



Flash Memory Summit

Applying Blockchain to Electronics Supply Chain

Dave Verburg, Senior Technical Staff Member, Storage Devices and End to End Quality
(Presenter) Michelle Lam, Senior Technical Staff Member, Supply Chain Engineering
Luis Freeman, Technical Project Manager - Procurement Engineering
Jung Yoon, Distinguished Engineer - Supply Chain Engineering



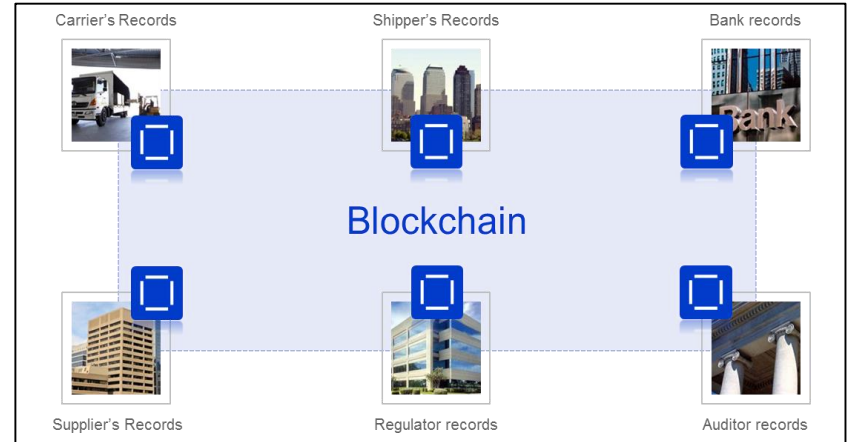
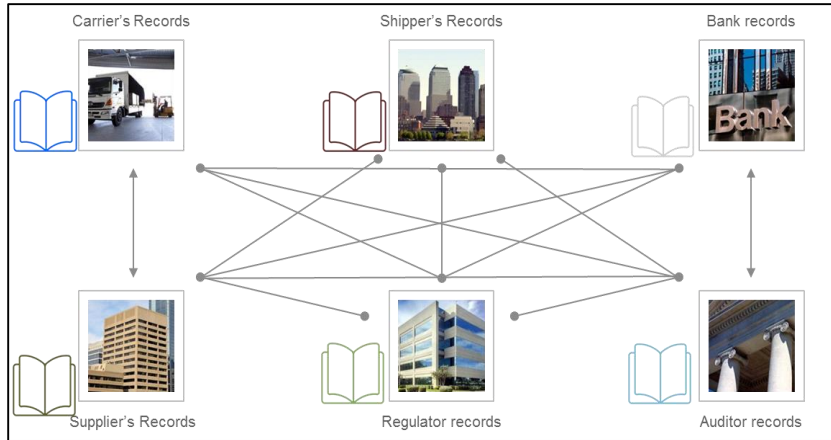
Flash Memory Summit

Our Motivation

Apply Blockchain to mitigate pain points in
Electronics Supply Chain



What is Blockchain?



Benefits of Blockchain

Saves Time



Transaction time from days to near instantaneous

Reduces Risk



Tampering, fraud & cyber crime

Increases Trust



Through shared processes and recordkeeping

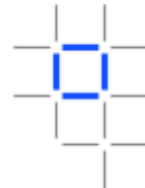
Removes Cost



Overheads and cost intermediaries



Tradelens - Global Trade Digitization



Flash Memory Summit

What?

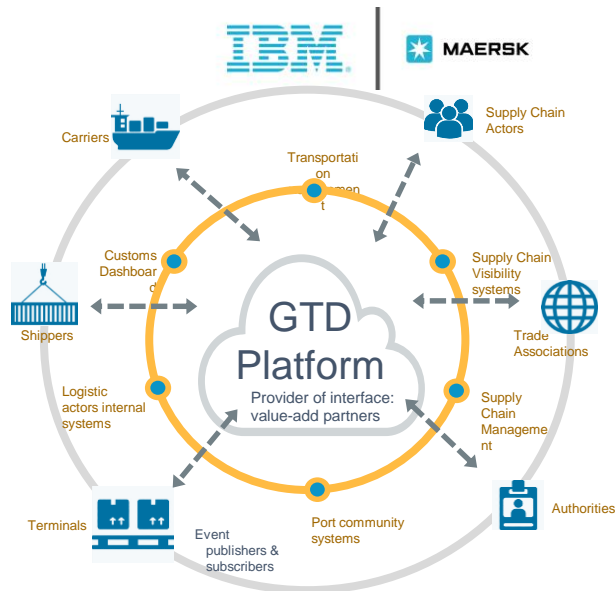
- An open, extensible platform for sharing shipping events, messages, and documents across all the actors and systems in the supply chain ecosystem.

