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Have an exit plan. Please take a moment to familiarize yourself with the route to the nearest exit from this room.

If an alarm sounds, please end your event *immediately* and evacuate the building. The escalators located in the center of each floor can be used to access the main lobby and exits. Additional stairs are located behind the elevators at each end of the main hallway on each level.

In case of evacuation, attendees should gather on the lawn of the Carnegie Library, across the street from the main entrance to the Convention Center. (*If blocked by construction fence, walk left to access the lawn on the 7th Street side of the library.*)

Transportation Research Board

International Trade and Transportation (AT020)

Annual Conference Meeting

January 14, 2009



Meeting Agenda

- I. Welcome and Introductions (Juan Carlos Villa)
- II. TRB Staff Report (Scott Brotemarkle)
- III. Annual Meeting Sessions organized/sponsored/supported by AT020
- IV. National Freight Fluidity Monitoring Program Implementation (Marygrace Parker, Freight and Innovation in Transportation, I-95 Corridor Coalition)
- V. International Civil Aviation Organization. Air cargo data linked to trade (Sainarayan Ananthanarayan Chief of Data Analysis Section)
- VI. Committee Business
 - Research Coordinator (Daniel Hackett)
 - Mid-Year Meeting Decision (Juan Carlos Villa)
 - Committee Centennial Paper & TRB Century Club Membership
 - Triennial Strategic Plan and TRB Critical Issues in Transportation (<http://www.trb.org/Main/Blurbs/178402.aspx>) (Juan Carlos Villa)
 - Communications (Irina Benedyk)

Meeting Agenda

VII. Strategic Topics Workshop

- International trade changes impacting the transportation system (Isabel Victoria)
- Chinese One Belt One Road initiative (Maria Boile)
- Blockchain technology impacts in international trade and transportation (Juan Carlos Villa)
- Impacts of the 2020 International Maritime Organization's bunker regulations in international trade. (Lefteris Sdoukopoulos)

VIII. Adjournment

General Topics

- I. Welcome and Introductions
- II. TRB Staff Report (Scott Brotemarkle)
- III. Annual Meeting Sessions organized/sponsored/supported by AT020

General Topics

III. Annual Meeting Sessions organized/sponsored/supported by AT020

Sunday	Workshop 1091
1:30 PM	Standardizing the Calculation and Reporting of Freight Transport Emissions on
4:30 PM	Global Scale. Verena Ehrler
Monday	Lectern Session 1207
10:15 AM	Impacts of Changes in Trade Policies on Agriculture and Food Transportation
12:00 PM	Paul Bingham
Monday	Poster Session 1238
10:15 AM	Liner Shipping Routes and Schedules Under Uncertain Conditions
12:00 PM	Juan Carlos Villa, Texas A&M Transportation Institute, presiding
Monday	Lectern Session 1283
1:30 PM	International Trade and Transportation Implications of the United States–Mexi
3:15 PM	Canada Agreement. Matthew Rooney, Christopher Wilson
Monday	International Trade and Transportation Committee
3:45 PM	Juan Carlos Villa, Texas A&M Transportation Institute, presiding
5:30 PM	International Activities, Freight Transportation, Marine Transportation
Tuesday	Freight and Marine Caucus (sponsored by BNSF)
5:30 PM	Debra Miller, Jim Kruse
7:00 PM	
Wednesday	Lectern Session 1686
8:00 AM	Cross-Border Costs, Investment Optimization, and Wait Time Predictions
9:45 AM	Isabel Victoria-Jaramillo

General Topics

- IV. National Freight Fluidity Monitoring Program
Implementation (Marygrace Parker, Freight and Innovation
in Transportation, I-95 Corridor Coalition)

- V. International Civil Aviation Organization. Air cargo data
linked to trade (Sainarayan Ananthanarayan Chief of Data
Analysis Section)

Committee Business

- Research Coordinator report
- Mid-Year Meeting Decision

Option 1

In conjunction with the [Innovations in Freight Data Workshop](#)
April 8-10, 2019, Beckman Conference Center. Irvine, California

Option 2

Mid-Year Meetings, Day of Plenary Sessions, and Port Tour Opportunity –
Galveston TX – Probable time frame: during first two weeks of June.

- Committee Centennial Paper & TRB Century Club Membership
- Triennial Strategic Plan and TRB Critical Issues in Transportation
- Communications

Communications

❑ **Irina Benedyk**

❑ birina@purdue.edu / irinaben@buffalo.edu (after August 2019)

❑ Skype / Telegram / Viber / WhatsApp – by request

❑ Help needed to maintain SSN running

❑ Links to news / research papers / other material suited our mission

❑ Email for:

❑ Committee and TRB business

❑ Workshops / seminars opportunities with approaching deadlines

❑ Calls for papers

Website

<https://www.trbtradetransportation.org/>

← → ↻ 🏠 <https://www.trbtradetransportation.org>



TRB International Trade and Transportation Committee

Transportation Research Board

About Us

Members

Calendar

Documents

Subcommittees

Contact

Resources

About Us



The **International Trade and Transportation Committee (AT020)** is a committee of the **Transportation Research Board (TRB)**. Part of the National

