Blockchain and the Maritime Industry

An introduction
We will look at...

- A review of the current transactional ecosystem
- The blockchain concept
- Smart contracts
- Q&A
Current Shipping Transactional Ecosystem
Significant paper documents are required.
Physical inspection of documents is time-consuming and expensive.
Long chain of parties including intermediaries also inflate the costs of shipping transactions.
Current Shipping Transactional Ecosystem
Supply Chain (cont.)

- No single party can access all aspects of the supply chain
- No accountability for inefficiency of parties
- No accountability for fraud
  - Qingdao warehouse fraud
  - Multiple warehouse receipts used to defraud lenders/buyers
- No accountability for external events such as cargo theft
- The reliance on multiple brokers to facilitate processes also inflates the cost of transactions
• Small to midsize owners find it difficult to obtain reasonable financing/refinancing terms
• Reasons: balance sheet of the Borrower; name lending considerations more important; varying valuations of the underlying assets; credit worthiness of the underlying charter party contracts and sustainability; regulatory concerns; other vague reasons etc.
• General lack of trust in the system to enable a level playing field is persistent and potentially disastrous for the maritime finance industry

• **A solution could be blockchain enabled smart contracts!**
The Blockchain Concept
A blockchain is a:

- Distributed
- Trustless
- Public
- Ledger
Means:

- There is no central server(s) running the operation
- Many computers combine to do the work involved
- E.g.: Bittorrent (filesharing)
- Eg: Calculations being shared out amongst many computers on a network
Trustless
What does it mean to be “trustless”?

- Uses public/private key cryptography - #hash function (or algorithm)
  - I.e. asymmetric cryptography
  - Public key associated with user freely distributed
  - Private key must remain private
  - The public key authenticates that a message was sent by the (person controlling the) private key – but the private key cannot be "reverse engineered" from the public key
  - No secure channel needed
Ledger

What is a “ledger”?  

- It is any record of a quanta of things of value (could include asset valuations, class certificates, charter rates, profit & loss analysis, etc., in a ship finance context)

- Against IDs

- (It may be lots of other things too, but we are keeping to a single example)

- Although the ID may just be a public key
What do we mean by “public”?

- It means that the ledger can be examined by anyone.
- The entries and IDs associated with a quanta of value...
- ...is open to everyone.
- No one person/authority controls it – no central authority is required for it to function and participants can join and leave at will.
Blockchain works by utilising two different (but connected) keys: a "private key" to create a signature and a "public key" that others can use to check it.

- The private key cannot mathematically be derived from the public key.
• The is only way to verify a chain of transactions without central authority...and that is to be aware of every transaction

• This is done by
  • Transactions being broadcast
  • Computers competing to do the cryptographic "work" which validates a "block" of transactions
How Does a Blockchain Work?
Part 3

- Which is added to the previous blocks to form a single chain of blocks

- Other computers signal their acceptance of the block by competing to add the next block in the chain

- The longest chain is the valid chain

- Computers doing the work of forming the blocks receive payment in newly created coins ("mining") and small transaction fees (incentive to participate)
Smart Contracts
This was posited in the early 1990s itself.

It envisioned self-executing contracts:
- E.g. payments made upon external conditions being satisfied

Follows the blockchain theory (with the exception of public ledgers).

Currently not fully implemented in any industry outside of crypto-currencies (Bitcoin, Ethereum, Ripple, etc.).
The contracts in the transaction will take the form of a computer program that is accessible to all parties.

In a typical shipping transaction:
- Exporters
- Export authorities
- Port officials
- Import custom officials
- Importers
- Financiers
- Surveyors
- Valuators, etc.
Various documents are uploaded to the system which form the transaction (standard documents such as MOA, BOL, CP, etc. are a standard part of the software program and will not change);

Thus the relevant contract is published by the asset owner and the counterparty will negotiate the price/freight directly via the blockchain network

As each party approves and signs the relevant document on the system, the program approves and moves the transaction on to the next stage

Contract is executed by a computer network using consensus protocols

Auto-Execution and simultaneous uploading of information for all parties to see
Smart Contracts
Advantages

• **Efficiency**
  • As predefined stipulations are met by the parties, the contract will self-execute which increases the efficiency of shipping escrow by limiting the intermediaries involved
  • Tasks that are normally completed manually can also be automated

• **Transparency**
  • The information is available to all with the required access key, which limits the risks in transactions as counter-parties can evaluate information along the chain
  • As the execution of contracts and other tasks are automated, there is less risk of human errors
Smart Contracts
Advantages

- **Security**
  - All information is encrypted and cannot be tampered with by the parties as a protection from fraud
  - The greater accuracy combined with greater security will limit disputes regarding the validity of the transaction
  - Encrypted software and increase in visibility to all parties will decrease the level of theft and hacking in the industry
  - Will also make it easier to apportion accountability for such events

- **Cost saving**
  - Large costs relating to documentation, procedural delays and errors will be limited
  - Costs related to various intermediaries will be removed or limited
Smart Contracts
Advantages

- **Market**
  - Everyone can access blockchain technology.
  - Lower barriers to entry will increase market competition
  - Parties can develop direct communication without intermediaries
  - Decentralised brokerage system built on blockchain technology
  - Open market place for financiers, owners, shippers and carriers
  - Open information on capacity, cost and estimated delivery times – easier for parties to assess potential transactions
  - World Economic Forum: Global trade will increase by 15% and global GDP will increase by 5%
### Smart Contracts

**Disadvantages**

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<thead>
<tr>
<th><strong>Special contractual terms</strong></th>
<th>Maritime related contracts can be very unique and specific</th>
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<tbody>
<tr>
<td></td>
<td>The blockchain network will need to recognise specific maritime norms and features</td>
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<td><strong>Flexibility</strong></td>
<td>Certain issues during the transaction are normally resolved commercially</td>
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<td>This could potentially be difficult in a sealed system approach</td>
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<td>Parties will also have different contractual terms that will need to be agreed and adopted by the blockchain network</td>
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<td><strong>Global adoption</strong></td>
<td>No current government or jurisdiction has implemented this</td>
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<td>Will require some time before being fully implemented</td>
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Examples
IBM & Maersk

- Planned joint venture to adopt block chain application for freight
- Trial in 2016 traced a container of flowers from Mombassa, Kenya to Rotterdam, Netherlands
- Platform designed to:
  - exchange real-time event data for the global supply chain
  - deal with document workflow though paperless trade
- Currently waiting regulatory approval
- Expected to be launched by mid-2018
Claimed to be world's first distributed ledger platform for participation in capital financing of assets and services in the shipping industry

Aim is to "democratise the way ships are owned, bought, sold and operated"

Based on the Ethereum blockchain platform

The platform will log various contractual transactions

Users to create their own virtual tokens to represent assets
Thank you for Listening
Questions?

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