

So, think of a consortium of banks that have come together they all agreeing to share this information with each other so, between let us say SBI and HDFC they have an agreement to come to a network together, any customer that goes to SBI first and then to HDFC, HDFC can get the documents from SBI and if the other way is to if I go to HDFC first and then to SBI, SBI can get the documents from HDFC and think of it as a larger network maybe a group of 20 banks can come together agree to share.

Now, I have to do the work only once all 20 banks can benefit regardless of where I go and open my account next right. And it also helps in keeping the information up to date let us say today I open an account with SBI I gave a set of information, tomorrow I go to HDFC maybe not tomorrow maybe let us say after 6 months I go to HDFC.

When I go to HDFC I give them updated information maybe a new phone number a new address when HDFC gets that new information they can share that back with SBI, SBI does not have to reach out to me again to get that updated information. So, all that will result in savings and benefits and that way we can significantly reduce redundancy we can improve the efficiency of the overall process and we also improve standardization.

So, all these banks now can follow the same process and this process can be wetted by the regulator because it is on blockchain, it is all automated on blockchain regulator can also see that yes this process follows the guidelines have specified today, tomorrow of the policy changes you can also modify the process to be adherent to be a to adhere to the policy and that can also be done. So, it also improves standardization it is not like 20

different banks are going to ask you for 20 different documents right when you bought they are all not going to follow the same process, so, that is also a significant benefit.

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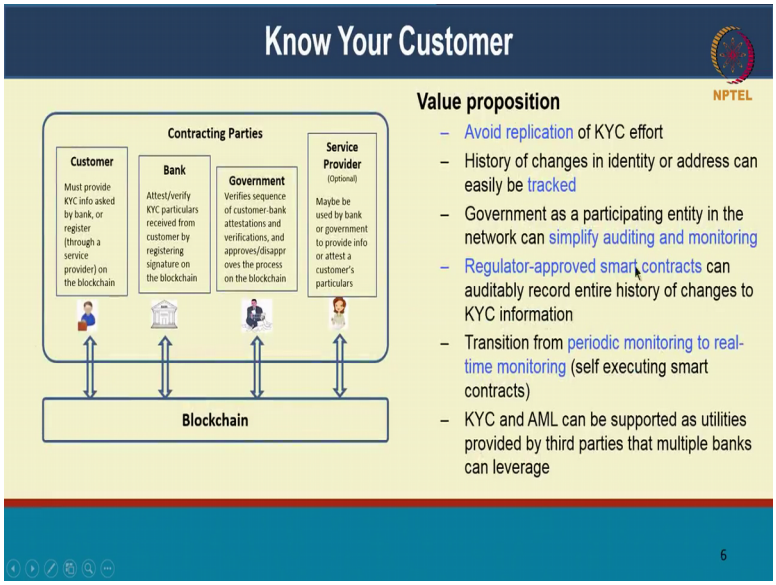

So, again I went through some of these so, the key participants in the network is of course, the set of banks, customers could have identity on this network to say that these are these are my documents and we can have a notion of consent. So, let us say I have given my documents to SBI when I go to open my account with HDFC I can give them my digital consent a signed transaction on blockchain to say I am permitting HDFC to get the documents from SBI. So, that is a consent transaction that the customer might provide and only after consent is provided will the documents be will HDFC be permitted to view those documents.

So, I talked about the banks and customers government can be a regulator an auditor on this network they can have immediate oversight and there could be optional service providers on top. So, there could be third party service providers who provide KYC as a service that is also possible. So, there are significant benefits that I have talked about. So, we can go from periodic monitoring to almost real time monitoring.

So, today it is a very adhoc on how updates are made to my KYC record unless I go and turn my bank my address has changed bank it is very hard for the bank to know and you will also notice if you have a e banking and net banking account whenever I saw after

with 3 months or 6 months they might pop up a question saying are your details still the same right.

So, those sorts of things can be avoided if this information is getting shared and they can they can continuously monitor how information is changing.

