Blockchains Architecture, Design and Use Cases
Prof. Sandip Chakraborty
Prof. Parveen Jayachandran
Department of Computer Science and Engineering
Indian Institute of Technology, Kharagpur

Lecture – 33
Blockchain in Financial Service – III Financial Trade

Hello everyone. Welcome back to the next lecture on our blockchains course. We had a couple of lectures talking about use cases and financial services. So, this is be the third one in that series talking again about use cases in financial services. Now we are going to go little bit into the commercial side of financial services, specifically about financing trade. So, this is area that my colleagues and I have been working on ourselves for the last couple of years this one and more on trade and supply chain. So, they will be the topic of the next few lectures that is actually very close to my heart and something that have been directly working on for the next couple of for the last couple of years.

How does the trade world work today? So, the trade international trade is probably the backbone of world economy today. So, most of the things you have in your home have probably been transported on a ship at some point or the other right. So, all the way from the regular even food articles some of them are you get imported fruits and so on. It could be electronics those are imported, exported.

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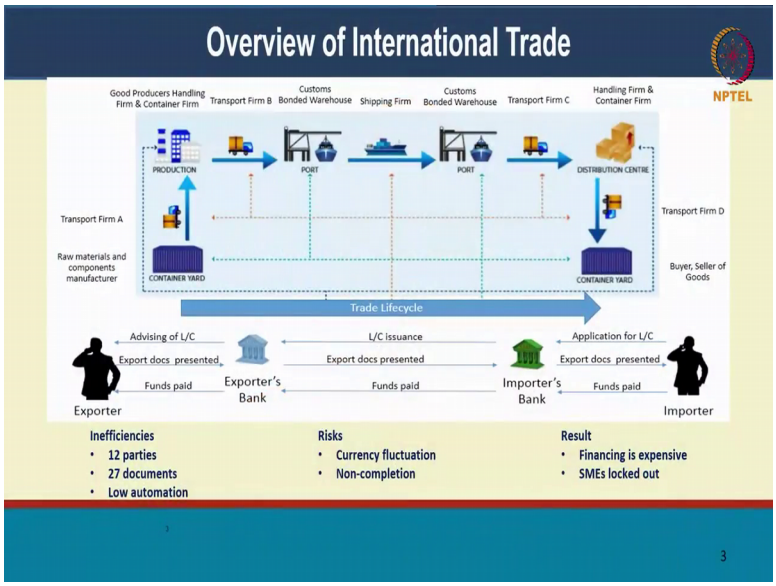

And there is a lot of the regular day to day activities regular day to day items that are actually shipped oversea. We do not really realize that because we do not see the back end supply chain of all of these things.

Today is well this whole process is extremely complicated. Let us say there is a small exporter the whose exporting the same mangoes from India to let us say France right. Today that farmer or a small enterprise has to be working with several participants today. So, they may be an exporter in India. So, they have to work with a logistics provider maybe a trucking company to transport their mangoes to a warehouse or to the port and then they have to work with a shipping line or a carrier to transport over a ship using over a ship.

And then they also have to be working with customs in India also customs in France. They have to be working with ports along the way. So, there is a and also freight forward is customs brokers and various other entities so, over; however, the handling the shipment all through the lifecycle and it is not just the people who are handling the container of the shipment itself.

There is also a huge range of documents that they need to be they need to be prepare to export regulations and import regulations. So, the Indian customs authority, we will say if you are shipping mangoes, then these are the set of documents that need to be prepared likewise the French customs might say these are the documents we require for you to import mangoes into France.

And the kind of documents are needed or let us say, it could this be about your packing list or your invoice that says what really are your shipping or it could also be let us say you might have to go to a phytosanitary. You might they have to get a phytosanitary certificate to certify that these mangoes are not infected or the have to they are of good quality. They are of export quality and they are to be exported out of India.

So, many such regulations which for which they have to prepare documents and they also have to pay be pay export duty. So, they have to have a separate document and a seal from an authority saying they paid the duty. So, there is a lot of these documents that need to be prepared. This picture basically shows some of that complexity. So, it shows how the container itself moves from one port to another port or one yard to another yard. There are a lot of inefficiencies right.

