

Cobalt Supply Chain Transparency, Auditability and Trust Using Blockchain Technology

This week Core Consultants will be presenting at the upcoming Cobalt Development Institute Conference (CDI) in Morocco, which is the reason I was unable to participate at InvestorIntel's 6th Annual Cleantech & Technology Metals Summit, I hear everyone on the InvestorIntel editorial team is there except for myself, Steve Mackowski (Australia) and Adrian Nixon (UK). While Core Consultants has had an interest in cobalt since the company's inception in 2009 before that, I had worked in Africa for a company that mined cobalt ore in the DRC and processed it in Kitwe, Zambia; Core Consultants' interest in supply chain transparency, however, is more recent.

In 2014, we were approached by a multinational telecommunications manufacturer in order to advise them on defining what exactly ethical cobalt sourcing was and then to evaluate potential DRC-based suppliers and help them choose an ethical supply partner. Following this project in the DRC, we began looking at whether there could perhaps be a technological-based solution to trace, evaluate and audit such a convoluted commodity supply chain such as cobalt. And so we put forth our hypothesis that perhaps blockchain, while not a panacea to all these problems, could provide a start and a step in the right direction.

Cobalt Supply Chain Journey



Figure 1

The diagram above is brief, but certainly phrases the issue. Just under a quarter of the world’s cobalt is currently produced by the informal or artisinal mining sector. And if we consider the imbalance between what these miners are earning versus, say, the cost of a smartphone, we have to acknowledge the discrepancy and start looking at the underlying issues and potential hurt to profits and stigma. Simply put, there is a human element that needs to be considered.

Cobalt Supply Chain Journey

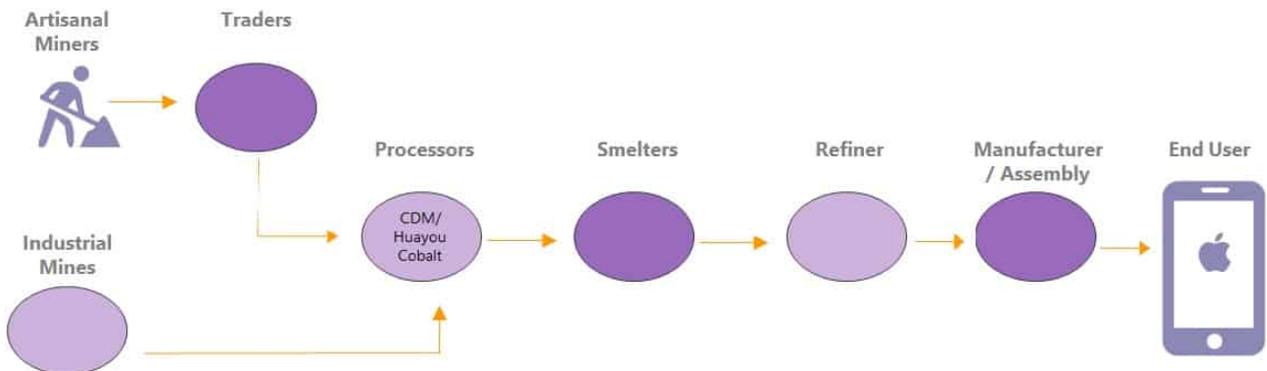


Figure 2: Cobalt supply chain

Figure 2 above outlines the cobalt supply chain in general terms. We have miners, we have legitimate or formal industrial mines extracting cobalt and either via traders or directly, sending it to processors. Potentially, at the processors, is the first time where industrial mines' material may come into contact with the artisinally-mined material. From the processors, the material may be sent to smelters, typically in Europe or China. From there, if being used in batteries, it is sent onto cathode manufacturers and finally onto the end users.

Blockchain technology is simply a database or distributed ledger for recording transactions. The basic difference between a blockchain and a database is that blockchain databases are decentralised, which means anyone can add data to the system without needing a centralised authority. And once added, the data is immutable, meaning that no one can tamper with it. A public blockchain, can be viewed by anyone, which adds a significant level of transparency.

