eTrios Commodities LLC

Smart-contract Solutions to a Variety of Contractual Problems

What are smart contracts?

Smart contracts are computerized protocols that execute the terms of a contract. The objective of smart contracts is to satisfy common contractual conditions (such as payment terms, liens, confidentiality, and even enforcement), minimize exceptions both malicious and accidental, and minimize the need for trusted intermediaries. They are computer protocols that can implement a particular requirement, and can show proof that certain conditions were met or not met. Smart contracts can be pre-programmed to initiate settlement automatically between two parties once certain criteria have been met. The beauty of smart contracts is that they do not involve a middleman for settlement; therefore they result in enhanced clarity, enhanced speed, and lower costs to buyers and sellers.

Historically, the smart contract concept was first introduced by Nick Szabo in 1994, but there was a slow evolution until around 2009 when the concept of the "blockchain" was introduced. (See: http://szabo.best.vwh.net/smart.contracts.html)

Smart contracts can be stored on an internet-based ledger called blockchain. Once an agreement, essentially a digital handshake between a potential buyer and seller, is reached, money automatically goes to the seller and an asset automatically goes to the buyer. A smart contract can execute a transaction based on a digital data feed such as the Dow Jones Industrial or a Reuters' feed. Such a contract can also have embedded remedies to be triggered in case of a breach. Examples include:

- I will pay you $1,000 out of my escrow account with HSBC, IF the price of oil drops 25% or more on the ICE exchange between today and August 1, 2017;
- I will sell you title to 5 tons of a certain type and quality of wood certified by SGS to meet a certain standard, at the port of Rotterdam, for $50/ton, on August 1, 2017, IF the stock market hits a certain level between now and next Tuesday, as indicated in the Financial Times;

- I will sell you 500 tons of certified greenhouse gas credits that result from good forest management practices in Brazil for $10/ton, IF the US Congress approves a bill creating a national greenhouse gas credit trading program in the United States between now and January 1, 2017;
- IF you are more than 10 days late on your automobile loan payment, your loan agreement contract triggers a breach-term that, via the internet, allows the lender to automatically lock down the automobile, making it immobile until you pay the loan amount due; or
- I will buy 100 tons of RSPO palm oil, delivered at village X, IF the price of palm oil on the London Exchange is $X/ton on July 2, 2016 and my money is held in escrow today with Bank of America.

Note that each contract is contingent on an event, a digital feed from a so-called third party "oracle" and self-executing payments, shipment of products or other actions based on conditional logic. The contract is also contingent on agreed-upon and verifiable proof of performance or the verification by a third party.

Sample Smart Contract to Sell Greenhouse Gas Credits	
Quantity	1000 metric tons
Quality	Certified CERs
Certified by	DNV
Insured by	Swiss Re
Country of origin	Brazil
On what registry	Brazilian registry
Based on what activity	Wind power replaced peat-based heat and power production
Using what methodology	ACM0002 ver. 11 - Consolidated methodology for electricity generation from renewable sources
Start year	2010
Finish year	2020
Tons/year	100/year
Method of payment	Cash sent to sellers account, then certificates will be electronically sent to the account of buyer's choice
Guarantees	Money refunded within 1 year if not approved for use within the EU
Guarantee insured by	Zurich Re
Price	$6.50 US dollar/ton
Claims reviewed by	SGS, certificate available to buyers

Why do we care about smart contracts?

According to a 2015 World Economic Forum report (Technology Tipping Points and Societal Impact), 10% of global gross domestic product (GDP) is expected to be stored on a blockchain by 2027. Noting the disruptive economic impacts that could obtain as a result of smart contracts, the report projects the following positive impacts:

- "Disintermediation of financial institutions, as new services and value exchanges are created directly on the blockchain";

- "An explosion in tradable assets, as all kinds of value exchange can be hosted on the blockchain"; and

- "Contracts and legal services increasingly tied to code linked to the blockchain, to be used as unbreakable escrow or programmatically designed smart contracts."

Clearly the impacts resulting from the diffusion of blockchain applications will vary by sector, vary by country and vary by culture.

