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# PILOT REPORT

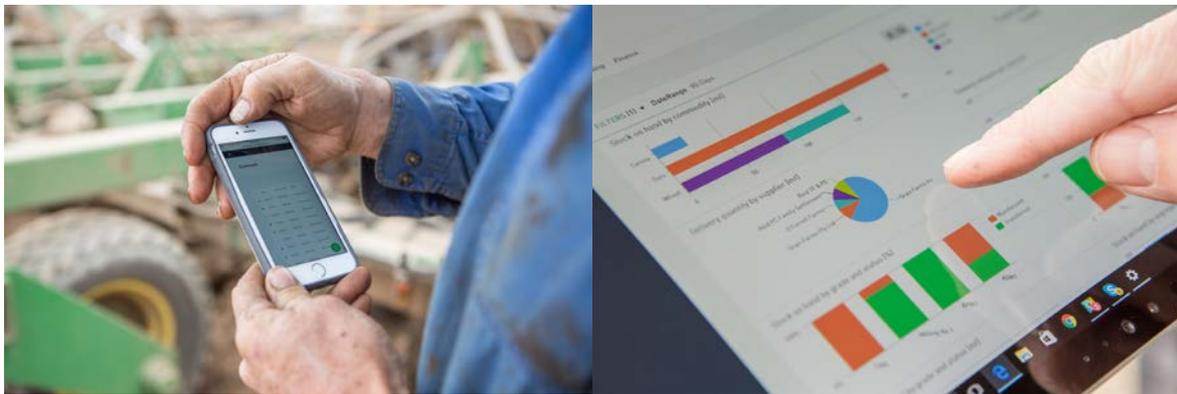
**SOLVING FOR SUPPLY CHAIN  
INEFFICIENCIES AND RISKS WITH  
BLOCKCHAIN IN AGRICULTURE**

**AGRIDIGITAL AND CBH GROUP**

## PILOT REPORT:

# SOLVING FOR SUPPLY CHAIN INEFFICIENCIES AND RISKS WITH BLOCKCHAIN IN AGRICULTURE

CBH Group and AgriDigital  
November 2017



## INTRODUCTION

Despite the global movement towards digital economies, agriculture remains one of the world's least digitised industries.<sup>1</sup> Blockchain and Distributed Ledger Technologies (DLT) have gained incredible traction over the past few years, with proponents claiming it has enormous disruptive potential to transform a full range of businesses.<sup>2</sup> Recent reports have identified supply chains as a primary use case for blockchain technology, with various applications being tested out across a number of supply chains globally.<sup>3</sup>

Amidst growing investment in digital agriculture and mounting interest in blockchain and DLT, CBH Group (CBH) and AgriDigital have recently partnered to pilot use cases for blockchain in the Australian grains industry.

<sup>1</sup> McKinsey Global Institute Industry Digitization Index 2015

<sup>2</sup> Australia's national scientific body, CSIRO's Data61, said blockchain will have a profound impact on the Australian economy and is critical to developing industries of the future in their reports "[Distributed Ledgers: Scenarios for the Australian Economy Over the Coming Decades](#)" and "[Risks and Opportunities for Systems Using Blockchain and Smart Contracts](#)"; The UK Government Chief Scientific Adviser, the Government Office for Science, said blockchain and distributed ledger technologies have potential to disrupt the whole economy and society in their report "[Distributed Ledger Technology: beyond block chain](#)".

<sup>3</sup> Australia's national scientific body, CSIRO's Data61, identified supply chain use cases in their 2017 report "[Risks and Opportunities for Systems Using Blockchain and Smart Contracts](#)"; The UK Government Chief Scientific Adviser, the Government Office for Science, identified tracking food fraud and identifying supply chain threats as key uses for blockchain in their report "[Distributed Ledger Technology: beyond block chain](#)".

## WHAT IS BLOCKCHAIN?

In essence, blockchain is a technology which provides a new way for storing data, facilitating transactions and transferring value.

There are some notable and unique features of blockchain technology:

- Blockchain allows peer to peer transactions rather than relying on an intermediary to facilitate transactions.
- Information is distributed throughout the network in place of data being stored in a centralised database.
- Data is stored in a way that is immutable and cryptographically secure.
- Changes to the state of the network require consensus among participants to approve transactions.

Blockchain is designed to be open source, however there are both public (open) and private (permissioned) blockchains. Private blockchains have certain features that provide control over access to transactional information, with few trusted participants having a view of the state of the whole network. In contrast, public blockchains provide radical transparency and allow all participants a view into the data stored on the blockchain as well as the history of all transactions.