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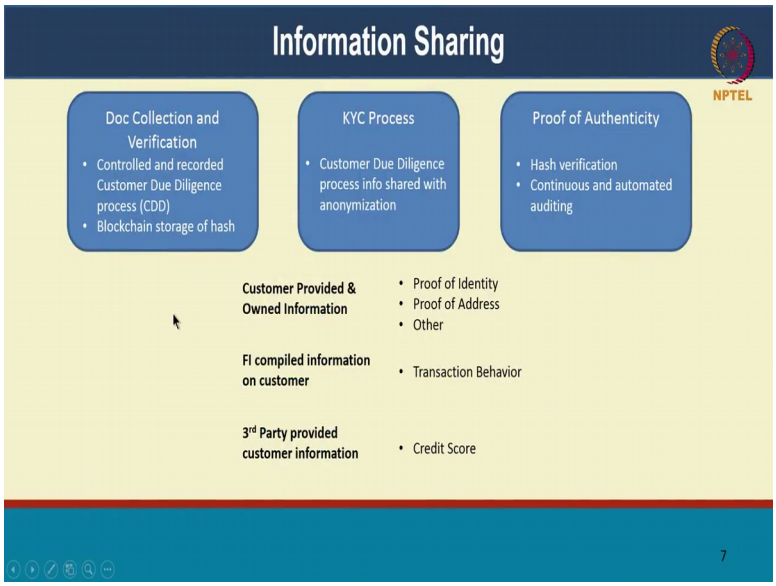

So, this going through this quickly what are some of the information that is getting shared of course, there is a set of documents, that are getting collected and apart from the documents there is a customer due diligence process and that process can also be standardized and shared across all the banks all the participating banks.

Blockchain could store either the documents themselves or more ideally because this has personal information and you probably want to store just the hash of those documents on blockchain. You can verify that hash saying when SBI shared those documents with HDFC, HDFC can actually verify that these documents have not been tampered with because the hash is still the same what documents I got from SBI are really what were put into the system 3 months back right.

So, you have that proof of authenticity of integrity of the data. So, what are the sets of some of the documents that are getting stored? What are? What is the some of the information that is getting stored in the network? We have proof of identity and address

and there could be other notions of identity that we are storing there like employment and so on what is there is also aggregated transaction behavior.

And this is part of the customer due diligence process that every bank actually implements today. So, based on how the pattern of transactions that I am performing they will compare that with some of my peers. And say is that transaction pattern similar to what they would expect of one of my peers. If the transaction pattern is somehow deviant or anomalous from what other people are doing they might actually flag that off for manual verification and that might actually be a trigger for the tracking maybe money laundering or fraudulent transactions and the other kind of information that is also getting stored is credit score.

So, it is also possible for all of these banks to share information to mutually agree on risk assessment. So, today risk assessment is being done in silos each bank or even within a bank had multiple lines of businesses, let us say the credit side of things whereas, the personal account or savings account may not talk to the credit card account line of business of the bank right, they might not even be sharing risk assessment information.

So, all of that can now be cumulate in some privacy preserving manner we can bring that onto a blockchain platform and that can help credit scoring as well credit scoring and risk assessment for individuals and corporates.

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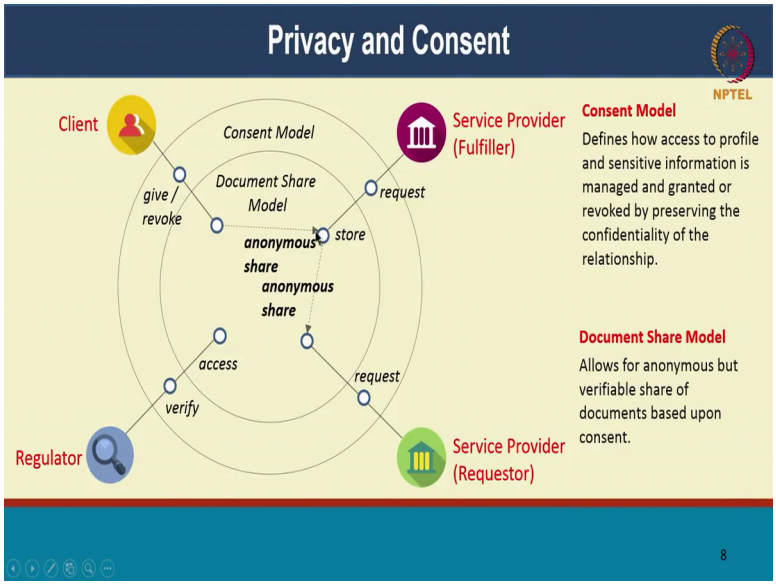

So, this is a high level model of how this might work. So, there is a client service provider think of it as a bank. So, this is let us say the first bank that on boards this client and there is a requester this might be a second bank that the client has gone to and there is a regulator that is overseeing all of this.

