DEVELOPING A NATIONAL TRADE COMMUNITY SYSTEM

Matt Kuperholz, Partner and Chief Data Scientist,
PwC Australia, Australia, Melbourne

Motivated by concerns over Australia's worsening position in the World Bank's Trading Across Borders rankings, The Australian Chamber of Commerce and Industry, Port of Brisbane and PwC Australia are seeking to bring Australian international trade to the 21st Century.

Our vision is to remove complexity and overcome inefficiencies in the supply chain through a 'Trade Community System' (TCS) which links key supply chain information and ensures trust in that information through distributed ledger (or 'blockchain') technology.

LEGACY SYSTEM WEBS

Businesses and their international supply chains are becoming increasingly complex.

To drive new efficiency gains, there is a need for industry leaders to develop mechanisms which facilitate the integration and interoperability of commercial operators across the supply chain and logistics sector.

We have identified a range of inefficiencies, which can be addressed through visibility and secure sharing of largely existing supply chain data.

At present, the current inefficiency across Australian supply chains occurring through lack of visibility can create up to $450 in cost per container. We are observing similar costs across the 36 Organisation for Economic Co-operation and Development (OECD) member countries.

Underpinning these costs are a range of factors, including:

• Varying levels of integration and digitization across international supply chains which constrain the efficient flow of goods and information
• Conflicting commercial interests which create inefficiencies across the whole supply chain
• The predominant use of manual transactions to communicate across supply chains
• Entrenched legacy systems with limited integration, which can reduce visibility, and hamper innovation;
• Excessive levels of double handling of information and data between parties
• Significant red tape, which can restrict and delay the fluid movement of goods and services.

The increasing volume of trade that hits borders corresponds with equal pressure on both ports and border authorities to process, screen and clear goods into the economy.

To reduce this pressure on both the public and private sector, we intend to transform the way supply chain participants interact.

END-TO-END DIGITIZATION

We are building a TCS platform which will digitize the end-to-end supply chain and the flow of associated trading information, improve connectivity for supply chain participants and reduce supply chain costs.

Trust and traceability will be enabled in the platform through the deployment of distributed ledger and a range of other technologies.

The next pilot phase will involve building out the platform to handle live data and running in parallel with real supply chains of selected partner organizations to validate and refine the benefits, costs and risks of building the platform to national level.

In building the TCS platform, we have established four guiding design principles which form the centre of our approach.

1. **An open, secure and trusted data sharing platform**
   - The data is owned and governed by its creator
   - The platform is operated independently of established supply chain interests
2. **Easy to integrate and start using**
   - It augments not replaces the systems that are already part of Australia's supply chains
   - Users access directly through a web portal or indirectly through their existing systems
3. **Low to no cost to participate**
   - The platform does not make money from charging users to access data about the goods they are managing
   - The platform's revenue comes from the productivity and service innovations that the data unleashes
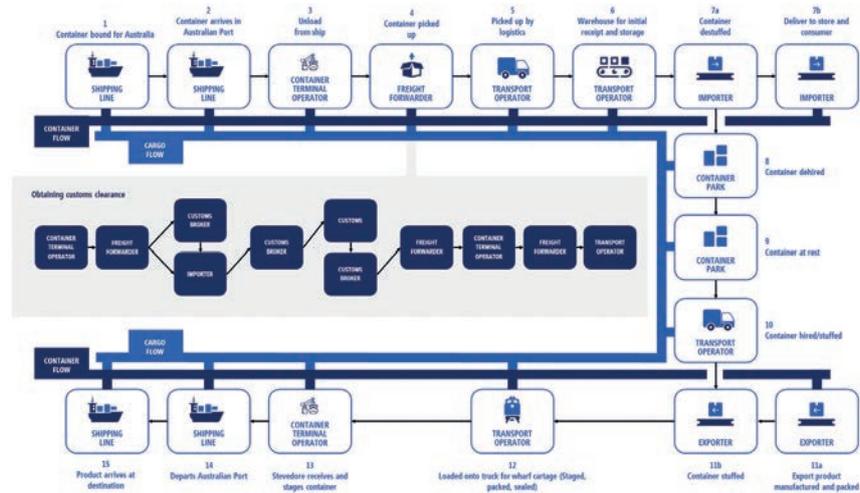4. **Visibility that delivers velocity and efficiency**
   - The platform will enable goods to flow through the supply chain more quickly and manage avoidable costs and fees.