How?

- Providing shared visibility and shared state for container shipments

Benefits

- Increase speed and transparency for cross border transactions through real time access to container events.
- Reduced cost and increased efficiency through paperless trade



TRADELENS ADDS MAJOR OCEAN CARRIERS HAPAG-LLOYD AND OCEAN NETWORK EXPRESS

TradeLens July 2, 2019
Rapid adoption of TradeLens continues as Hapag-Lloyd and Ocean Network Express (ONE) Plc. Ltd. announced they will join the blockchain-enabled digital shipping platform.



BUILDING APIS FOR SHIPPING: WHAT WE'VE LEARNED SO FAR

Nils Jespersen June 18, 2019
TradeLens has been among the very first adopters of APIs for the shipping industry, so we've been through our share of trial and error. Now it's time to share some of what we've learned.

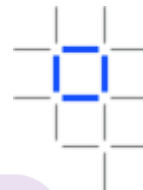


NEW MEMBERS SET STAGE FOR NEXT WAVE OF TRADELENS GROWTH

TradeLens May 28, 2019
The addition of leading carriers will bolster what is already an extensive and diverse ecosystem of supply chain partners using TradeLens today. On this occasion, we thought it would be a great time to highlight a number of new and recent additions.



IBM Food Trust – Food Safety



What?

- IBM Food Trust is a set of modules providing traceability to improve food transparency and efficiency

How?

- Blockchain is used to create a trusted connection with shared value for all ecosystem participants, including end consumers.

Benefits

- Reduce impact of food recalls through instant access to end-to-end traceability data to verify history in the food network and supply chain.
- Help to address the 1 in 10 people sickened and 400,000 fatalities world wide which occur every year from food-born illnesses.



Typical manual, mixed digital and paper-based method

**6 days
18 hours
26 minutes**

IBM Food Trust digital solution

2.2 seconds

Momentum is growing



<https://www.coindesk.com/walmart-will-start-tracking-groceries-on-blockchain-in-2019>



Carrefour



Albertsons Companies

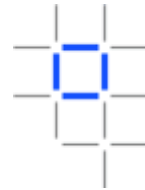


Nestlé





Provenance in Supply Chain



Flash Memory Summit

Provenance:

– Merriam-Webster Dictionary

(1) Origin, Source

(2) the history of ownership of a valued object or work of art or literature

We face new challenges around product safety, responsible sourcing, and counterfeiting every day **Where is the Trust in our economy?**

Conflict Diamonds: African Artisanal Miners Struggle For Survival

Published 3 days ago on June 16, 2018
By Makinde Okunwami

Fiat Chrysler recalls 4.8 million U.S. vehicles for cruise control defect

Drivers can overpower the system by continuously applying the brakes.

How Chinese Sellers of Fake Dior Are Evading a Crackdown Online

By Bloomberg News

53% of People Who Accidentally Deleted Content Agree It's Wrong to Do So (Survey)

83% of U.K. piracy users claim they first try to find legal sources for films, TV shows, and music

By Todd Spangler



Fresh-cut melon recalled in the wake of salmonella outbreak





Electronics Supply Chain Pain Points

Flash Memory Summit

How do you ensure your supply chain won't have counterfeit issue?



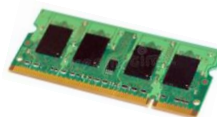
Product Recall?

All personal data wiped from this drive before decommissioning?



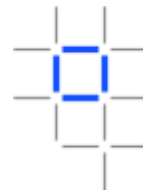
Malicious components?

How do I know this is not a counterfeit item?





How Blockchain can help?