So, typically on an average it is estimated that about 12 parties are involved in a single shipment and up there is average 27 documents. So, in my own experience, there are certain goods for which you need even up to like maybe close to 100 documents because may they be dangerous goods or they may be restricted goods. So, there is a lot of documentation that is required in that is very cumbersome it is very little automation. So, it is all manual process is paper based documents that are in place today.

And all these adds to the risks rate so, because of the fact that this is international trade you are also dealing with multiple currencies. So, you are you are subject to currency fluctuation issues and there is also issues with what if the shipment does not reach the other end. So, the there is a non completion issue itself and then on both sides. So, exporter has to ship the goods to the importer, importer needs to pay the money to the exporter.

So, there is this both ways exchange that is happening and the end result of this is that financing becomes very expensive and in a country like India that is a very severe limitation. Because we have a large number of small and medium enterprises and they are very much dependent on financing for their capital inflows, outflows.

So, if the financing is going to be very expensive, then this exporting becomes a impossible task for them. So, they are restricted to the markets only in India and they can not leverage some of the demand that is there outside India. So, that is the SME lock out that that is mentioned here.

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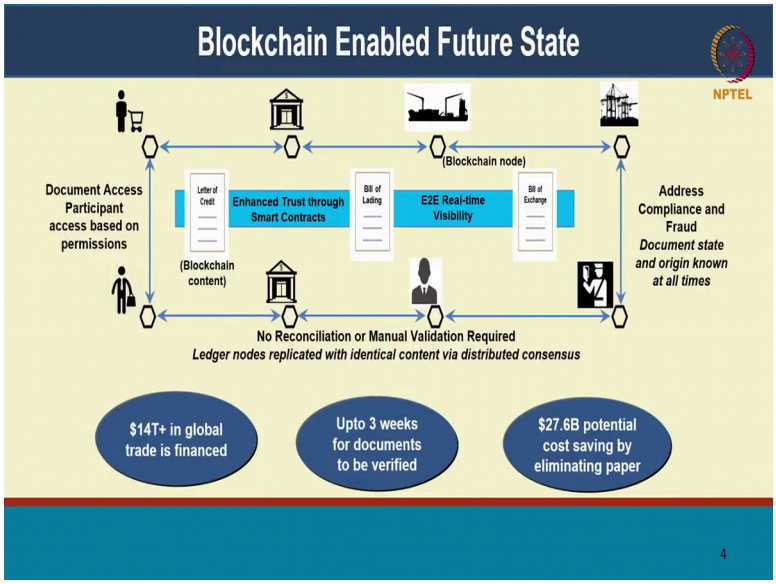

So, what can we do to alleviate this situation? So, what if we can get some of these parties maybe even all of these participants onto a blockchain platform where they all securely share information. So, what we can achieve is end to end real time visibility into exactly where your containers are what documents have been prepared already, what documents are still pending, what approvals need to be obtained from various authorities. So, all that everyone can get a real time visibility into exactly what is going on.

And along with that we can automate some of these business processes that are transcending organizational boundaries. So, I talked about how many documents of do you have to be prepared by different participants. This is actually a sequential process that people have to follow. So, you need a set of documents once they are prepared you may need couple of other documents that are dependent on the first documents and so on.

So, that entire process can be captured in an automated fashion as smart contracts on blockchain and these smart contracts can have additional intelligence. So, they can actually eliminate some of the manual verification and the validation of the data elements in these documents. So, the people actually manually look through these documents and see whether they are ok.

Now you can automate some of those aspects as well. So, making sure all the documents are matching their information is all correct. So, all that valuation can also be automated and you can of course, have restricted access certain documents you can only allow

certain participants to view based on their authorization. So, what are they allowed to see we can only show those things to them. So, that is part of the access control that we have looked at.

And at the end of the day if there are regulators in the picture they are part of the blockchain as well and then they can also get a real time view into this and it can really help them address fraud. Today if trade fraud is a huge issue it is in the trillions of dollars worldwide today and even if we can address a fraction of that through technology I think it can make really big impact.

So, today overall over 14 trillion dollars of trade is being financed. This is just the trade that is being financed is not the overall amount of trade and it takes up to 3 weeks for just the documents to be verified. The actual shipment itself from India to France can go faster over ship it probably takes less than 10 days to go over ship. And by just eliminating some of this paper, it is estimated that we can save about 27 billion dollars. It is a huge amount of money.