So, there is a document shared model that is the inner circle. So, this is where documents are being shared by the entities in the ecosystem, let us say a client first comes in. So, they are going to give a set of documents or submit a set of documents to a particular service provider, they can also revoke access at some point maybe I am closing my account with SBI and then I say SBI should no longer have access to my records my customer records

So, that is give and revoke access. So, the client now is in charge of the, their own data the documents that I have provided so, we can bring that in. So, this is the customer consent so, that is a consent model that is the outer circle. Now the service provider can request for access saying this client this particular client has come to come to my bank and has requested to open this kind of an account maybe it is a credit card account.

And because of that credit card account I have a request to see these documents that the client has submitted and it is possible for you to anonymously share these documents across banks and then this then each service provider that the client goes to can get access to these documents, likewise another third service provider can also come in and request these documents and then once a client provides consent the documents can be shared with the other service provider.

Regulator at any point of time can come in and verify whether all of this sharing is being done in a regulated manner whether the due diligence is being performed when collecting these documents when sharing these documents with other banks; so, all of that regulatory oversight is then possible ok.

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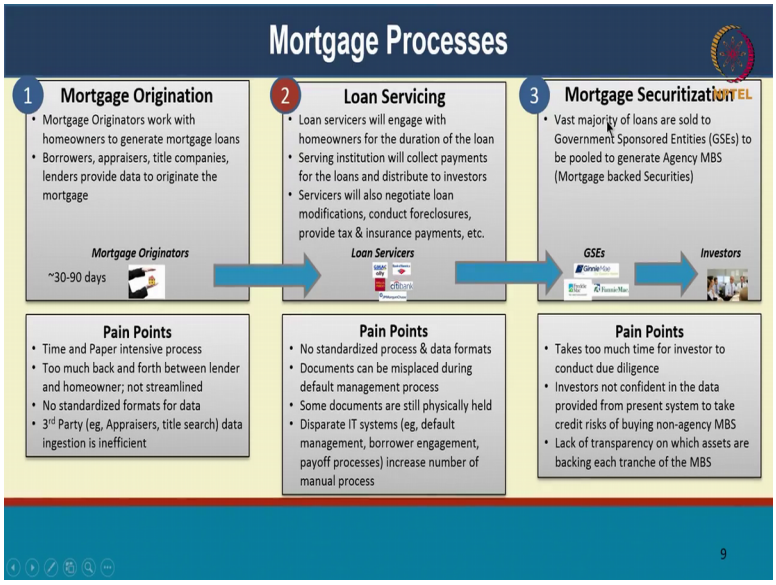

So, with that we have covered the KYC process itself. So, let us look at the next use case which is the mortgage process.

So, this is again another major use case for financial services again there are many aspects of mortgage itself I am going to give you just a high level overview of what this is and what are some of the benefits in mortgage for bringing in blockchain to support mortgage processes.

Today again the mortgage whole mortgage system is extremely manual there are a lot of physical steps if you have opened or let us say a if you have got bought a house on a loan you will know I have bought one, it probably takes you 2 months to get a loan approved right and there are a lot of documents that they asked for lot of regulatory processes that the banks internally go through before they are proven know.

And in today's world you probably also know that a lot of loan related fraud that has happened and lot of that is coming out in recent times and lot of it is because in there are there are loss with rate people the regulators say [vocalize d-noise] the banks or whoever provided the loans have not followed due processes right. A lot of that is because we have following very manual processes it is very inefficient today and very little very little a regulator can do because this it is so complex and oversight on each and every loan that is being provided is very hard.

So, some of these frauds surface very late in the day also right after several years even. So, what are some of the mortgage processes? So, first to begin with there is a mortgage

origination. So, this is where there are originators this might be employees of a bank could be others the third party service providers who work with homeowners or people who bought a home to generate mortgage loans.

So, they will assess value of these homes so, they will be like appraisers, there might be companies that will look into the title deeds to see whether this title is a valid title whether or is it fraudulent, are you the real owner of that house and so on. And there is a lot of these checks and balances that are done in the mortgage origination and today like I said it could take anywhere between 30 and 90 days for you to even figure out whether a mortgage can be applied for this property.

So, it is very time and paper intensive too much back and forth between multiple parties here between the lender which is a bank or a financial institution and the homeowner right and it could also be multiple employees of the bank that have to communicate or multiple functions in the bank that are communicating with the with the homeowner again it is not at all streamlined.