LinkedIn

<https://www.linkedin.com/groups/4362564/>

❑ Pros

- ❑ Many users
- ❑ Easy to post and read

❑ Cons

- ❑ Too much noise
- ❑ Privacy issue

The screenshot shows a web browser displaying a LinkedIn group page. The address bar shows the URL <https://www.linkedin.com/groups/4362564/>. The LinkedIn navigation bar is at the top with icons for Home, My Network, Jobs, Messaging, Notifications, and Me. The group header includes the group name 'TRB International Trade and Transportation Committee (AT020)', a description 'Unlisted group', and a member count of 57. A post by Irina Benedyk is visible, discussing a PhD student's involvement with the committee. The right sidebar contains information about the group, including a description of the Transportation Research Board (TRB) and the group owner, Michael Bomba.

Online Ed.D. Degree - Our full Doctorate tuition is 1/3 the cost of comparable online programs. Ad ...

Irina Benedyk
Joined group: May 2017

Your communities

Hashtags

- #globaltrade
- #transportation
- #shipsandshipping

Show more

Groups

Maritime Network

TRB International Trade and Transportation Committee (AT020)
Unlisted group

Start a new conversation in this group

Images Video Post

Irina Benedyk
PHD Student / RA at Purdue University
now • TRB International Trade and Transportation Committee (AT020)

Although it is not very Trade related, it is interesting activity and I invite you all to come and check how teams will attempt to solve problem of delivering Mobility as a Service.

STRATEGIC

57 members See all

About this group

The International Trade and Transportation Committee (AT020) of the Transportation Research Board (TRB) is concerned with research, management, and regional, national, international, and multinational policy issues related to international trade and transportation