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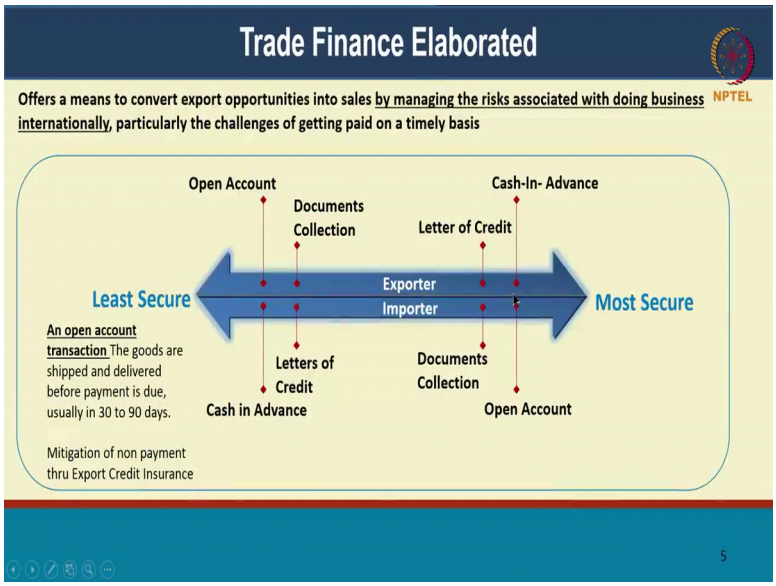

So, what is trade look like, trade finance look like and let us we see, how we can impact this. There are various forms of trade finance as you might imagine. So, in this picture it shows some of the least secure modes of trade finance rate to the most secure ones. So, for instance if you take one example where cash is paid in advance. So, the importer is

going to pay the exporter in advance and then only then will the exporter ship the goods the other way around.

So, now, if you think about it the importer is paid the money in advance, what if the exporter does not ship the goods. So, the risk of non completion is fully borne by the importer ship. So, it is very less it is not secure for the importer, but it is secure for the exporter because they have the money they got the money. And only then they are obliged to send the goods so, that is cash in advance.

The other extreme is what is called an open account, where exporter is going to bear all the risk. So, they are expected to send the goods in advance and only after the goods have reached the destination and have been verified. There will the importer, then pay back. So, there in this case the exporter is going to bear all the risk and it is least secure for them whereas, the open account is more secured for the importer.

There are other forms of financing in between so, these 2 actually may not even involve a bank the cash in advance in the open account may not even involve a bank or a financial institution. It might just be an agreement between the importer and the exporter, one party for whatever reason agrees to absorb the risk and the send the money across. And of course, there are problems that happen along the way right and relationships are and there may be lawsuits and so on right.

But when financing comes in there are multiple modes again I am going to talk about just 2 of them one of them is called letter of credit. It is actually a fairly popular way of financing today where a bank comes in the picture let us take it take for example, it is the importers bank. So, the importers bank will say exporter you may not trust the importer, but I was guarantee that whether if you send the goods across I will verify, the bank will verify and we will make sure that you get the payment. So, the bank now assumes the risk of payment of non completion the importer maybe pays a fee to the bank to assume that risk and exporter that there by is now has probably a more reliable entity maybe a large bank that they can trust and send the goods across.

So, the way the letter of credit works, we will talk about it in the next slide. But the another version of it is documents collection where the bank is in the picture that bank may not assume the risk of non completion. So, if the money does not get paid, the bank is not liable. So, bank is not going to pay the exporter, but the bank will assume the

responsibility you just collecting the documents that are required so, that the importer or somebody else can verify those documents.

So, there are many forms what I wanted to impress on this on the slide is there is a huge range of these financial instruments today, all the way from being very less secure for one of the parties to being fairly secure and trusted and executed by 2 or more banks in this ecosystem.

And in some cases when the letter of credit is involved, then maybe even 5 or 6 banks that are involved. There could be a guaranteeing bank that can be correspondent banks, because there is a currency exchange that could be negotiating banks that help negotiate terms of the agreement. So, many banks that are involved in even a single financing situation for a single size shipment.

