Final Report
Summary
Block Chain Traceability for Tea Tree Oil
Part 2
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A significant threat to the Australian tea tree industry is adulteration, a problem that has persisted for several decades. The fraudulent dilution of 100% pure tea tree oil (TTO) with other products, often industrial waste, allows competitors to severely undercut the market for 100% pure TTO. Historical evidence (2010–15) shows that 50–70% of all TTO sold to consumers was adulterated [1, 2]. This has been lessened through a decade-long campaign of testing, and educating manufacturers and consumers; it is now estimated that about 35% of ‘100% pure TTO’ sold is adulterated (unpublished data) although the precise percentage of adulterated TTO in TTO-containing formulated products (cosmetics and pharmaceuticals) remains unknown.

To help better resolve the issue of adulteration, the Australian tea tree industry is championing the rollout of an end-to-end supply chain traceability solution that uses blockchain technology. Export markets are now beginning to demand proven datasets to show the history and origins of 100% pure code of practice (COP)-accredited Australian TTO. This requirement includes tracking products as they are grown on farm, processed, exported, and eventually sold in various products to the consumer, with particular emphasis on post-farmgate traceability.

Blockchain technology can be used successfully by the tea tree oil (TTO) industry. There are few companies with the appetite to lead development of a utility that would benefit an entire industry; the Australian Tea Tree Industry Association Ltd (ATTIA) is such an entity, and has demonstrated the necessary vision, mandate and drive by conducting and completing this project. Blockchain will allow the TTO industry to track asset ownership and asset status to tackle problem points, including inefficiency, process opacity, and fraud. Two of these factors capture the use case for TTO: it operates in a real niche supply chain that is challenged by process opacity and fraud. This project involves developing a minimum viable product (MVP) blockchain protocol to the point where it can be launched, tested and demonstrated to selected industry participants to educate them on the protocol. Industry participants can then provide comment on the usefulness and validity of a fully functioning blockchain protocol based initially on COP-accredited 100% pure Australian TTO. Three key applications for blockchain have emerged: traceability, payment security, and real-time finance. This project concentrates exclusively on traceability. However, the protocol has been designed to ensure that the other two key applications can be easily integrated, if desired, as the protocol is rolled out and developed.

The protocol, developed by Geora, which uses the open-source Ethereum platform, fills the gap between base technology and its application to agri-supply chains and their participants. Designing a solution to meet the specific needs of agriculture means designing for privacy, key management, ease of access, and creating applied smart contracts.

It is vitally important to understand that this project is delivering only the most basic (MVP) solution to the issue of absolute traceability. Integration with other software within individual organisations that choose to adopt the protocol will be managed through Geora’s application layer, which is being developed as an application programming interface (API) specifically for the tea tree industry to engage with the Geora protocol. This API is the user interface for participants in the TTO supply chain to create and store records of TTO transactions. It is owned jointly by ATTIA and Geora.

Adulteration is a fact of life for the TTO industry, so it must find ways to minimise the impact on its producers and all links in the TTO supply chain, including the ultimate end user. The MVP for a TTO blockchain solution is a first iteration of a system that aims to prevent much of the remaining adulteration of TTO globally. The objective is to protect the consumer through verification of pure TTO. By providing transparent and traceable records of TTO through production, manufacture and distribution, we are building the foundation of a digital system for global participants in the supply chain. Participants will be able to track TTO from paddock to bottle through a standard TTO record using smart contracts (tokens) deployed on a blockchain platform.

The MVP system offers automated certificate registry of all ATTIA COP-accredited producers which enables them to transact TTO using smart contracts. Transaction units, parties to the transaction and detailed transaction data can be recorded. The intent of this MVP for Blockchain Traceability for Tea Tree Oil is to facilitate enthusiastic adoption of this protocol by all participants throughout the TTO supply chain. This next stage of development will enable global supply chain traceability verification through the development of a user-friendly blockchain API and a universal mobile app that can be downloaded from Google/Apple stores.