There is no standardization and sometimes even the banks struggle and very last moment they will say I need this document also, you would have given them 10 other documents they would not have told you that they needed this eleventh document also and then you will have to run around to get that eleventh document. So, all those problems exist today because of lack of standardization and streamlining of processes.

The second part of it once you have determined that this is to give a loan if appraised the value of the home and you have if this how determined that this is how much loan I can give then there is a loan servicing part of it.

So, the loan servicing part is where the institution the serving institution or the financial institution that has lent the money is going to collect payments on the loan, may be today it could be EMI is that you pay monthly payments or it could be lump sum payments that you pay back. So, the many models that are there different countries follow a different models and it is also possible to renegotiate a loan and the loan interest rates also change with time right.

So, all of those are part of loan servicing these are again very little standardization different banks follow different interest rates, different processes of how you can initiate,

let us say renegotiation and so on, different documents are required sometimes documents are misplaced they will the banks will ask for you that all the documents again they are all those always physically held right.

So, today if you go to a mortgage section of a bank they will have stockpiles of paper of all the loans that they have today and very disparate IT systems that are not really connected with each other there is a lot of issues with loan servicing themselves. And this is even more a problematic I will talk talked about that when multiple banks are involved in giving a loan.

So, we will talk about that then the third part of it is mortgage securitization. So, what happens is a mortgage can also be sold to third parties there might be an initial lender let us say a bank, that bank might sole might sell one mortgage or they might aggregate multiple mortgages together securitize it and sell that as a security that security might actually have hundred mortgages underneath.

And these are a large faction of these at least in the US they are sold to government sponsored entities and there are again like some regulations here, but one of these problems is I think if you go back to the 2008 financial crisis a lot of that happened because of mortgage securitization and the lack of transparency there.

So, what happened is mortgages were pulled together and the risk assessment they went through almost like multiple levels of securitization. So, mortgages will be pulled into a security, those will all be pulled together to another level and another level and so on, by the time you go to the fourth or fifth level you have no visibility into the original mortgages themselves or the risk associated with those mortgages.

So, there were a lot of these really bad mortgages that were created, but at the fourth or fifth level they will be packaged as a triple aerated security and so on right. So, those sorts of problems arise because there is very little transparency across the board and multiple parties were also involved along the way. So, the whole 2008 financial crisis was attributed to that again multiple pain points there because of that.

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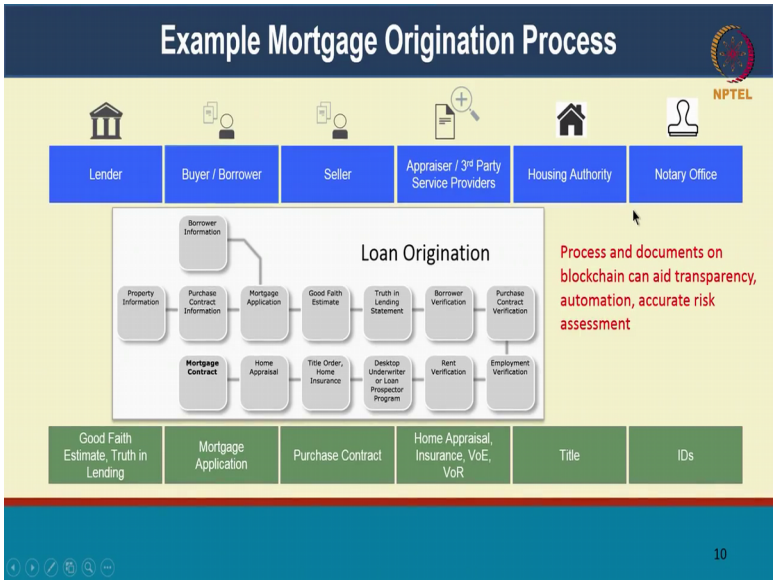

So, this is just an example origination process multiple parties that are involved a lender a buyer borrower and a seller. So, think of it as a I am let us say I am a buyer and I am going to buy it from another person who owns that property currently.

And there is a bank that is involved there might be third party service providers who act as appraisers to see whether the value of the house whether the it could be or associated with the housing authority because it might be one flat out of one apartment in a larger complex, in which case I have to validate whether the housing authority or the complex itself is a legal entity that land is and then I have to validate whether that flat is has legitimate documents, there are multiple aspects of it and then there is a notary office register are and so on, that you have to work with again a long process.