TRADE COMMUNITY SYSTEMS

The port, whether sea or air, is the first and last point of domestic contact in the international supply chain and the point at which all significant supply chain participants converge.

There is an abundance of information created before the border, at the port and behind the border, which when integrated, becomes more meaningful and of greater importance to government and downstream supply chain stakeholders and service providers.

A TCS will increase trade competitiveness by improving the connectivity facilitated through port community systems into a platform that fosters increased visibility beyond the port through the entire landside supply chain.

By including air freight and air cargo into our TCS platform, we hope to provide comprehensive coverage to all corners of the supply chain.

The primary benefits supply chains would offer are the efficiencies borne from access to accurate, timely and traceable supply chain data, improving the flow of goods from producers through ports and across borders and into consumers hands.

TECHNICAL FUNCTIONALITY

The aim of the TCS is to complement the needs of today's businesses operating in global trade and logistics.

Our goal is to render the international supply chain faster (velocity), more efficient (efficiency), and host to information that is more secure and yet open or transparent to permitted users (visibility).

Technologically, this TCS solution is designed to be agile and able to adapt to the business environment in which it operates.

PwC's previous work on product traceability and the digitization of supply chains has considered that there are nine different technology groups that interact to create a trade community system.

To date, our work on the technical challenges to be solved has principally focused on the data layer, consisting of:

- **Asset Tagging and Nesting -** How assets in the physical and digital worlds are identified to the platform and linked to each other over time, including complex dilulation, mixing, repacking, and joining
- **Chain Of Custody protocol -** How the events that occur to assets are interpreted, assessed against business process rules and recommendations for actions made
- **Distributed Ledger -** How to create and access an immutable record of events so that all users can implicitly trust the integrity of data that is put into the platform.

A distributed ledger makes up only one important component part of the technology stack - engendering greater trust in information and events associated with the supply chain by creating an immutable record or digital signature of every data and hand off point.
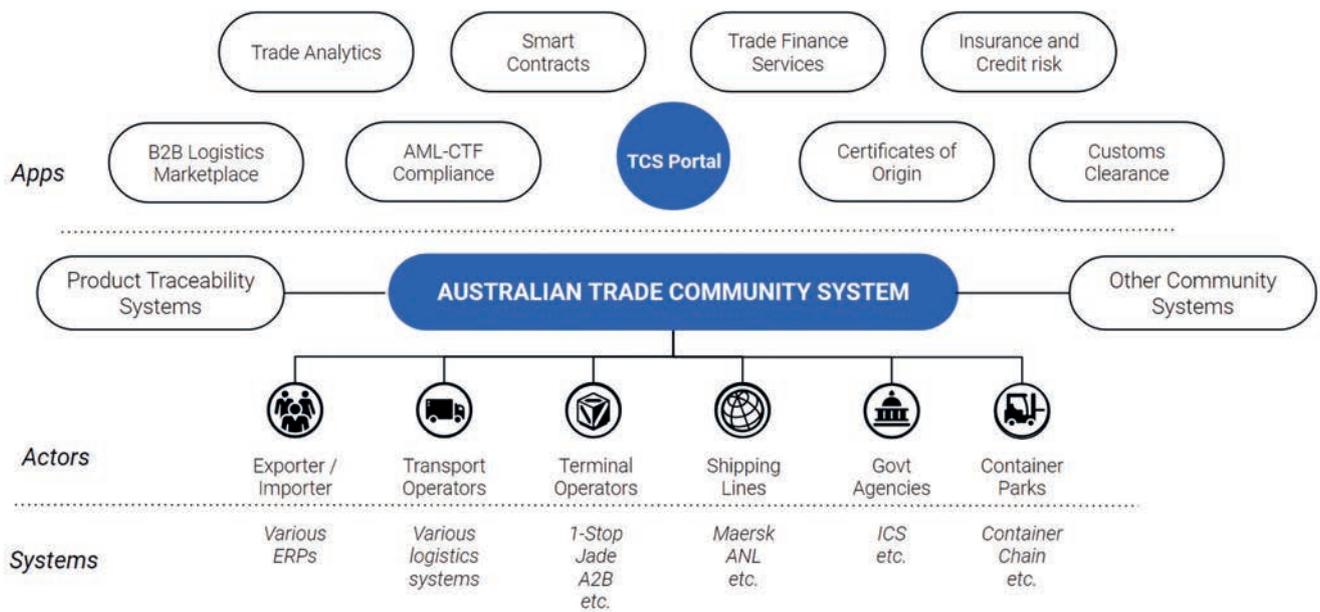
At this time, it is not feasible to store all supply chain data 'on chain,' so our solution is a hybrid one leveraging an off chain graph database to manage storage of data mass efficiently and effectively.