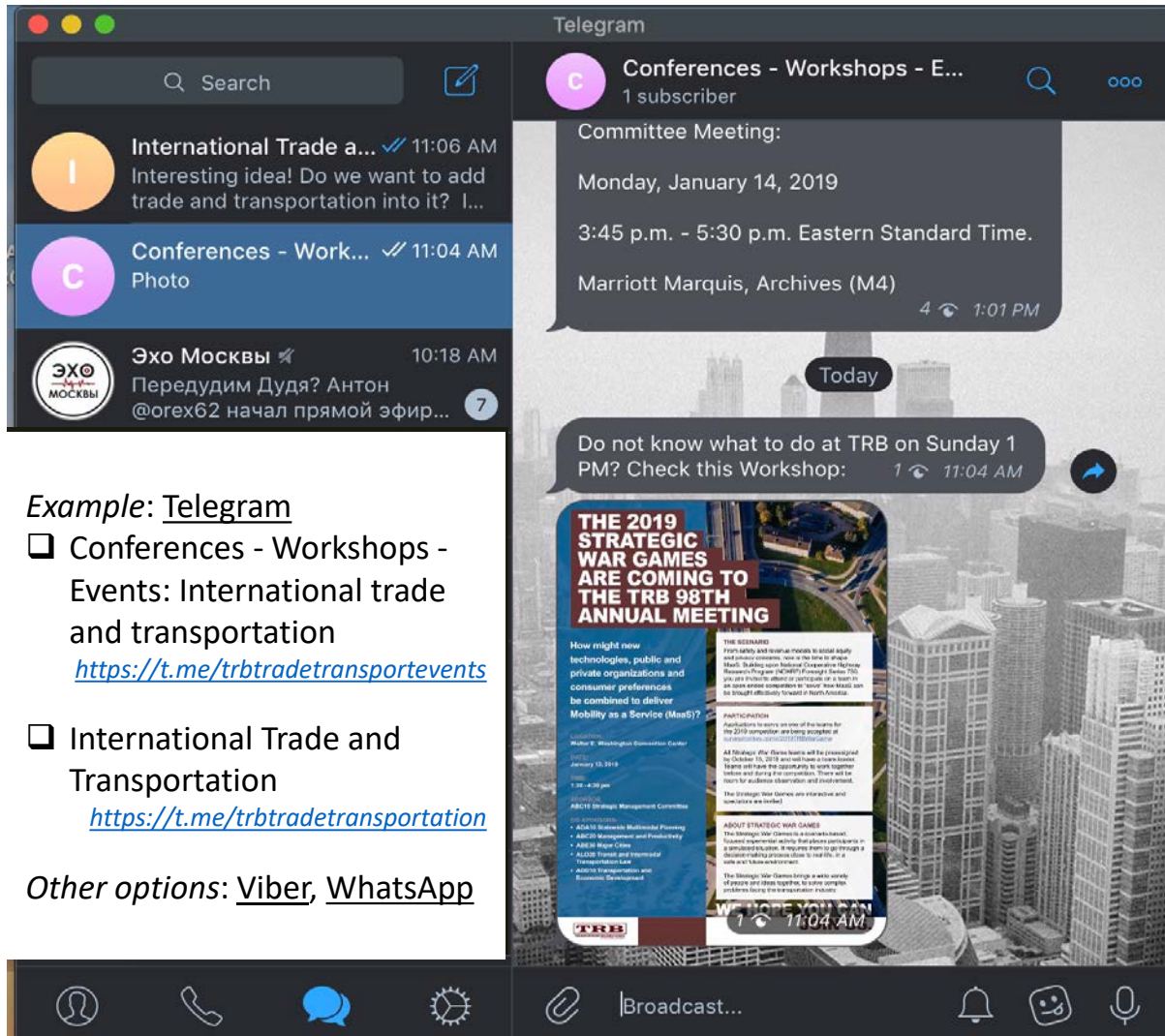
Show more

Group owner

Michael Bomba · 2nd
Research Associate Professor at University of North Texas

Group managers

Channels in the messengers



Pros

- ☐ Easy to post
- ☐ Easy to read
- ☐ No adds, no extra information

Cons

- ☐ You need to be user of those messengers

Example: Telegram

- ☐ Conferences - Workshops - Events: International trade and transportation

<https://t.me/trbtradetransportevents>

- ☐ International Trade and Transportation

<https://t.me/trbtradetransportation>

Other options: Viber, WhatsApp

Twitter

@and_trade

☐ Pros

☐ *Easy to post and read*

☐ Cons

☐ *To much noise*

The screenshot shows the Twitter homepage for the user @and_trade. The browser address bar displays "Twitter, Inc. [US] | https://twitter.com". The navigation bar includes links for Home, Moments, Notifications, and Messages, along with a search bar. The left sidebar shows the user's profile for "International Trade and Transportation Committee @and_trade" with 5 tweets. Below the profile is a "Add your birthday" form, which is 83% complete. The main content area shows a tweet from @and_trade: "Idea for Sunday 1 pm slot!". The tweet features a large graphic for the "TRB 98TH ANNUAL MEETING" with the text "ARE COMING TO THE TRB 98TH ANNUAL MEETING". The graphic also includes details about the meeting: "How might new technologies, public and private organizations and consumer preferences be combined to deliver Mobility as a Service (MaaS)?", "LOCATION: Walter E. Washington Convention Center", "DATE: January 13, 2019", and "TIME: 1:30 - 4:30 pm". To the right of the main text, there are sections for "THE SCENARIO" and "PARTICIPATION".

Twitter, Inc. [US] | https://twitter.com

Home Moments Notifications Messages Search

What's happening?

See 1 new Tweet

International Trade and Transportation Committee @and_trade · now
Idea for Sunday 1 pm slot!

ARE COMING TO THE TRB 98TH ANNUAL MEETING

How might new technologies, public and private organizations and consumer preferences be combined to deliver Mobility as a Service (MaaS)?

LOCATION:
Walter E. Washington Convention Center

DATE:
January 13, 2019

TIME:
1:30 - 4:30 pm

THE SCENARIO
From safety and revenue models to social equity and privacy concerns, now is the time to shape MaaS. Building upon National Cooperative Highway Research Program (NCHRP) Foresight Series 750, you are invited to attend or participate on a team in an open-ended competition to "solve" how MaaS can be brought effectively forward in North America.

PARTICIPATION
Applications to serve on one of the teams for the 2019 competition are being accepted at surveyMonkey.com/tr2019TRBWGame

All Strategic War Game teams will be preassigned by October 15, 2018 and will have a team-leader. Teams will have the opportunity to work together before and during the competition. There will be room for audience observation and involvement.

The Strategic War Games are interactive and

Add your birthday
Let Twitter celebrate with you. You're always in control of who can see it.

This should be your date of birth, whether this account is for your business, event, or even your cat.

Month Day Year

83% complete

Strategic Topics Workshop

Objective

Identify research ideas on strategic topics that impact international trade and transportation

Mechanics.

Brief presentation followed by discussion to define research questions/topics

Outcome.