I am not going to go into the details of the process itself so, it is useful to think of this in 2 ways, one is the exact existing origination process you can bring that on to a blockchain system and you can bring all of these parties onto a blockchain system and you can bring in automation in efficiencies, but more transformative way of looking at it would be to say I am going to completely rethink the way this thing works because this is so paper oriented, so manual in nature, today I am going to envision a completely new way of doing mortgage origination.

And that new process a set of financial institutions can agree to bring that on board and the set of service providers together with let us say the land authority or notary office can all together come together to come up with a new process in which they going to do

mortgage origination and some of those conversations are happening today and that can significantly improve transparency can improve efficiency automation and so on right.

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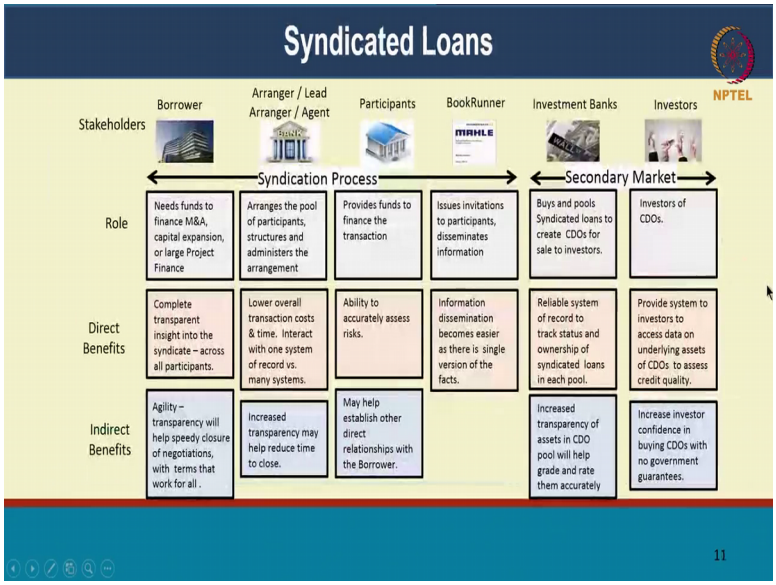

And the bottom are some of the documents that are needed for this kind of a origination process.

So, our next level of complication these are more broadly not just mortgage which is tied to land and house housing syndicated loans. So, syndicate loans are loans where one organization or one entity is asking for a really large loan maybe for building their business and multiple it is beyond the risk that a single bank is willing to take.

So, there might be a consortium of banks that come together sometimes upwards of 10 banks come together to provide portions of the loan right and. So, each bank might take on a different amount of risk. So, maybe the whole loan may be for 1000 crores each bank might take 100 crores and agree to give 100 crores to the to the borrower.

Now, again there is a huge process of how this works right. So, there could be a multiple participating banks a borrower, there could be an arranger or an agent that actually brings these banks together for this borrower, there is a book runner who keeps tribe of who has learned how much has been repaid and so on. There could also be investment banks, there could be a secondary market on this right so, beyond just the primary market of

providing the loans these banks might sell those loans to other investments right they could securitize it insert. So, that becomes a secondary market and set of investors there.

So, there is a whole set of an ecosystem here of participants there are a set of benefits for each of these participants to actually come onto a blockchain network because it improves transparency for them, they know how much has been much has been borrowed by this entity. It is today what has happened is there might be one syndicate of banks providing a loan to a borrower that syndicate might be completely unaware of another syndicate of financial institutions that have also provided loan to the same borrower right.

And that may means that their risk calculations were completely out of out of whack and that has led to a lot of these nonperforming assets today in India especially and that is true for a lot of the developing countries as well again there are a lot of direct and indirect benefits that blockchain can bring about for syndicated loans.

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So, hopefully I have motivated why blockchain can significantly change the landscape of how we do a compliance and mortgage today. So, if you have not seen if you if you do not know what the newer customer process is about I would encourage you to look up the Wikipedia article it gives you good set of details.

And this is a nice Reddit article I think it back in 2010 that talks about why KYC is mandatory now, it is a very short article it just tells you why it is mandatory, why it is useful for banks to follow this and again for syndicated loans is a nice Wikipedia article that tells you what syndicated loans are with that, thank you and in the next session we will look at some more aspects of financial services where blockchain can play a differentiating role.

Thank you.