Using flexible graph schemas to represent the information provides for easier integration with existing data models in place within the user environment.

Graph databases naturally accommodate complex interrelationships, and are 'future proof' to cater for increases in related data fields with the wider and greater adoption of IoT devices in the supply chain.

We believe this approach can address traditional challenges associated with trust and information asymmetry between supply chain operators, importers and exporters- or what we refer to as the trust leap.

Without traditional intermediaries like government regulators, banks and insurers, businesses are reluctant to take trust leaps and forge new transnational business relationships.

This is where distributed ledger technology plays a pivotal role in our solution- it digitizes and automates this trust leap, lowering the barriers to trade and participation in international supply chains.

The other significant technical challenge to be solved relates to handling, reading and understanding disparate supply chain data ontologies.

This is a problem as old as trade (how for example could Marco Polo communicate and trade with Kublai Khan when they fundamentally speak different languages),

and one we have spent considerable time and effort understanding.

It forms a core objective across our asset tagging and nesting and chain of custody protocol technology groups.

Efforts to standardize and harmonize datasets across commercial operators and governments are longstanding - and are yet to fully mature.

SUCCESSFUL VISION

Our future vision with TCS is to facilitate the secure linking of data between all supply chain participants and between other supply chain platforms that are developing across the globe to build an ecosystem which drives productivity and service innovation.

ABOUT THE AUTHOR

Matt Kuperholz is a partner and chief data scientist at PwC Australia.

Formally trained in actuarial science and computer science, Matt honed and expanded these technical skills with more than 20 years consulting experience for top-tier companies.

An expert in planning, executing and communicating the results of advanced analytics projects, Matt's area of specialization is the application of artificial intelligence and machine learning technologies to detailed and complex data. Matt is currently Australia's top ranked Analytics Leader according to IAPA, the peak body for analytics professionals in Australia. Matt was also recently honoured by Malcolm Turnbull and Australian Chief Scientist Alan Finkel as one of the Knowledge Nation 100, a group of innovators and entrepreneurs helping to shape Australia's new economy.

ABOUT THE ORGANIZATION

PwC is one of Australia's leading professional services firms, bringing the power of our global network of firms to help Australian businesses, not-for-profit organizations and governments assess their performance and improve the way they work. Having grown from a one-man Melbourne accountancy practice in 1874 to the worldwide merger of Price Waterhouse and Coopers & Lybrand in 1998, PwC Australia now employs more than 7,000 people.

ENQUIRIES

PricewaterhouseCoopers
2 Riverside Quay
Southbank 3006

Email: luke.branson@pwc.com
Twitter: twitter.com/PwC_AU
Web: www.pwc.com.au