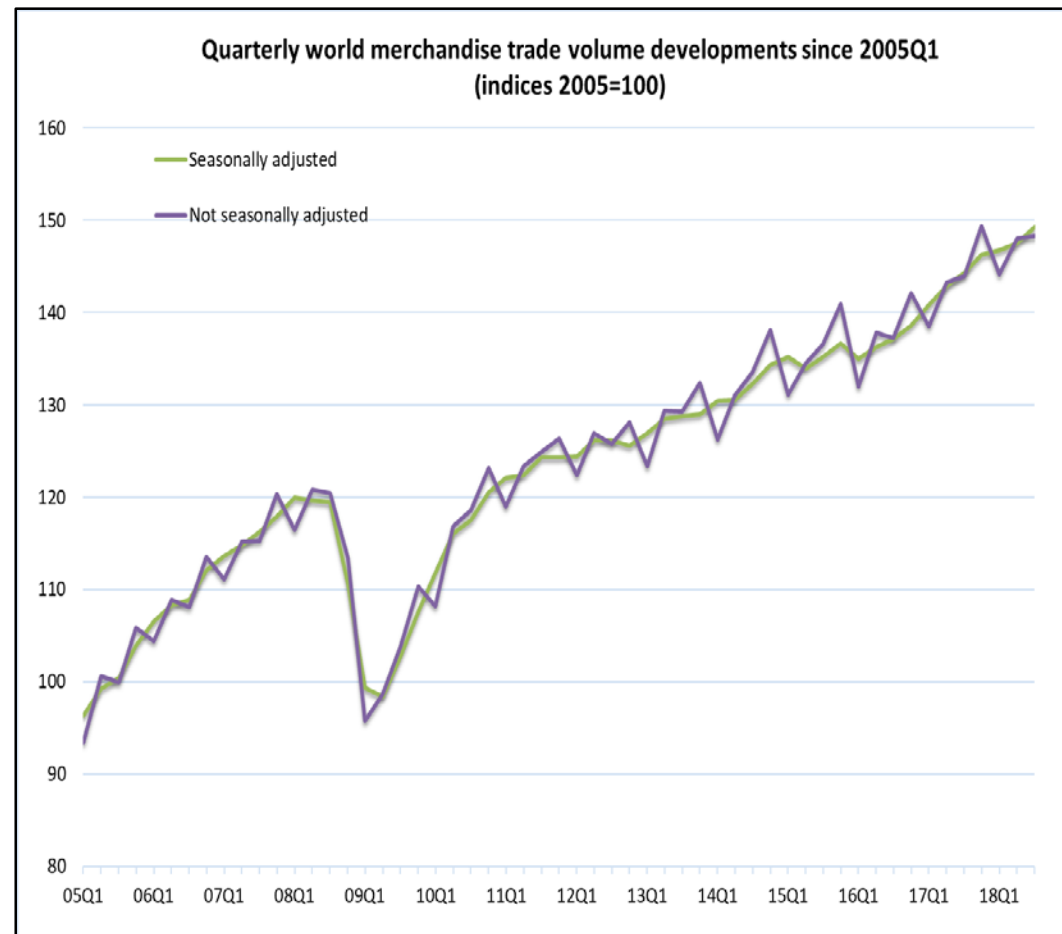
Research ideas that could be developed further into problem statements

- ✓ International trade changes impacting the transportation system
- ✓ Chinese One Belt One Road initiative
- ✓ Blockchain technology impacts in international trade and transportation
- ✓ Impacts of the 2020 International Maritime Organization's bunker regulations in international trade