Provenance Blockchain provide a single, uncorrupted, holistic view of the asset's history from inception to decommission

Problems in life without Provenance



Fraudulent products



Authenticity



Defective products



Traceability



No transparency



Transparency



Process Inefficiency



Trust



Addressing them with Provenance on Blockchain

- Proof of authenticity (verified claims) of an asset through its data or evidence attached to any transaction involving the asset

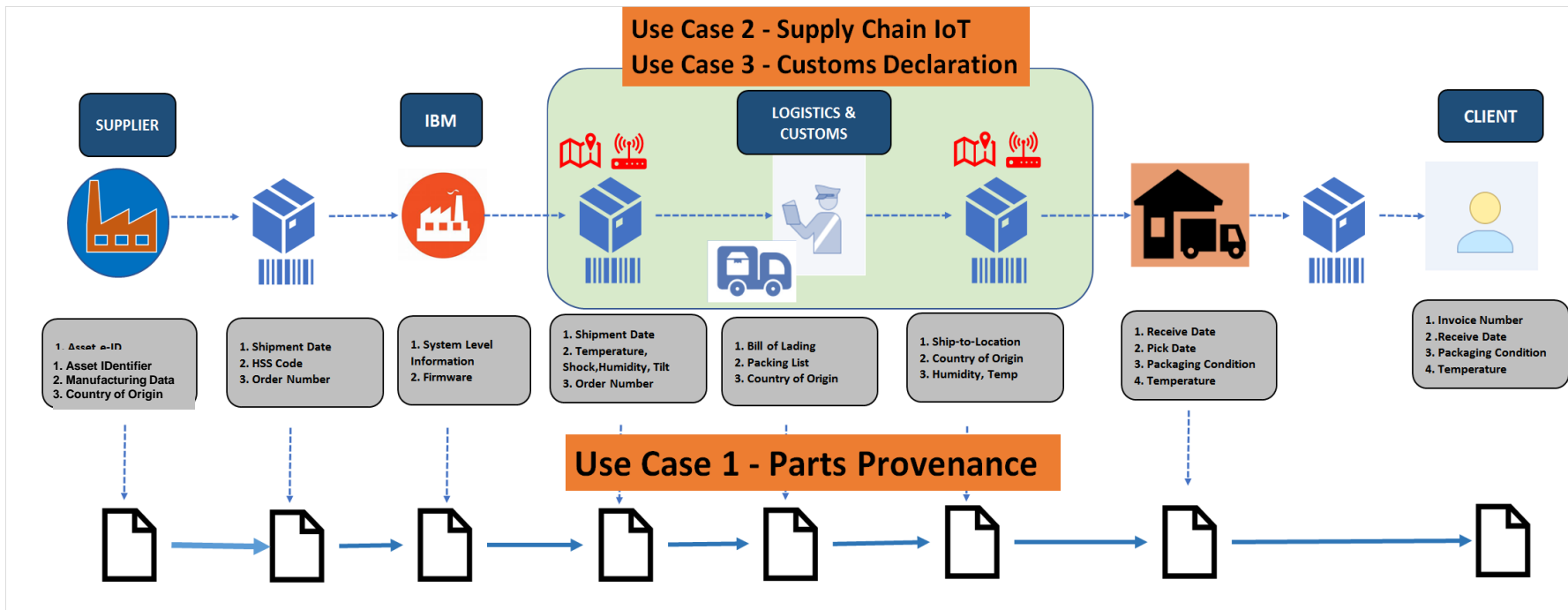
- Improved speed of access to asset information through a digital, shared, transparent ledger

- Structured data linking among independent entities that handle a common asset or associate with it, providing a traceable history of the asset's change of custody and/or transformation

