

# Blockchain in Transportation and Logistics

Current applications, and the potential to help with future pandemics, trade wars and other supply chain disruptions

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## Snapshot Biography

- Transportation lawyer practicing primarily in the areas of road, rail, and intermodal transportation and logistics, as well as ocean transportation and issues pertaining to unmanned aircraft systems.
- Experience with transactions pertaining to transportation assets and operations, including the sharing of information via blockchain.
- Vice President and a member of the Board of Directors for the Association of Transportation Law Professionals.
- Chairman of the Rail Committee for the Transportation Lawyers Association.
- Leads the Transportation Sector of Holland & Knight's Blockchain Initiative.
- Authors the motor carrier regulatory column for the Association of Transportation Law Professionals' Highlights publication.
- Motor Carrier and Logistics Editor Holland & Knight Transportation Blog.



# Overview

- **How is blockchain technology being used in transportation today?**

- Current state of the transportation information exchange
- Power of blockchain
- Challenges to the adoption of blockchain
- Commercial application
- Examination of TradeLens
- Participant perspective
- Monetizing the blockchain platform

- **How can blockchain make supply chains more nimble in times of disruption?**

- Blockchain improves trust among participants
- Combine with IOT and smart contracts to allow more autonomous function
- Improves ability of
  - Buyers to assess its needs
  - Buyers to assess suppliers
  - Supplier to assess buyers (ensure payment)



# Current state of transportation information exchange



- Highly fractured markets, and many participants in an international multi-modal movement.
  - E.g. 500,000 registered motor carriers, 50 largest account for 38% of market.



- Substantial reliance on paper shipping documentation (despite efforts to make them electronic)



- While certain data is shared via electronically via electronic data interchange (EDI) transmissions:
  - it is generally shared between two parties, not with a network
  - EDI standards are old and not used uniformly and consistently



- Intermediaries such as banks included in some transactions to provide letters of credit in order to add trust



# The power of blockchain

- Blockchain allows data to be shared with substantially improved trust and security.
- What can be done with greater levels of trust and security?
  - Open up data silos and make the accumulation of data more valuable and thus justify the cost of its collection (including through automatic IOT processes) and make its collection more prevalent.
    - “Smart containers” / and trucks with sensors, smart warehouses, etc.
  - Improve efficiency: remove labor-intensive paper documentation and intermediaries that are needed today because of a lack of trust, or at a minimum, make their process more efficient.
    - Paper bills of lading that serve as a document of title
    - banks that provide letters of credit
  - Track origin/authenticity of goods (e.g. IBM Food Trust).
    - Food recall - average cost of a recall to a food company is \$10M in direct costs, which does not include damage to reputation and lost sales. See Improving the Supply Chain through Technology: From Trade Finance to Produce (<https://www.hklaw.com/en/insights/publications/2018/04/improving-the-supply-chain-through-technology-from>)
    - Organic verification – millions of pounds of produce are misclassified.
  - Provide business information to help entities verify credentials.



# Challenges to the adoption of blockchain in the transportation industry

## Information exchanged via blockchain must:

1. Serve as a replacement for current shipping documents
  - Negotiable (title, transferrable) vs nonnegotiable bills of lading (receipt)
  - Digital equivalent to a negotiable bill of lading must be accepted by parties and governmental authorities, and there cannot be significant impediments to transferability.
2. Be accepted internationally
  - Despite international conventions, international laws vary.
  - Some countries do not currently recognize the validity of an electronic negotiable bill of lading.
3. Be accessible to a critical mass of participants without significant cost or business disruption (incomplete information has substantially reduced value)
  - Trucking, broker, freight forwarder and customs broker markets are fractured, and made up of many small participants.
  - Smaller participants are less well equipped to make substantial investments in new technologies or processes.

**If these issues are not solved, widespread adoption of blockchain will be unlikely.**



# Commercial application: TradeLens

- While there are competing blockchain platforms (e.g. the Global Shipping Business Network (GSBN)), the current leading commercial application of blockchain in transportation is TradeLens.
- TradeLens fast facts:
  - Joint venture between IBM and Maersk (Maersk is the largest container ship and supply vessel operator in the world).
  - Supply chain platform with the potential to connect a shipper with every other entity involved in the transportation: carriers, terminal operators, intermediaries such as customs brokers, governments, and financial service providers.
  - As of July 2019, the scope of the platform extends to more than half of the world's ocean container cargo.