### Outcomes

A fully functional MVP protocol has been developed, launched and tested. Producer/growers, traders and overseas manufacturers were involved in two ‘sandbox’ testing sessions. In the first session, two entities were invited to participate: a single TTO producer/trader, and a single-point US-based manufacturer who is committed to using only COP-accredited 100% pure Australian TTO for a range of air purifier and cleaning products. TTO was created as an asset, edited and transferred successfully, and the user dashboard was working for the manufacturer functioned correctly. The manufacturer enthusiastically accepted the entire concept despite a few new bugs being identified. After assessing the protocol during the session, including its potential as a marketing tool, they were very positive and asked two questions: When will it be launched, and when can we start using it?

In the second downstream user session, two TTO producer/traders, a US-based trading house and a US-based multi-point (10 separate manufacturing sites) manufacturer, were invited to participate. The trading house and the manufacturer immediately grasped the marketing potential of the protocol. However, the manufacturer noted that while it was an excellent concept, the blockchain protocol was simply not robust enough for them to contemplate its adoption without further significant improvements.

Their input and questions around multi-point manufacturing, privacy and permissions-based access by the various levels of a complex supply-chain were valuable and noted. Further, they asked about the potential for the protocol to be integrated into a mobile device app to enable consumers to query the provenance of TTO as the active ingredient. Their most critical questions, about permissions, access to and integration of the API with their own enterprise resource planning (ERP) and accounting software, will be invaluable when developing proposals for future versions of the protocol.

### Objectives

The objectives of the project were to develop a blockchain MVP which involved the following steps:

1. **Determine the most critical points along the tea tree oil supply chain to capture data and understand the key claims to be tracked and verified.**

2. **Scope the various methods that could be utilised to capture data along the supply chain, including in production, processing, logistics and packaging, identify where more methods or devices will need to be implemented.**

3. **Assess and record the requirements of the user so they can visualise and interact with the digital supply chain. These requirements may include the use of smart packaging or QR codes on the packaging to link the end consumer to the history of the tea tree oil recorded in the chain.**

4. **Build initial user case studies with selected industry producers, marketers and resellers to develop a foundational digital system for rollout and testing.**

5. **Liaise with Geora to provide guidance with software and hardware setup for ease of use. At each phase the selected industry participants are analysed and tested the various results to optimise and improve the MVP.**

6. **Share knowledge with industry participants to test blockchain solutions along the supply chain, including training of internal developers to enable the continued management and improvement of the MVP.**

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1. MVP is a concept that stresses the impact of learning in new product development. An MVP is a version of a new product that allows a team to collect the maximum amount of validated learning about customers with the least effort. This validated learning allows an understanding of the interest in the product without fully developing it.

2. An application program interface (API) is a set of routines, protocols, and tools for building software applications. An API specifies how software components should interact.
Implications

There are incalculable implications of a fully functional and well-integrated, unbreakable traceability protocol based on blockchain for every link in the TTO supply chain. Walmart, a US based trader in products containing TTO, confirmed in a project planning session that they wished to start using this TTO blockchain solution immediately. Walmart have currently embraced blockchain, however they stated that this TTO concept MVP needed more work (and investment) before it could become a reality within their marketing structure.

In its current form (as an MVP), the protocol has the potential to be a catalyst for incremental development, testing and input from various links in the TTO supply chain to develop a model that includes the many demands and novel concepts this simplified version has already raised.

It is obvious that the development of this MVP to introduce the concept of a blockchain protocol to the TTO producers and resellers was the correct decision. With this minimalist but functional version, potential users have been able to visualise the process and so provide constructive feedback for further development.

Acknowledgements

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The staff of Geora (https://www.geora.io/) provided invaluable guidance and advice on the processes for a cutting-edge technology that seems, to the casual observer, to be complex and unfathomable. Geora’s staff helped guide industry representatives to develop, test and better understand the MVP blockchain protocol and the interfaces that make its use possible.

References