A blockchain, envisaged for this purpose, would specify the role players that are allowed to interact with the blockchain.

So for instance we can consider a hypothetical blockchain (Figure 3), focusing on the artisinal supply chain:

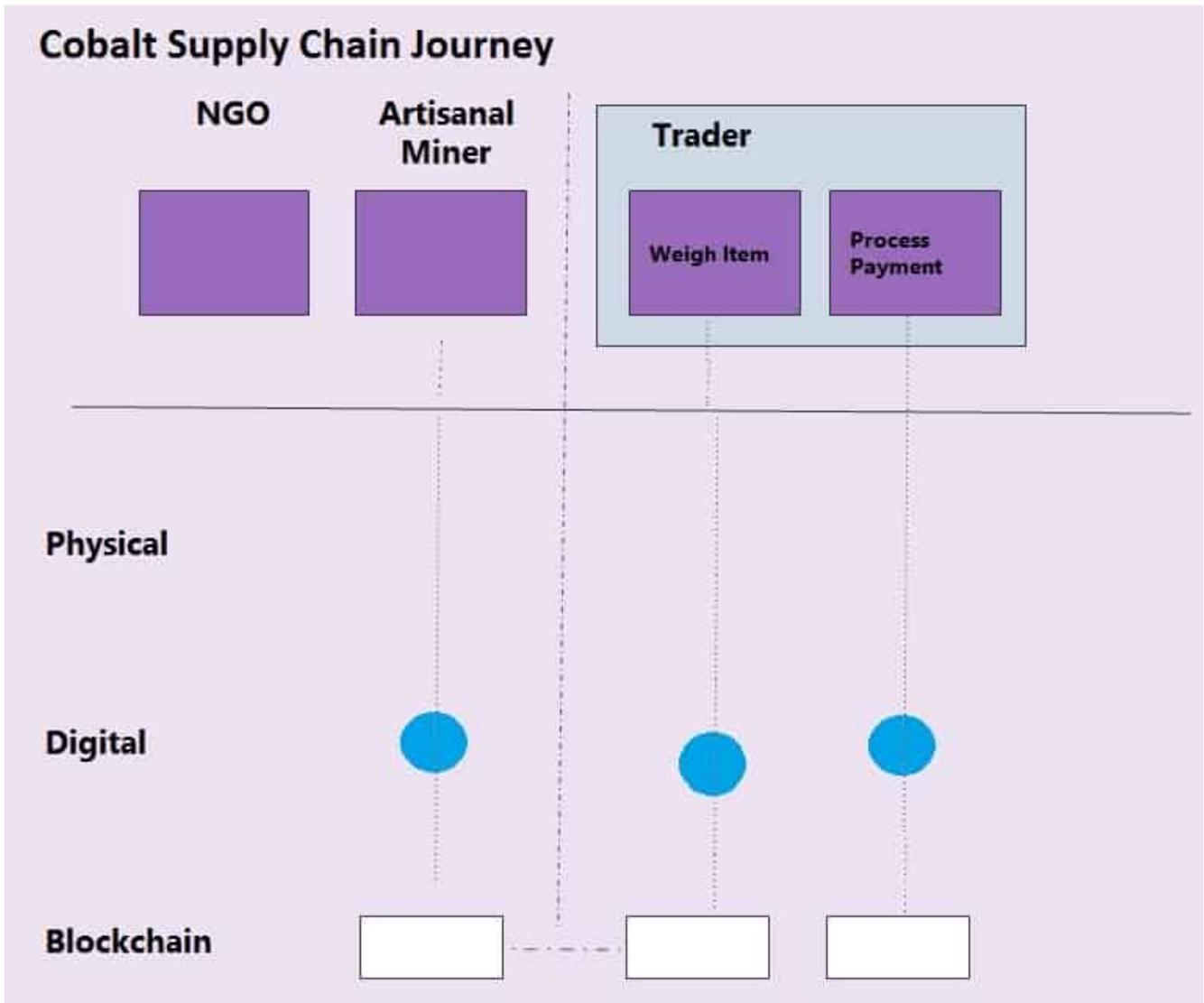


Figure 3: The First Mile

Step 1-The First Mile:

As shown in Figure 3, working with a local NGO or trusted organisation whose audit systems validate their compliance to an external standard, we set up all miners, including artisanal miners with keys on the blockchain, linked to their mobile number, key verified data.