# How the TradeLens blockchain platform helps solve blockchain challenges

1. Be accessible to a critical mass of participants without significant cost or business disruption (incomplete information has substantially reduced value)
  - Maersk and IBM have market prominence and cachet
    - Can include a substantial base of customers, and smaller providers are more likely to join if there is a critical mass that they are missing out on.
  - TradeLens may be able to monetize the platform even from those who do not participate in their service, through the sale of aggregated market data, which can reduce the cost to use the platform.
2. Be accepted internationally
  - Necessary changes to international laws for electronic bills of lading are more likely to occur when there is a large group seeking it, lead by large companies like IBM and Maersk.
3. Serve as a replacement for current freight documents
  - Any blockchain helps solve security issue for negotiable bills
    - Blockchain information can document title without the need for the bill of lading to fill this role





# Expansion of TradeLens

- Announced in August, 2018. Initially, TradeLens had difficulty getting rival ocean carriers of Maersk to sign up.
- That changed by the middle of 2019, with the addition of MSC, CMA CGM, Hapag-Lloyd, and Ocean Network Express (ONE). As of July 2019, the scope of the platform extends to more than half of the world's ocean container cargo.
- In the meantime, other rival platforms have stalled.
  - However, some participants are hedging their bets. CMA CGM and Hapag-Lloyd are also shareholders in the GSBN joint venture.
- In the latter half of 2019 and into 2020, TradeLens has entered a new phase, expanding beyond ocean carriers and terminal operators to include railroads, customs agencies, and banks.



# Example of expansion: CSX joins TradeLens in 2019

- On November 1, 2019, CSX publically announced that it had become the first North American railroad to join TradeLens.
- Reasons CSX states for joining include:
  - Provides customers with improved supply chain transparency and shipment-status visibility
  - Furthers CSX's commitment to greater transparency that enables shippers to manage their supply chains more efficiently
  - Overcomes data processing siloes to support collaboration across the supply chain and provide customers with timely updates.

<https://www.csx.com/index.cfm/about-us/media/press-releases/csx-leads-railroad-industry-by-joining-tradelens-global-shipping-information-platform/>