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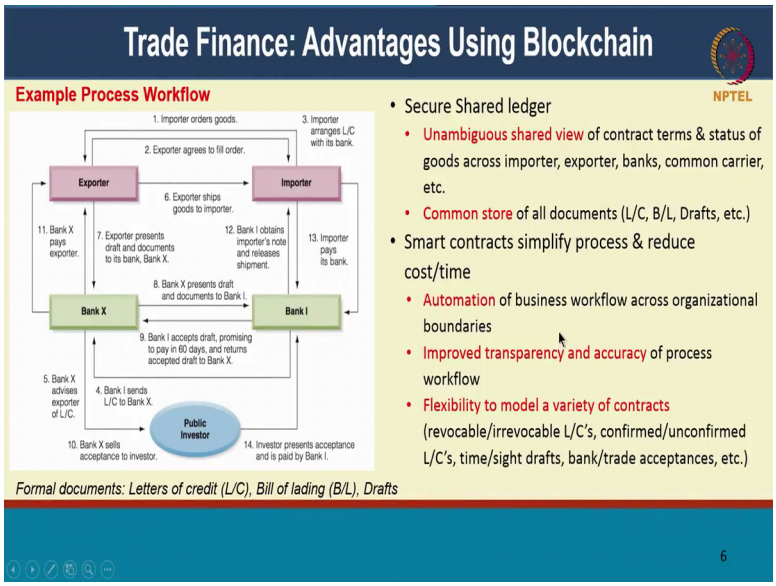

What are some of the advantages if you can bring in blockchain right? So, they mentioned some whatever the parties first right so, of course, the exporter, importer, have to be invert. So, they are the 2 parties who are fundamental to the trade and they have this fundamental discord rate. Importer is worried that the exporter will not ship, the goods exporter is worried that the importer will not pay. So, they are both reluctant to be the first to show their end of the deal right.

So, they both of them employ banks and hopefully these banks are trusted. So, that is how the world works today and it may not be just the importers bank and the exporter's bank there may be other banks involved. There could be a regulator involved; there is other investors who might be involved. So, this is actually a fairly complex ecosystem and this is this whole process that is out there I am going to let you see it clear, but I want to impress upon the fact that is a fairly complex interaction that is happening even between these 4 parties there are actually more parties that are not shown in this figure.

So, what blockchain brings and if we can bring these parties on to a blockchain platform is that it can give you an unambiguous shared view of exactly what has happened so far. What needs to happen in the future? It is a common store for all documents. So, whether there are multiple kinds of documents here and as I mentioned it can automate business processes on the blockchain. So, you can have smart contracts that are executing these business processes and they can automatically validate whether a particular step has happened correctly whether the document is valid and so on.

And of course, as I mentioned there are many different instruments trade financing instruments with different levels of security and different risk assumed by different players and of course, you can encode them as different kinds of smart contracts.

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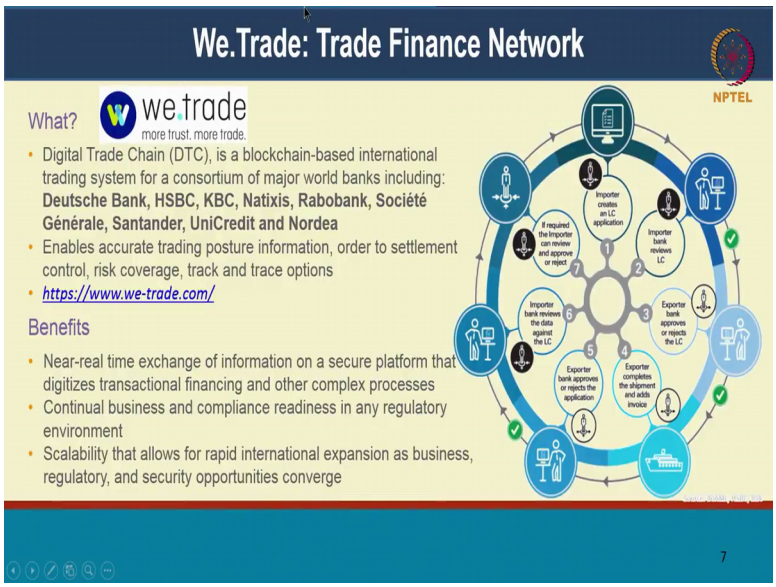

So, we dot trade is actually an existing consortium of banks who are running a blockchain network for their trade finance purposes. So, they are running this in

partnership with IBM. So, there are actually 9 banks who are involved in this consortium today and maybe potentially other banks could join them in the future. This is all banks in Europe some of them have a global footprint like HSBC or even Deutsche bank are is there in multiple geographies.