It is obvious that smart contract transactions will be internet or mobile telephoned-based. Today, mobile telephones have more computing power than anyone could have imagined even 20 years ago. Today, a mobile telephone can be used to conclude smart contracts by capturing a variety of data, storing the data on a blockchain, and verifying the identity of the buyer or seller.

In developing countries, the mobile telephone is becoming the primary instrument for communication and internet access and it is easy to imagine mobile telephone technology and smart contract technology becoming harmonized and becoming the smart contract highway of the future.

Two smart contract instruments that are of interest in developing countries are micro-loans and micro-insurance.

Micro-loans

The concept of micro-loans started in 1976. The Grameen Bank lent small amounts of money to villagers organized in voluntary groups. Since then, the idea of micro-finance has spread all over the world, and has been expanded to cover a much broader range of financial services than just loans for the poor. By the end of 2007, more than 150 million clients worldwide had used the services of microcredit institutions. Today, the potential pool of customers is much larger.

While not a cure for all developing country financial ailments, micro-loans do have a role. This assertion is further supported by the rapid diffusion of mobile telephone technology.

As an example, consider a recent initiative in Africa developed by L-Pesa. While most of the interaction with L-Pesa and completing the loan form is through the L-Pesa website, movement toward a mobile telephone and blockchain-based system is not a big technological leap:

> "These loans are excellent resources for small and medium enterprises that may not have access to loans through conventional banking. The low interest rates make Mobile Micro Loans more attractive than bank loans or financing through money lenders. Although commonly used for business purposes, a Mobile Micro Loan can offer a financial solution to a family emergency, personal development, school fees, and a range of other issues.

> The steps to get a cash loan through mobile banking are simple. Once you make your application, including details of the amount required and your proposed repayment amount, and your application is approved, the money goes directly into your mobile phone account, and can easily be repaid in the same way." (See: http://www.l-pesa.com/)

With the increasing usage of mobile phones, more people in Africa, South America, and Asia today have access to mobile banking. Increasingly, with mobile banking, mobile telephone users can make payments on goods, services, and bills. Because of blockchain based identity-protection systems and smart contracts, micro-loans can be constructed to mitigate risks to lenders and for consumers by offering loans contingent on certain circumstances being obtained.

Micro-insurance

Micro-insurance in developing countries can take many forms. One product that is amenable to smart-contracting is a commercial product that focuses on the needs of commodity producers such as agriculturalists, forest product producers, and others that face commodity price, commodity quality or commodity quantity risk.

Developing country commodity producers are affected by weather, worldwide demand, and a host of factors outside of their control. While many small producers have neither the access to risk management tools like insurance or limited skills to employ risk management tools like insurance, there are many that do have the access, knowledge, and skills to mitigate select risks.

Smart contract based insurance products can provide many of the tools needed by developing country commodity producers. And, if linked through a mobile telephone, a variety of relevant credit-related data can be transmitted to assess premiums, secure identity, and facilitate the issuance of a micro-insurance policy, including paying the insurance premiums.

Supply-chain tracking systems can facilitate both micro-loans and micro-insurance

Supply-chains connect commodity providers such as growers with transporters, aggregators, further aggregators, converters of commodities into refined products or altered products, further transporters or shippers, final product producers, wholesalers and retailers. Many supply-chains are complex. What they all have in common is ability to:

- Alter one or more attribute, and
- Link commercial agents that transmit money between them in exchange for a product or service.

Blockchain-based supply-chains can provide for attribute traceability and verification of attributes such as quality or quantity or lab-practices. The same supply-chain can also be used to facilitate transactions, contingent on a certain event transpiring i.e., smart contracts, providing advanced payments, loans or provide insurance products to reduce a variety of risks.

As has been illustrated, a blockchain-based supply-chain can produce a variety of benefits for all economic agents within the chain. A blockchain-based supply-chain can provide governments and other stakeholders a simple way to verify the attributes of products passing through the supply-chain and the same chain can support a variety of smart contracts dealing with commodities, payments, loans and insurance. Blockchain-based supply-chains, therefore, provide two benefits - - (1) traceability and (2) lowering the cost and enhancing the access to smart contracts.

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