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There are a number of different blockchain protocols including Ethereum, Hyperledger, Corda and the Bitcoin Blockchain. These protocols are still being developed and there are various features and benefits associated with each.

## BLOCKCHAIN IN GRAIN

Blockchain holds exciting possibilities to help solve two key challenges that have long plagued the grains industry and growers globally:

1. Matching title transfer of the grain asset to payment; and,
2. Supply chain provenance and traceability.

Historically, growers worldwide have carried the burden of counterparty risk and a lack of payment security when making a delivery to a buyer or storage site. There is an overwhelming desire on the part of growers and grower representative groups like CBH, to provide greater security over title to grain for the grower and to explore ways to eliminate counterparty risk entirely by matching the transfer of title to payment (commonly referred to as “delivery versus payment or DVP).

Globally, there is increasing demand to provide greater provenance and traceability for commodities. Participants the whole way along supply chains are looking for data rich, digital solutions to help preserve or attract premiums, protect against counterfeit goods, provide food security, meet supply chain compliance obligations and verify where food comes from. Being able to prove out business processes and full supply chain traceability is becoming an integral part of a proactive brand strategy in the digital economy. Blockchain offers a way to provide data links across supply chains and could help to ensure market access in a more transparent future world.

## FINDINGS

AgriDigital and CBH carried out a pilot to test the application of blockchain in the Australian grain industry at CBH’s wholly owned subsidiary, Blue Lake Milling, an oats processor in Bordertown, South Australia. The pilot scenarios were conducted using the AgriDigital commodity management platform and blockchain application.

## DIGITAL TITLE FOR COMMODITIES

AgriDigital and CBH successfully generated digital title to a physical commodity and executed payment on a blockchain.

Using the AgriDigital platform, digital title to a delivery of oats was generated on a private Quorum network and held in the grower's digital wallet. Seven days later, settlement occurred in an atomic transaction meaning payment was made from the buyer to the grower, and simultaneously title transferred from the grower to the buyer. For the period up until payment, the grower had clear ownership of the digital title token that represented the physical grain delivery and therefore security over their asset.

The grower delivery was received at the buyer's site using the AgriDigital platform, where information around the quantity and quality of the commodity was captured and pushed through various integrations to generate a digital title token on the blockchain. The token was then held and flagged for payment in seven business days. The payment on the blockchain layer was made using a second token, minted by AgriDigital and known as 'Agricoin', which was pegged 1:1 with the Australian dollar. Smart contracts, agreements codified for execution on a digital distributed platform, were used to auto-execute payment on the blockchain layer which was parallel processed using traditional banking methods; to ensure the grower received payment in fiat (the Agricoin was then destroyed).

The Quorum network uses the Raft consensus mechanism with 50 millisecond block times meaning transactions can be processed in real time. This allowed us to produce sub second transaction times for the exchange of digital currency and digital title. At a rate of four transactions per second, this settlement method is scalable to process all transactions in the Australian grains industry on a blockchain.

One of the key challenges faced by bulk commodity supply chains has been in providing

clear visibility over commodity ownership. Paper based systems or spreadsheets provide little to no security for growers when looking for means of recourse where payment is disputed or fails. Being able to match title transfer to payment provides instant benefits to growers and all sellers through reduction of counterparty risk and increased security over the asset up until title transfer.

## SECURE AND TRANSPARENT DATA AND TRACEABILITY

In a secondary scenario, AgriDigital and CBH used a private Quorum blockchain to trace the movement of a batch of organic oats from the farmgate, through milling and production to a retail consumer<sup>4</sup>. Data on the provenance, movement and treatment of a batch of organic oats from the farmgate, through milling and production to a retail customer was stored and analysed on a private Quorum network.

A range of physical inventory data points were captured on a web application and bundled into assertions, each representing an event or claim determined to be critical to the organic status of the oats. Across the various stages of growing, transporting and producing organic oats, there are thousands of data points available to be captured.

Determining the data points which are valuable to the supply chain as a whole and ultimately to individual consumers and those relevant to proving the organic status of the oats, requires matching the digital assertions to business processes. Each assertion was then hashed and recorded on the blockchain layer. At the point of sale to a consumer, the assertions pertaining to that particular batch run were analysed to produce a report that either confirmed or denied the organic status of the oats.

AgriDigital developed an analytics model to determine whether the oats were organic at the farmgate, and by checking off pre-

environment with the product physically processed, packed and digitally tracked up until that point.

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<sup>4</sup> For the purpose of carrying out this scenario, the final stage of delivery through to retail consumer was simulated in a lab

identified business processes through hulling, milling and packaging, produced a true/false statement as to whether the organic status had been retained as the batch of oats passed through the various stages of the supply chain to the point of packaging and readiness for delivery to the retailer.