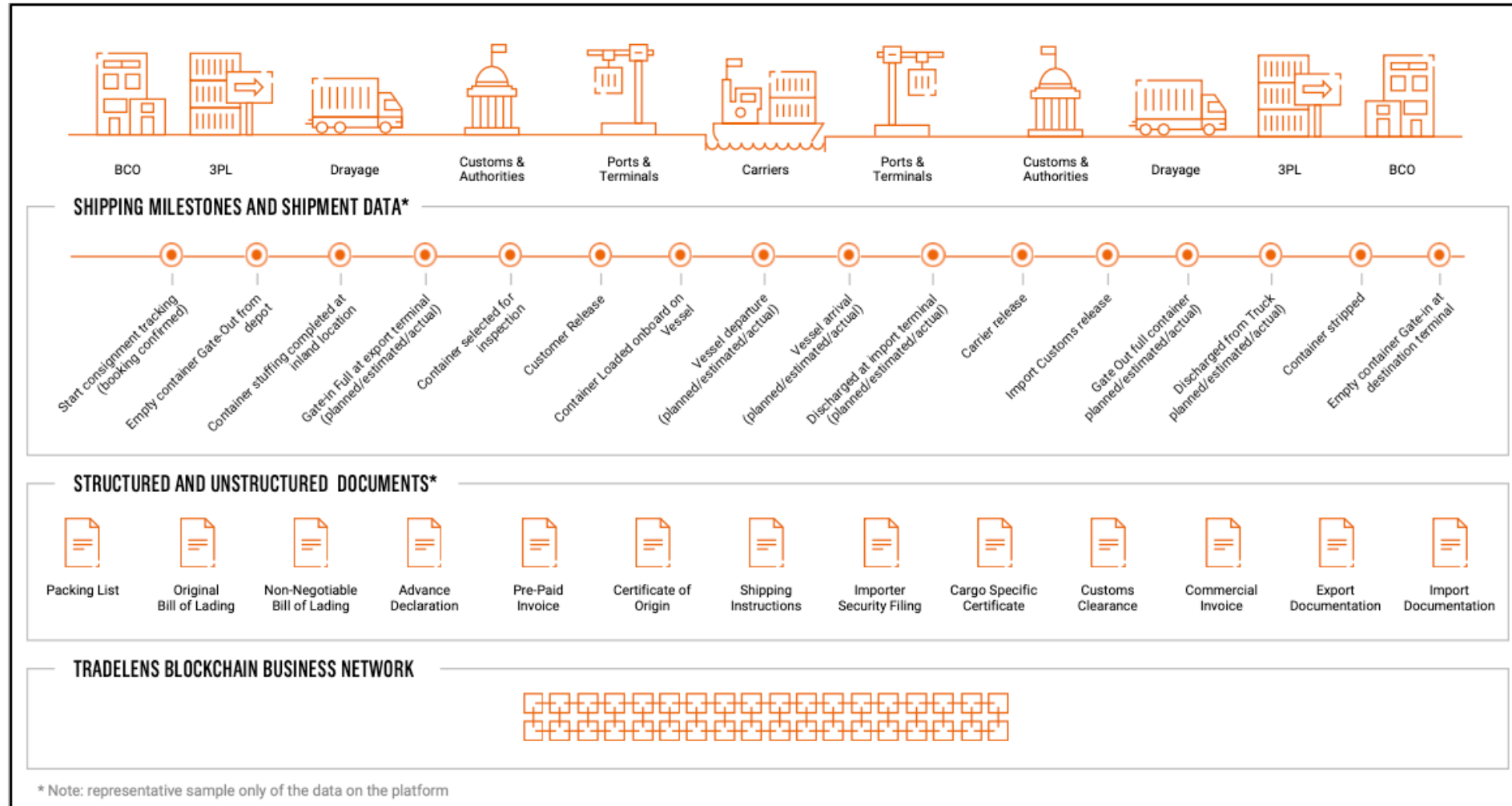


# Closer look at Tradelens

- TradeLens makes certain contract documents publically available:
  - TradeLens Network Member Agreement [https://www-03.ibm.com/software/sla/sladb.nsf/pdf/8226-03/\\$file/i126-8226-03\\_07-2019\\_en\\_US.pdf](https://www-03.ibm.com/software/sla/sladb.nsf/pdf/8226-03/$file/i126-8226-03_07-2019_en_US.pdf)
  - Service Description [https://www-03.ibm.com/software/sla/sladb.nsf/pdf/8178-04/\\$file/i126-8178-04\\_07-2019\\_en\\_US.pdf](https://www-03.ibm.com/software/sla/sladb.nsf/pdf/8178-04/$file/i126-8178-04_07-2019_en_US.pdf)
- Technical details:
  - Involves IBM, so the platform relies on Hyperledger Fabric blockchain technology and the IBM cloud.
  - Hyperledger Fabric is offered under a copyleft open source license (GPLv2).
- TradeLens describes itself as an “open, neutral platform” and an “open-source permissioned blockchain.”
- Others might call it a private permissioned blockchain
  - Specific details are included in the data sharing specification [https://docs.tradelens.com/reference/data\\_sharing\\_specification/](https://docs.tradelens.com/reference/data_sharing_specification/)
  - Access is subject to a “unified permission matrix”
  - Only certain parties are permitted to join the network to access data
  - Those rights are further limited by the type of participant they are, their relationship to any particular movement, and the type of data being sought.



# Tradelens – data being shared



# TradeLens data sharing

## 2 Data Sharing Principles

Several key principles guide the model:

- No data is made available to any party unless the party is a TradeLens participant, meaning they are customers or network members who are known, have agreed to the TradeLens terms and conditions, and have been onboarded.
- TradeLens only provides access to the data associated with a specific shipment / consignment (see definitions below) to other participants that are involved in that shipment / consignment. For example, while an ocean carrier would have access to the data for containers it operates, other ocean carriers would not have access to that data. A cargo owner would have access to data for its shipments but no access to shipment data of other cargo owners.
- Data is made available to a participant according to the role that participant performs in a given shipment / consignment.
- Non-sensitive data (under the category Events) that today are generally accessible are made widely available to the other participants if they are involved in that shipment / consignment.
- More sensitive data (under the category Trade Documents) have stricter access rights across the participants involved in the shipment / consignment.
- The data sharing model recognizes the various commercial and logistics relationships common today, notably that shipments often comprise multiple consignments contracted to separate parties, and those consignments themselves are often subcontracted to other parties. For example, when a freight forwarder moves cargo for the shipper on a house bill of lading and subcontracts ocean carriage, the house bill of lading (and the sensitive data contained therein) is not visible to the ocean carrier, and the ocean bill of lading (and the freight data it may contain) is not visible to the shipper.
- Any reporting on aggregated or summarized data will not disclose the identities of individual TradeLens participants, unless the recipient of the information is already authorized to see the underlying data.

*private, permissioned*

*permission matrix*

*EDI equivalent data*

*e.g. pricing and payment*

*preservation of status quo*

*safety in allowing TradeLens to share the data*



# Closer look at Tradelens – data use

## TradeLens Network Member Agreement

### 2.2 Data Use

- a. Platform Provider will make Member Provided Data for a Consignment available to any Participant that is involved in that Consignment in accordance with the Data Sharing Specification.
- b. Platform Provider will access and use Member Provided Data for the purposes of (i) providing and managing the TradeLens Platform; and (ii) improving the TradeLens Platform, including performance and functional validation testing for current and future functionality for TradeLens offerings.
- c. Platform Provider will de-identify and aggregate Member Provided Data to gather global trade statistics and insights, which Platform Provider will use internally or make available to others.

### 2.4 Data Redistribution

Member may make available relevant Solution Data for a Consignment to a commercial party or authority that is not a Participant only if that commercial party or authority is involved in, or provides services related to, the transport of such Consignment.

Member shall not, without the express written permission of Platform Provider, systematically redistribute Solution Data to any party including, without limitation, redistribution by EDI transfer, API integration, bulk file transfer, or any other systematic means.

- TradeLens provides and manages the Platform.
- Allows TradeLens to aggregate data (and monetize it) and sell real-time access to shippers.
- Does not allow carriers to use the data outside of the TradeLens platform.

[https://www-03.ibm.com/software/sla/sladb.nsf/pdf/8226-03/\\$file/i126-8226-03\\_07-2019\\_en\\_US.pdf](https://www-03.ibm.com/software/sla/sladb.nsf/pdf/8226-03/$file/i126-8226-03_07-2019_en_US.pdf)



# Monetizing a private permissioned blockchain platform

- The Tradelens model may not satisfy purists
- Recall, an essential element to blockchain adoption is that it:
  - Be accessible to a critical mass of participants without significant cost or business disruption (incomplete information has substantially reduced value)
- The ability to monetize the platform incentivizes creating it and doing the work needed to bring others along.
- The ability to profit from external sources helps bring down the cost for users.
- Both of these elements help achieve an essential element of bringing blockchain to the industry.