International trade changes impacting the transportation system

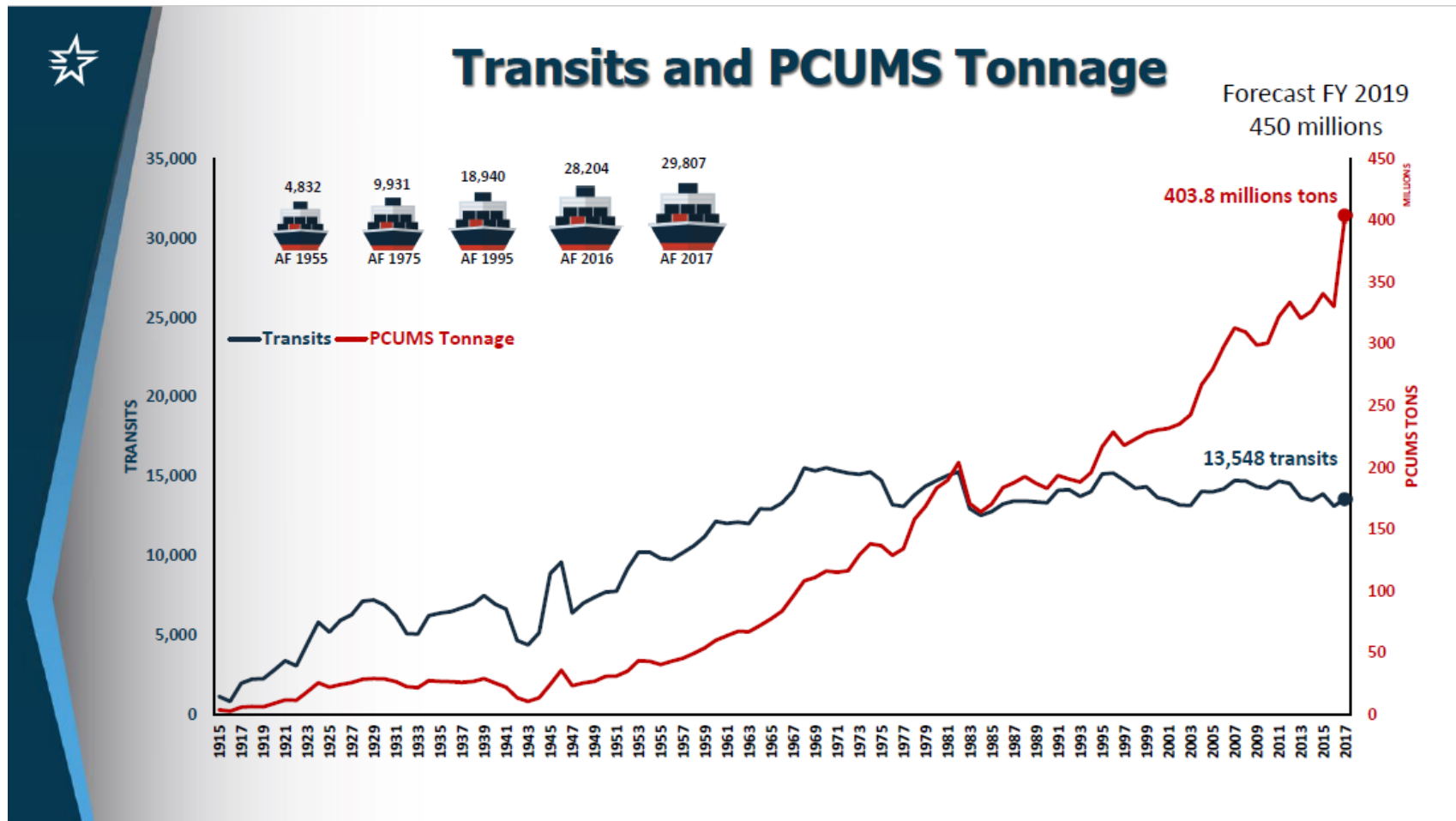
Background

- International trade volume continues growing
- However, trade patterns are changing due to:
 - ✓ Changes in infrastructure (Panama Canal expansion)
 - ✓ Trade agreements (disagreements)
 - ✓ Commodity demand fluctuations
 - ✓ Technological development (3D printing, advanced robotics)



International trade changes impacting the transportation system

Panama Canal Expansion

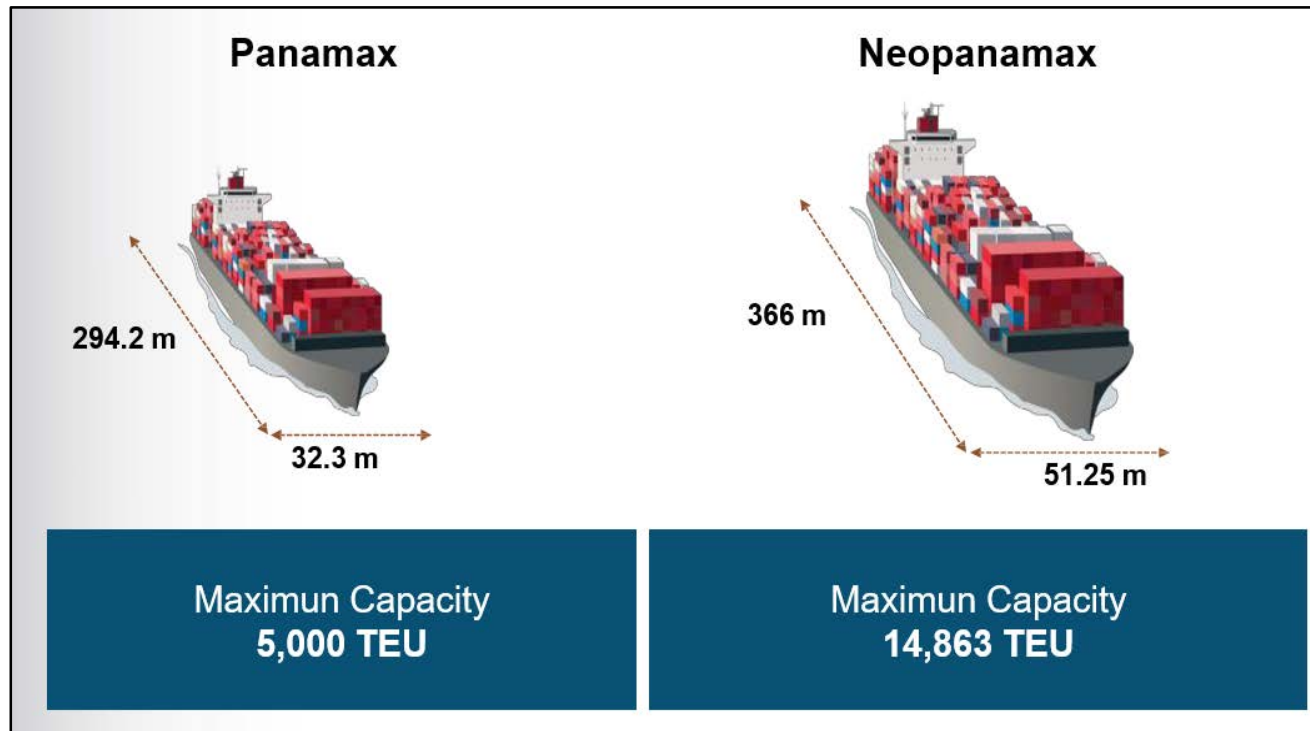


Source: Panama Canal Authority (PCA)

International trade changes impacting the transportation system

Panama Canal Expansion

- Effects generated by larger vessels: the larger the vessels the fewer the number of port calls, reduction in transportation costs, reduction in CO2 emissions.