What this sketch illustrates is how each step in the supply chain moves onto the blockchain. So we have a trusted NGO or organization that confirms the fact that the artisanal miner has a 50kg bag of cobalt ore (the physical). We might weigh the bag and take a picture of it (which is the digital confirmation) and then this picture, weight, time and date is

uploaded onto the blockchain by the miner and is now immutable.

The artisanal miner take his bag to the trader (physical). Again this item is weighed, a smart contract is generated, money is paid. And this smart contract, the money and perhaps a picture of the miner receiving the money along with the amount is recorded digitally and loaded onto the block chain. We now have evidence of the miner digging the ore in step one, and selling and receiving payment in steps two and three. This evidence is recorded on the blockchain, is immutable and can be seen by everyone in the industry.

In this way, there is firstly a transparent payment system which could ultimately enable artisinals to get farer pay and also the records has in effect created a kind of “bag and tag” ability which can be traced along the supply process.

Step 2- The Second Mile:

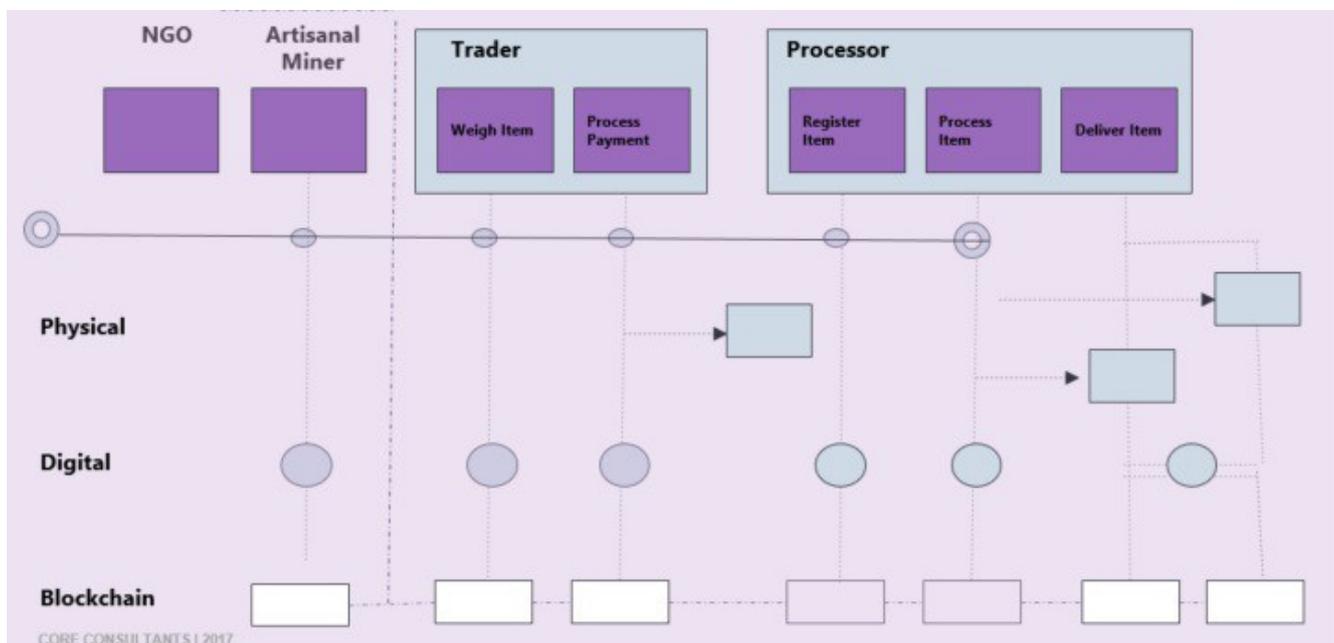


Figure 4: The Second Mile

Following the same proccess, perhaps again working with a local NGO such as the Compliance Smelter Programme, we set up a trader with keys on the blockchain, perhaps linked to their

mobile number or some kind of digital tag/ verified data. These traders then sell the cobalt to CDM or a main supplier or smelter and this transaction is digitally recorded and loaded onto the blockchain.