And they are using blockchain today to extract some of these benefits to have this real time visibility into the information that is being exchanged for a trade finance use case. And they are looking at ensuring that they have continuous business automation and also compliance right. So, blockchain can give you an auditable log of everything there is happened and banks can use that to show regulators that they are complying with trade practices.

So, every country has regulations on what can and cannot be done and banks are expected to show proof basically as for to an auditor that they have been complying to regulations. So, this is one real world production application of blockchain that is running today.

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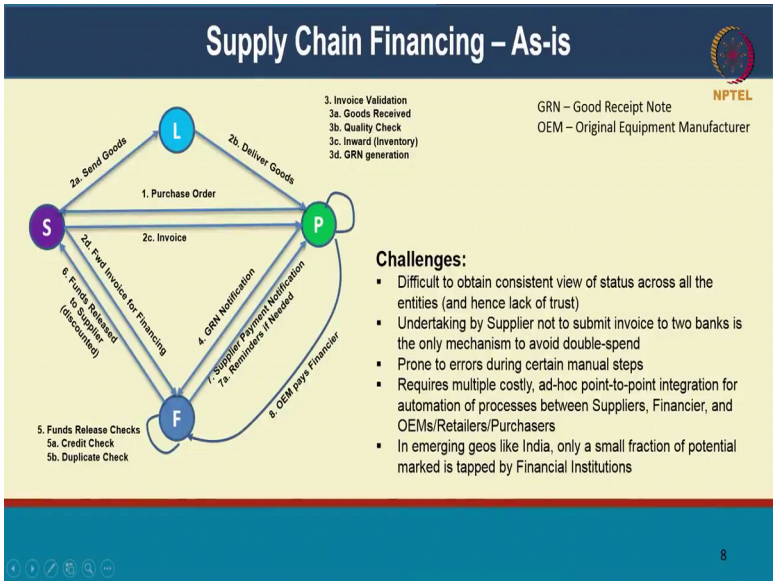

So, let us move on. So, a related topic to trade finance is actually supply chain finance. So, there is a little bit of distinction in to how or what the use case itself is. So, let me just describe the use case first I want to take this picture is as it example. So, let us say there is a large manufacturer right, it is they are the buyer. So, let us say this is Tata

Motors right, Tata Motors probably works with hundreds of suppliers, each supplier may be supplying let us say a small automobile part maybe let us say nuts and bolts.

So, the supplier who is going to who is a small scale enterprise who is just manufacturing nuts and bolts and they are selling these to Tata motors and there is a financier in the picture. So, Tata motors is a big company the supplier is probably a small entity here and L here is the logistics provider. So, there is a logistics provider. So, let us see how this process itself works. Today we want just one example of supply chain finance, there are other flavors as well, but let us just take this example.

So, the supplier now creates purchase order sorry other the Tata motors creates a purchase order saying I want to buy let us just for example, I want to buy 1000 nuts and bolts from here. So, they agree create a purchase order send it to the supplier. The supplier then would package those nuts and bolts and they would send it through a truck to through a logistics provider and this will get delivered at a Tata motors warehouse for instance. They parallely also send an invoice to Tata motors saying, hey I have shipped these goods across they will reach you tomorrow. But this is the invoice for this shipment and you need to pay me whatever 10000 rupees for this for the shipment.

Now, Tata motors is what Tata motors typically does is it probably needs it has it is own supply chain, it has its own orchestration. So, it probably will take it is take a few days to even verify that the shipment has come in look at the quality assess the quality of those nuts and bolts say there. So, this multiple steps that Tata motors would internally do and typically takes time and the arrangement is usually that Tata motors would pay the supplier after maybe 30, 60 or 90 days depending on the agreement back to the suppliers. So, they you pay the money only later.

Now there are often times the supplier is a very small company right, unless they get paid for the ones that they have already produced in and sold. They cannot use; they cannot produce the next batch of goods right next batch of nuts and bolts. So, any money to prepare the nut produces the next batch. So, what they do is, they go to a financier. So, now, if the small company goes to a financier then this bank is probably not going to give them a very good interest rate because they do not have a very big credit history and they will not be a big company right.