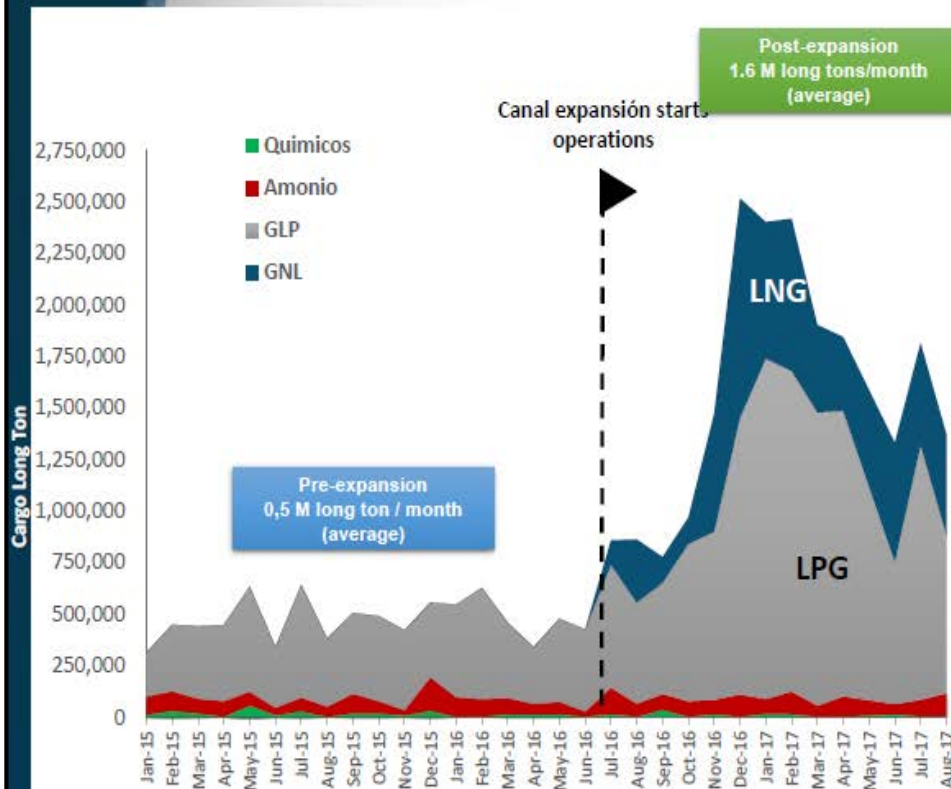


Source: Panama Canal Authority (PCA)

