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## Blockchain is Coming for Agriculture and You Might Not Even Notice

MAY 21, 2018 | REMI SCHMALTZ

*Editor's Note: Remi Schmaltz is CEO of Decisive Farming, a Canadian software program for farms offering precision agronomics, data management, crop marketing, and telematics services. He has extensive agriculture knowledge after taking over his family's ag retail company Dynagra Corp with his brother where he started incubating new technologies in farming resulting in the launch of Decisive Farming in 2011.*

Over the past year, blockchain has become a buzzword in media coverage, industry publications, and press releases for new start-ups. Of course, Bitcoin and other cryptocurrencies have received much of the spotlight. However, hundreds of articles proclaim the benefits of using blockchain technology in

industries including agriculture. The real question is: can blockchain outlive the hype and deliver real value to growers?

Bitcoin and other cryptocurrencies have received a lot of hype, but blockchain technology isn't all about digital cash. Blockchain technology is actually a powerful type of secure database. It's a ledger of accounts and transactions that's easy to amend if you have the right keys, but nearly impossible to alter once a transaction has been written. As a result, you can think of a blockchain as an ultra-secure way to record, certify, and transfer assets without needing to rely on a bank, broker, or other middlemen.

While blockchain is theoretically interesting, farm owners and growers want technology that produces real benefits in the near term. In agriculture, blockchain promises a single source of truth about the state of your farm, inventory, and contracts. Many farmers today utilize a combination of software, apps, spreadsheets, pen and paper, and memory to record their data. That effort is then multiplied when farm service providers require information and data in order to deliver on the service they were hired to perform. By providing a single source of data for a farm, blockchain minimizes the strain of record-keeping and maintaining multiple record systems. Blockchain can ultimately save time and energy in the agriculture value chain.

It's important to realize that blockchain alone doesn't make growers more money, but it does provide the technology infrastructure for things like digitization, automation, and tracking, all of which drive farmers' bottom lines in modern agriculture.

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## **Traceability in the Crop Supply Chain**

Most of the early applications of blockchain in agriculture have to do with traceability and supply chains; a blockchain ledger could record and update the status of crops from planting to harvest to storage to delivery. The upside for large operations is a secure, immutable ledger that ensures you never lose a load. The status of all your crops is available in real time.

As demand for organic and other specialty production methods grows, there's a huge incentive for growers who can verifiably produce documentation of the supply chain that went into those foods. Blockchain tracking allows growers to meet regulatory compliance and consumer expectations.

One startup in the food provenance industry is Pipeline Foods. Pipeline focuses on increasing the supply of sustainably produced commodities—such as organic foods—that can pay the farmer up to a 100% premium above conventionally-grown crops. Organic farmers must capture detailed production data, sign off on its accuracy, and share that data with third-party certifying agencies. This provides a clear opportunity to streamline data entry and increase the frequency of data verification through the blockchain.

An additional benefit of traceability comes when it's time to sell the harvest to grain buyers or food processors. Growers can ensure the quality of their deliveries and even manage the asset exchange, including instant payment, via the blockchain. One startup working on integrated blockchain grain storage, contracts, and delivery is Australia-based Blockgrain. Their platform promises real-time transactions, payments, and access to brokers to help growers get maximum return from their operation.

Traceability isn't just restricted to the crops themselves. With the right information sources and/or in-field sensors, growers can access and track detailed records about soil quality, field applications, weather, farming practices, and seed type.

## **Precision Farming & Farming Resource Management**

Of course, there's a lot more that goes into running an operation than just the crops. Taken together, there's a complex, ever-changing picture of all the input resources that go into crops throughout the course of a season. Increasingly, growers are using farm management software to track where all their resources are at a given time. Decisive Farming's data platform and app, for instance, enables growers to record all field applications and then track these resources from the field to multiple storage locations and then to the elevator.

This resource management data can be incredibly powerful for optimizing agronomics on the farm, and it creates marketing value for food and beverage companies to differentiate themselves. For instance, Decisive Farming recently paid farmers, as part of a field to glass initiative, for data on fertilizer, seed, and yield from their malt barley production in order to gain more insight into optimal growing patterns.

Indigo Agriculture is another great example that pays the farmer a premium for an end to end production contract. For example, Indigo pays up to a \$0.47 per bushel premium over the regular market for milling quality wheat. The premium is based on using certain products, following specific agronomic practices, and providing traceability data on the production and movement of the grain. The contract is direct to the farmer and bypasses the traditional channels of ag retail and grain elevators.

What makes blockchain such a good fit for these types of inventory management jobs is the decentralized nature of blockchain records. Any updates made become part of the ledger and every participating device receives the updated record. Even out in the field, disconnected from internet access, any changes will sync to the network as soon as the device regains internet access.

Additionally, blockchain can track other types of records like machinery maintenance records or status of in-field sensors and equipment. In practice, this means a grower could keep a real-time picture of what machinery is available for work, which machinery will need maintenance soon, and which are currently in repair. A grower could even give a mechanic blockchain access to update the status as soon as a piece of machinery is fixed. This is a game-changer for large operations with multiple farms and dozens of pieces of equipment in various locations and states of repair.

## **Internet-Of-Things & Quality Control**

Another huge challenge for growers is monitoring the quality of crops leading up to harvest and during storage before delivery.

IBM is focused on IoT that allows growers to monitor irrigation, soil quality, pests, and other factors on a precise scale in the field. After harvest, there are initiatives to use sensors to track the quality of stored crops. For example, CO2 and temperature sensors in grain silos can track the quality of stored grain over time.

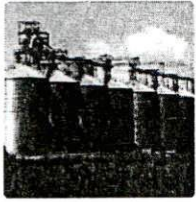
Of course, each of these sensors produces records that need to be tied together into a cohesive ledger that can update in real time. IOTA is one such project focused on bringing distributed ledgers, similar to blockchain, into the realm of IoT devices to operate a secure, global database for all device information.

The ultimate goal is to digitize and automate as much as possible when it comes to agricultural record-keeping and quality control. Sensors gather data automatically in real-time so that when a grower needs information, it's just a click away. Many aspects of this are happening now in agriculture, allowing growers to provide precise irrigation based on rainfall, custom fertilization tailored to changes in soil quality, and targeted pest control measures in response to an emerging outbreak.

## **You Might Not Even Notice Blockchain**

Blockchain is coming for agriculture in a big way. It will make it easier to track, manage, and transact in all kinds of agricultural assets, from crops, to inventory, to precision data. When blockchain comes, however, you might not even notice it. Blockchain is a low-level, behind the scenes technology that creates secure databases. Apps and software that implement blockchain will look and feel the same as applications growers are using right now. The difference is blockchain opens a wealth of potential new options for collecting data and automating farm management. These new blockchain-powered features could come sooner than you think and without you even realizing it's blockchain.

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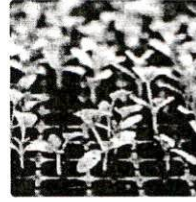
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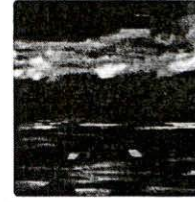
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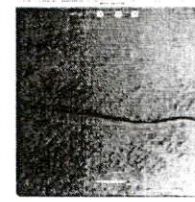
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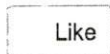


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