# How can blockchain improve supply chain reliability in times of disruption?

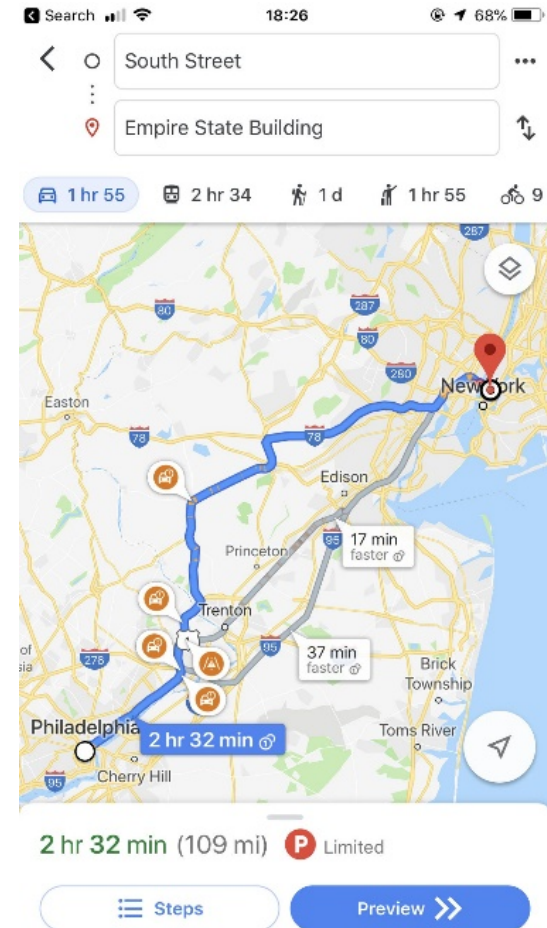


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# Future benefits of blockchain for shippers for dealing with supply chain disruption

- When supply chains get disrupted, alternative options for sourcing and transportation need to be considered.
- Ideally, for shippers dealing with supply chain disruptions would be like checking traffic: choose the right option based upon the current conditions.
- While it may not become quite this easy, the goal of blockchain (supported by smart contracts and IOT) is to make supply chains nimble enough to achieve this kind of result.
- Social benefit - more efficient allocation of resources



# Blockchain and supply chain disruption

- How can blockchain help with supply chain disruption?
- Recall, the primary benefit of blockchain is increased trust and security. From this benefit other possibilities can be unlocked:
  - “Smart warehouse” example for investing in data collection and use, and automating processes.
- Blockchain helps facilitate buyers having more information to better understand:
  - what do I have?
  - what do I need?
  - Where do I need it?
  - When do I need it?
  - How long will it take to get it?



# Blockchain and supply chain disruption

- Help buyers vet suppliers.
  - Do they have the inventory needed?  
Can they certify necessary quality standards of the goods, or the facility?
  - Do they pass background checks, meet ethical sourcing requirements?
  - Are they reliable/solvent?
  - IBM – Trust Your Supplier <https://www.trustyoursupplier.com/for-buyers/>
- Product tracking
  - where is it?
  - When will I get it?
  - Have there been any incidents?
- Provide assurance to suppliers of payment.
  - Automatic payment triggers by hitting milestones.



# Blockchain and efficient supply chains

- All the benefits listed are helpful for any efficient supply chain, even when not disrupted.
- Help with “just in time” ordering
- Minimize warehouse inventory, or use primarily as a buffer
- Allow more cost-effective transportation choices



# Medical supply chain example

## The 5 Trust Challenges facing the medical supply chain

1. **Product Requirements:** standards vary across health systems and countries, creating confusion for what each factory should be producing.
2. **Supplier Credibility:** there is uncertainty over which suppliers can produce equipment to the right quality, at the right production volume, at the right time.
3. **Financial Payments:** factories and freight companies are requiring financial payments be made upfront as their workers slowly come back online, and they themselves are trying to prioritize credible purchase requests.
4. **Customs Certifications:** Customs Certifications need to be rapidly validated to allow rapid transportation of equipment internationally, given that medical equipment is highly regulated.
5. **Transportation Tracking:** transport options need to be validated to ensure the right shipments can move from factories to airports to distribution centers to health centers around the world, under the right conditions (e.g., [temperature controlled](#) for pharmaceutical products).

<https://www.forbes.com/sites/nishandegnarain/2020/03/22/5-ways-blockchain-can-unblock-the-coronavirus-medical-supply-chain/#f71d9fd13805>



# Blockchain and supply chain disruption – smart contracts

- IOT provides the data,
- blockchain allows the data to be shared securely,
- smart contracts can automate the execution.
  - If-then logic, with the parameters pre-set.
  
- Smart contracts automate the procurement lifecycle, including:
  - Choosing a supplier
  - Deciding when to place an order, of what, from whom, etc.
  - Making payment upon the occurrence of certain milestones
  
- Reality check
  - There is a lot of complexity that does not easily automate
  - But for everything else... there's blockchain



# Conclusion

- Commercial application of blockchain is here.
- TradeLens may not satisfy everyone, but it is a positive development in improving transportation efficiency.
- From the carrier perspective, these benefits make its processes more efficient
- From the shipper perspective, these benefits make supply chain management more nimble and efficient.
- Times like these that these make the need for efficiency – the ability to do more with less -  
- even more clear.



# Questions?

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**Thank You**