International trade changes impacting the transportation system

Gas Trade and the Panama Canal Expansion

FY 2018



LPG-Panamax



Average Cargo:
25,000 metric tons

VLGC



Average Cargo:
43,000 metric tons

ECONOMIES OF SCALE

LNG – New Segment



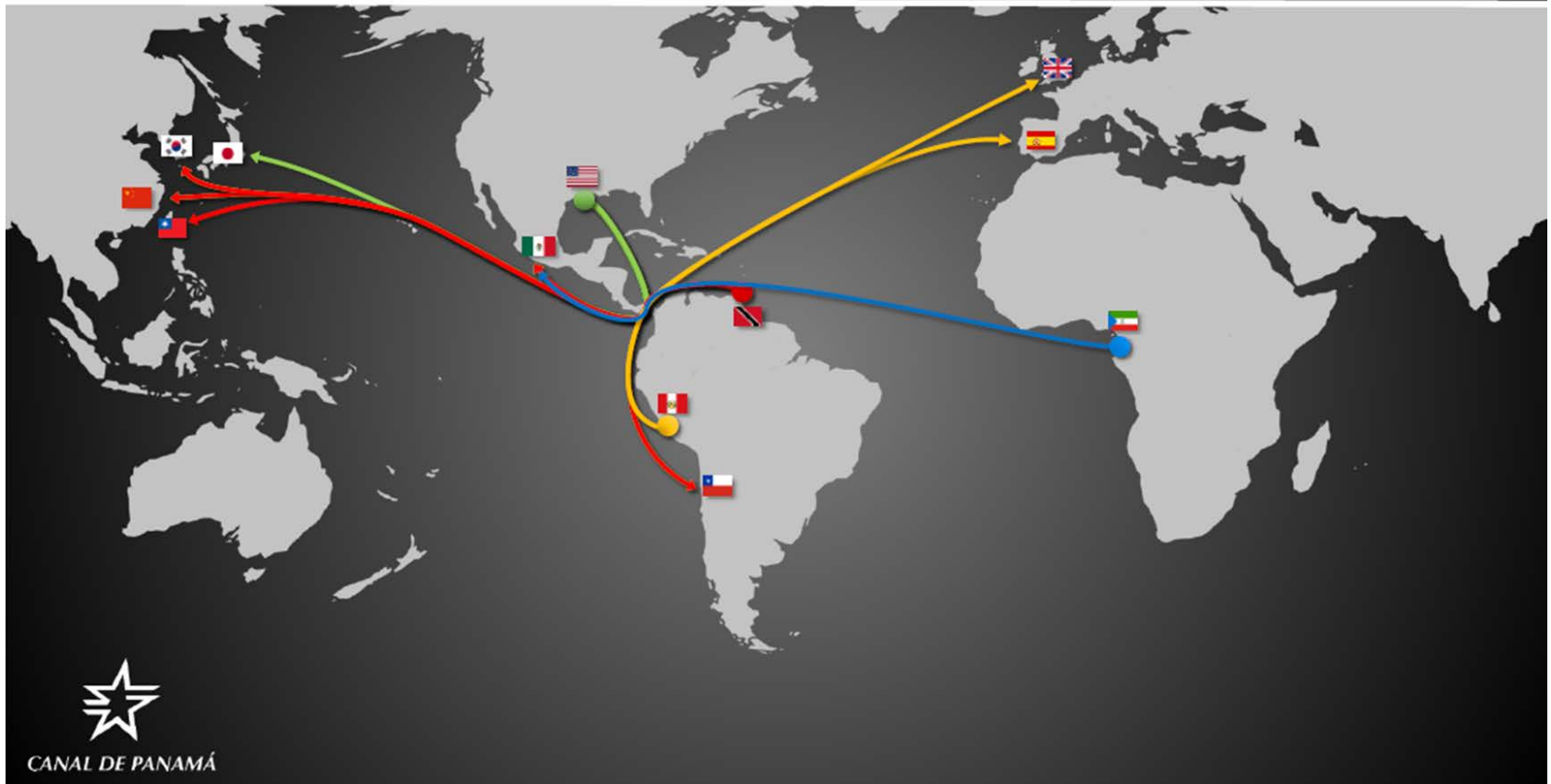
Average Cargo: 70,000 metric tons

Source: Panama Canal Authority (PCA)

International trade changes impacting the transportation system

Gas Trade and the Panama Canal Expansion

The Routes for the New LNG Segment



Source: Panama Canal Authority (PCA)

International trade changes impacting the transportation system

Trade Agreements (disagreements)

Renegotiation of NAFTA

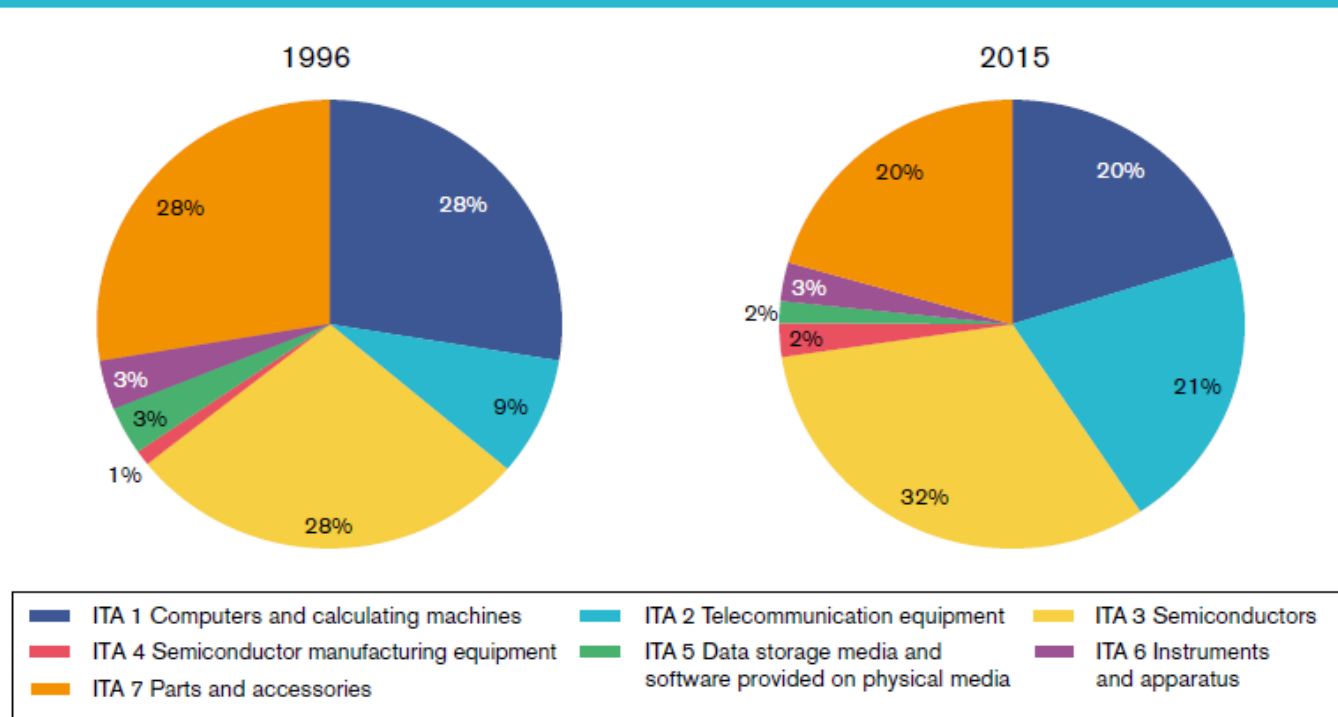
- **The United States-Mexico-Canada Trade Agreement (USMCA)**
- New provisions related to the auto industry starting in 2020:
 - ✓ Cars and trucks must have 75% of its components manufactured in NA to qualify for zero tariffs (current requirement is 62.5%)
 - ✓ Cars and trucks should have at least 30% of the work on the vehicle done by workers earning \$16/hr (moves up to 40% for cars by 2023)

International trade changes impacting the transportation system

Technological Development

- With the increasing penetration of digital technology, international trade of some goods may **rise**, **decline**, or even **disappear** in the coming decades.