So, there are there loan rate might be fairly high, but if the supplier can show that hey I have actually sold goods to Tata motors; this big company, then what the financier would do is, oh I do trust Tata motors more right; they are not going to go they are not going to run away any time. So, I will give you the money now right away when you show that if sent goods to Tata motors or the financier will pay the supplier immediately right and after the 30, 60, 90 days whatever is the agreement between the supplier and the purchaser or between Tata motors and the small company they will collect that money from Tata motors.

Now, the advantage of the supplier is one they got the money early they did not have to wait until Tata motors does all it is processing and pays it after 30, 60 or 90 days and the second thing is they got a lower interest rate. So, they basically got a loan of some sort at a lower interest rate. If they went for a loan with a bank directly, they would not get that interest rate, they got an interest rate at the date maybe Tata motors would get a loan right. So, that is the advantage of the supplier.

Now advantage for Tata motors is that they get their 30, 60, 90 days to process this shipment and then they can take that time to make the payment. And if some things are not good, they can raise a discrepancy, they can raise an issue. And of course, finance here out of this when they are getting the money when they are giving the supplier. They might give 100 when they getting from Tata motors, they will they will get 105. So, they get the cut or it might be the other way around they probably give the supplier 95 and get 100 that that the supplier was owed from Tata motors. So, they get the interest rate cut from this transaction.

So, in this ecosystem almost everyone benefits right, but there are of course challenges. The challenges is that it is now, this process itself. I just showed one shipment right this might be like a periodic shipment with a supplier sending goods to Tata motors. So, it is difficult to get a consistent view of the status across all the shipments across all the entities in this ecosystem. There is also the issue of what if the supplier sells this or shows this invoice to financiers now both of them may be sending the money and expect Tata motors to pay both of them; of course, Tata motors not going to pay both of them is going to pay only one of them.

So, that becomes an issue right how do you make sure that the supplier is not trying to cheat and is not showing that invoice duplicate version of that invoice to 2 people. So, this is a duplicate invoices are a huge challenge in today's world. Today there are also challenges about under reporting or over reporting, for instance the supplier could say hey Tata motors has given me these 10 invoice. The total worth is actually 1 lakh rupees whereas; it might just be 90,000 right.

So, there might be issues such as that that are also problematic, because these are all paper documents it can easily be tampered in and so on and they are prone to error. So, there is a lot of errors that happen along the way right. The supplier will say, hey I sent you 10 shipments and Tata motors will say I go I received only 8 right. So, those sorts of discrepancies also happen. So, all this entire process is fairly manual today and it is very expensive and very risky and error prone and there is a lot of manual reconciliation that happens between these parties to make sure things happen smoothly.

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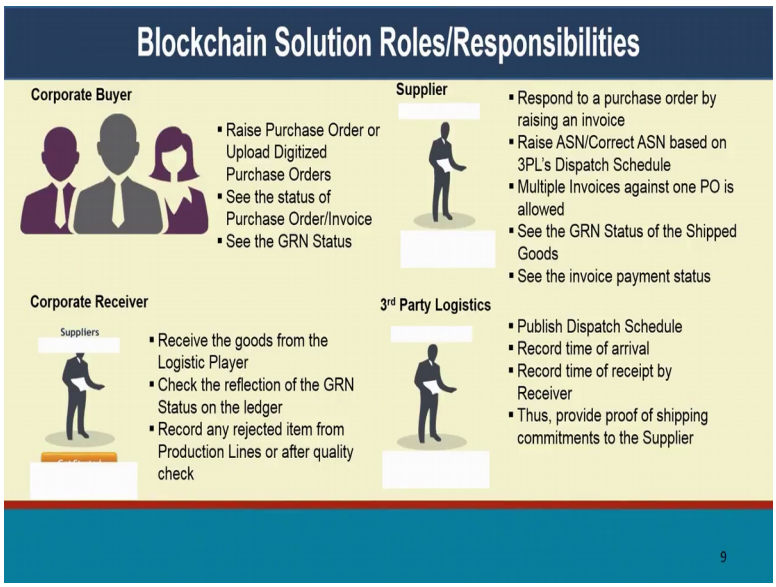

Again the here with blockchain, if you can bring these parties onto a blockchain network then blockchain can be a single source of truth it also eliminates. This issue of any kind of fraud that might happen, it automates this process. So, you do not have to wait for the other person to manually do some work and so on.