Step 3-The Final Mile:

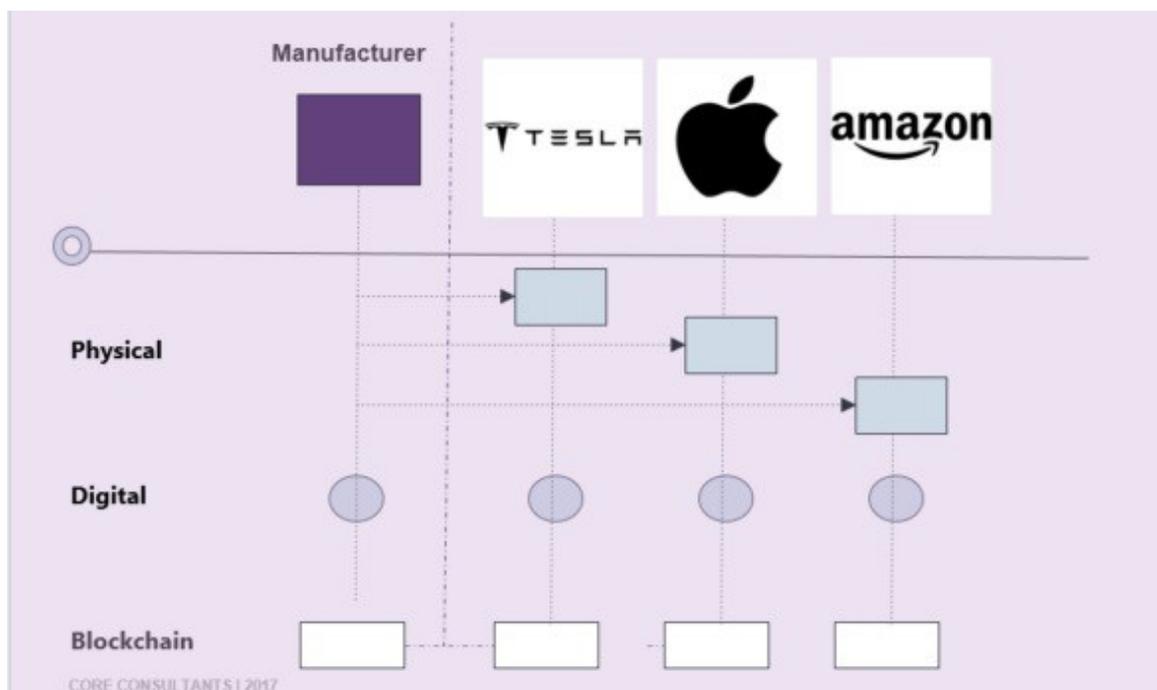


Figure 5: Final Mile

In the same way as the previous two steps, we can set up an end-user to record when they have purchased the cathode or final product from the manufacturer. In the same way that we can see that tuna is “dolphin friendly” by the label on the can, there can be a digital label on any cell phone or device or aeroplane or whatever the product which would enable consumers not only to immediately see that the raw materials were responsibly sourced, but also they could theoretically scan it and view the blockchain down to the original ore/concentrate supplier.

The above process is at this stage, a hypothesis to get us all thinking about possible solutions to the problem. Given the burgeoning electric vehicle, portable electronic and alternative power sectors, it is obvious that this demand for

cobalt will not be filled by the cobalt mining juniors in the States and elsewhere which have neither the grades, the resource or in many cases, the mining/processing know-how. African resources will need to be expanded and we need to accept Africa, with all its challenges. Now more than ever, we need to work on viable solutions. Seeking alternatives to African deposits is simply not going to be a sustainable solution.