- Improved trust lead to remove of process redundancy

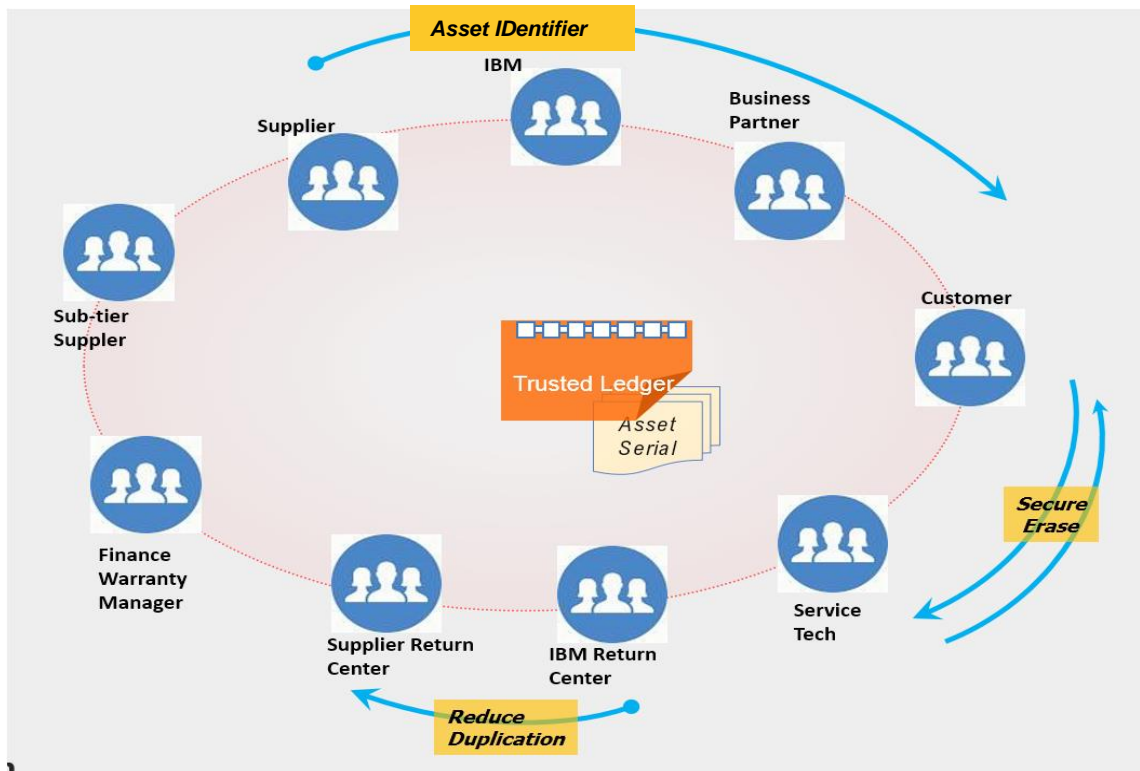


IBM System Supply Chain Blockchain



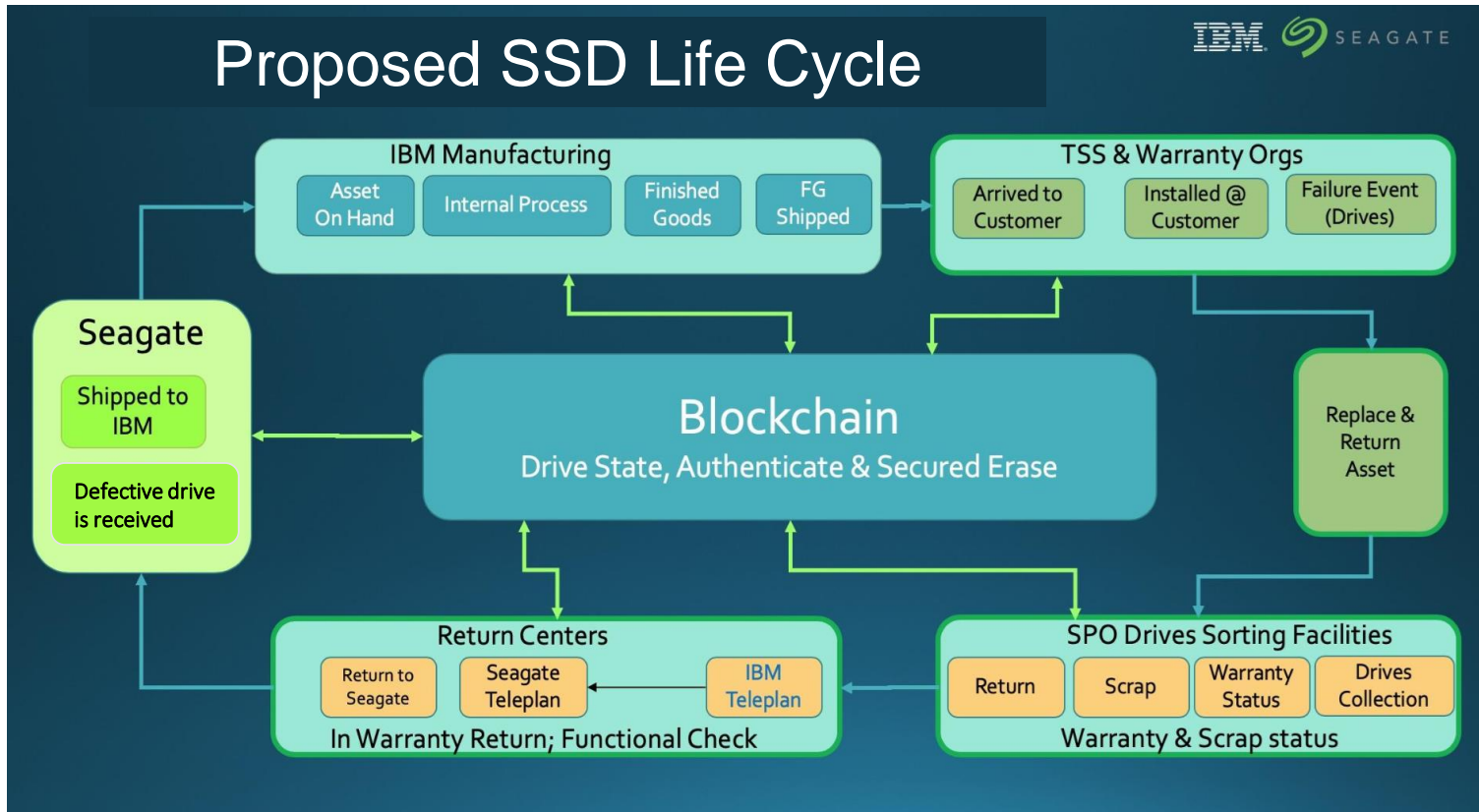


Part Provenance Blockchain Network





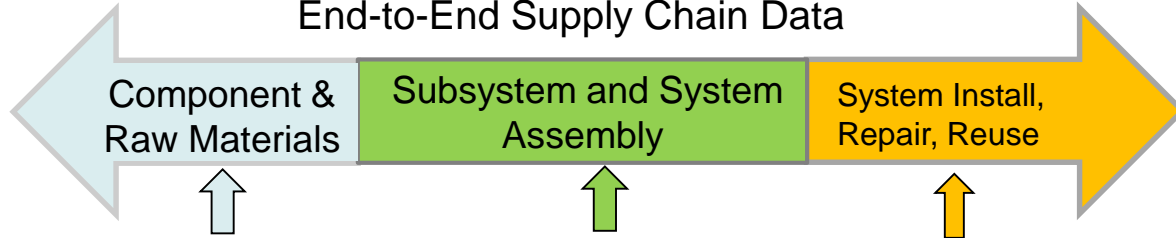
SSD Provenance Blockchain





Electronics Supply Chain Blockchain Connection

End-to-End Supply Chain Data



- Raw Materials**
 - Conflict minerals declaration
 - Material testing
 - Environmental
 - Mechanical properties
 - MSDS
- Components & Procured Assemblies**
 - Traceability (assembly info)
 - Anti-counterfeit
 - Manufacturing data
 - Material Declarations
 - Environmental compliance
 - Conflict minerals
 - Battery compliance
 - Safety Certifications
 - EMI, flammability, electrical
 - Device documentation
 - Datasheet, outline, PWB pad layout, qual report
 - Customer notifications
 - PCN (and ECs)
 - Product discontinuance

- Raw Materials** (solder, coatings, etc.)
 - Conflict minerals declaration
 - Material testing
 - Environmental
 - Mechanical properties
 - MSDS
- Components & Procured Assemblies**
 - Connect to component blockchains
- Assembly** (card, subsystem, system)
 - PWB Assembly
 - Card and stencil design,
 - 1st article inspection image
 - Traceability (assembly info)
 - Anti-counterfeit
 - Manufacturing data
 - Material Declarations
 - Environmental compliance
 - Conflict minerals
 - Battery compliance
 - Certifications
 - EMI, flammability, electrical
 - UL, other markings
 - System documentation
 - Manuals

- Partner**
 - Traceability (Assembly info)
- Customer**
 - Traceability (Assembly info)
 - Improved recall
 - Analytics
 - Install information
 - Failure information
- Repair Centers**
 - Part information
 - Failure analysis information
 - Return linkage
- Reuse**
 - Connect to system, subsystem blockchains



Summary

- Blockchain is a transformative technology that can address counterfeit, traceability, transparency, process efficiency.
- We are moving beyond proof-of-concept.
- Work is needed to develop data exchange standards for industry adoption.
- Key to success is Collaboration.



Flash Memory Summit

We believe by strengthening our trust, we are empowered to change the world.

What will we solve together?





Flash Memory Summit

Thank you!