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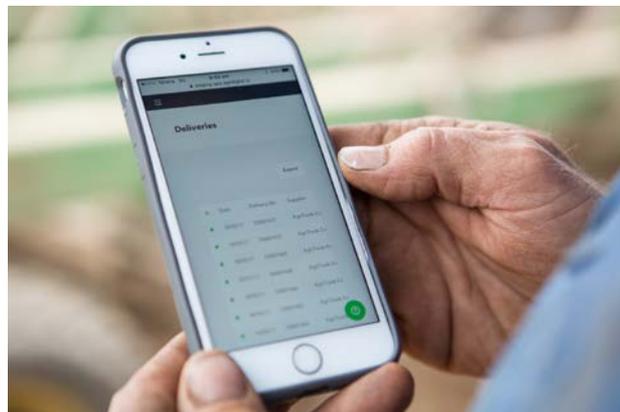
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## **DATA INTEGRITY**

As a blockchain is an immutable record of data, it is critical to ensure both the data and the actor making an assertion are correctly identified at the time of record on the blockchain. Manual, human data input continues to act as a threat to data integrity with poor, incorrect or incomplete data being hashed to the blockchain.

Where the blockchain or the blockchain application such as AgriDigital can easily integrate with machines and digital systems, such as a weighbridge integration and quality testing instrumentation or processing equipment, this is clearly preferred. Removing human data input and increasing the number of such integrations allows for much more reliable data entry and increases the integrity of the blockchain overall.



## **INCREASING EFFICIENCIES**

Payment on a blockchain is significantly more efficient as it occurs in real time and has the benefit of being programmable. This means complex sequences of events and dependencies can be written into the blockchain itself to allow certain events such as matching title transfer to payment and automating an escrow arrangement.

A transaction habitually taking days to execute in current grain supply chains, happened in less than one second under the Pilot conditions. However, without an accepted digital currency that can be transacted on the blockchain, the user does not experience the full benefit of this efficiency and a new risk is introduced in transferring into fiat: currency risk or volatility.

Integrations into the blockchain clearly provide greater efficacy improving the processes of data transfer with clear back office efficiencies and costs reductions. Holding information across a distributed network where there is a single point of data entry, increases trust in the system and reduces time-consuming paperwork, reconciliations and re-entry of data. However, blockchain applications lose much of their natural utility when operating in closed or isolated systems and where only small networks of users participate. Further the incorporation of blockchain or DLT technologies also requires efficient and robust technology solutions to support an entire digital ecosystem.

## CONCLUSION

The combination of the AgriDigital commodity management platform with blockchain technology and AgriDigital smart contract layer created a robust and integrated digital solution that was readily and successfully applied in the real world at CBH's Blue Lake Milling site. AgriDigital and CBH are dedicated to building the trusted and efficient grains supply chains of the future, where growers and all other participants such as buyers, traders, storage

and logistics providers, financiers, retailers and consumers can operate with full confidence. Blockchain is part of this future; through digital title we can provide payment security and transparency to all participants; we can prove product integrity and move from the disconnected and siloed supply chains of today to the value chains of tomorrow.

## ABOUT THE PILOT PARTICIPANTS

### About AgriDigital

AgriDigital develops software solutions to real world problems in the agri-sector, bringing trust and transparency to the global agricultural supply chain. In addition to our agri-blockchains, AgriDigital has a cloud-based commodity management platform in market which connects farmers, buyers, site operators and financiers in a single platform. Currently enabled for the grains industry, AgriDigital will be expanding cross-commodity in 2018.

For more information on AgriDigital visit <http://www.agridigital.io>

### About CBH Group

CBH Group is Australia's largest co-operative and a leader in the Australian grain industry, with operations extending along the supply chain from storage, handing and transport to marketing shipping and processing. Owned and controlled by approximately 4,200 Western Australian grain growers, CBH is Australia's largest exporter of grain, with a market share of approximately 30 per cent of aggregated bulk exports.

For more information on CBH Group visit <http://www.cbh.com.au>

### Thanks & Acknowledgement

AgriDigital wishes to thank CBH and Blue Lake Milling staff and growers for their willingness to partner in this pilot and in some cases to adapt current business and processes in order to implement the digital and blockchain based solution. This pilot broke new ground with respect to commercial application of blockchain technologies in a real-world environment and we are grateful to CBH and Blue Lake Milling for their commitment to innovation and leadership in the Australian grain industry.

### Disclaimer

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