So, there are actions and responsibilities for every participant in this ecosystem and that is what is captured in this slide and the benefits right.

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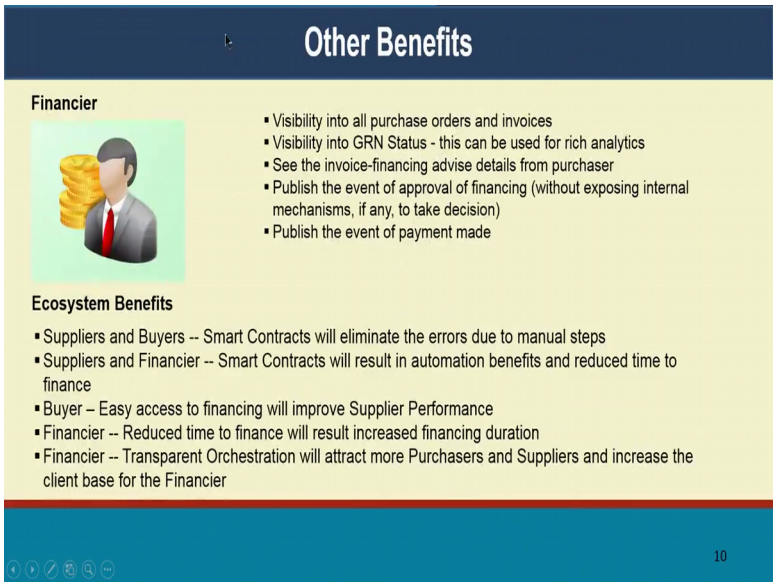

So, every participant in this ecosystem gets some benefit out of participating in this eco systems that is why they going to be they will be willing to come on to the blockchain and we are already working with Mahindra finance on this in India where pretty much this use cases is what they are targeting with some complexities of course.

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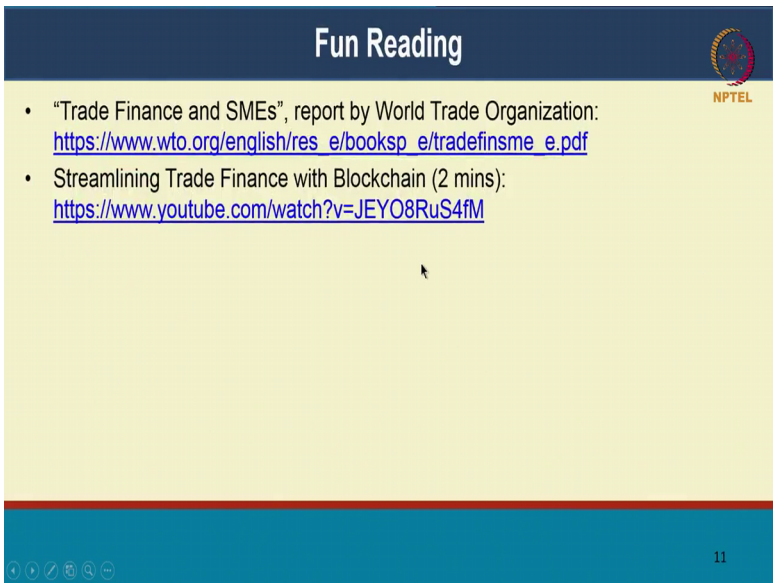

So, that comes to the end of what I wanted to talk about how blockchain is being used in a very big way in trade finance and supply chain finance for various kinds of financing. So, there are a couple of interesting reads as part of our fun reading section this week.

So, one article is on trade finance in SME's. This is by the way world trade organization. It is an interesting read to say how if we can just make certain changes to the way trade works today, there can be significant improvements and benefits especially to small and medium enterprises and that is I think a huge deal for India because we have a huge number of them and it can make a really big difference for the Indian ecosystem for Indian economy. Then there is also a small very short 2 minute video on streamlining trade finance with blockchain. So, I would encourage you to watch that as well.

Thank you.