Figure C.15: World exports of ITA products, by product category (percentage share)



Source: WTO Secretariat, based on UN Comtrade.

International trade changes impacting the transportation system

Technological Development

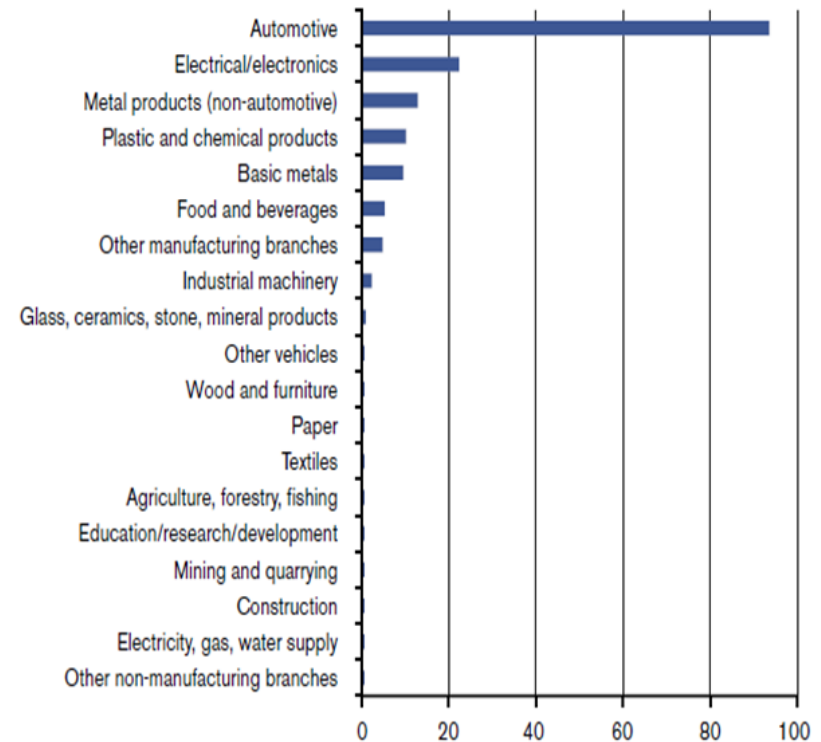
- Digitalization has led to a decline in trade of DVDs, CDs, books and newspapers from 2.7 % in 2000 to 0.8% in 2016.
 - These items have been replaced by e-books, news apps and media content streaming or download services
 - This trend is likely to continue with the advent of 3D printing technology
- 3D Printing may render transport and logistics costs irrelevant.
 - Example: sports shoes are 3D-printed in new automated factories in Germany and the U.S., shorting the time between completion of the shoe design to its delivery to shops to **less than one week**.

International trade changes impacting the transportation system

Technological Development

- Advanced robotics, 3D printing, and other advances are changing how cars, electronics, apparel, and consumer goods are made, and how nations compete for production and international trade.

Figure B.20: Robot use by sector (number of robots per 1,000 employees)



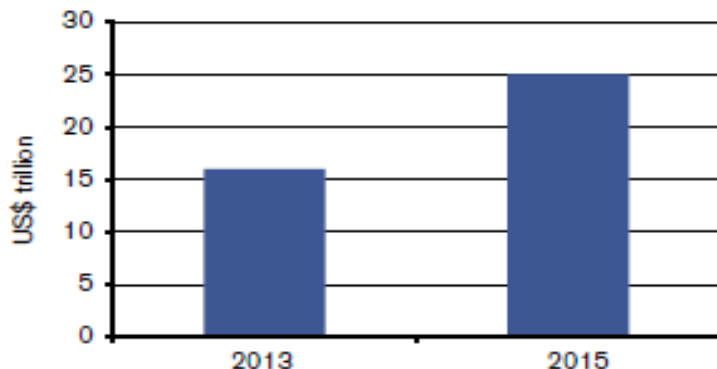
Sources: Authors' calculation based on data by the International Federation of Robotics.

International trade changes impacting the transportation system

Technological Development

- From 2013 to 2015, value of global e-commerce transactions increased by 56%.
- Digital technologies are reshaping consumer habits.

Figure B.21: Value of world e-commerce transactions, 2013 and 2015



Source: UNCTAD (2017a).

Note: Data cover both B2B and B2C transactions.

E-COMMERCE SHIPPING



63%

of customers
expect items to be
delivered in 3 days



85%

of buyers will pay
for expedited
shipping



75%

consider free returns
when deciding where
to shop online

Source: Freight Waves

International trade changes impacting the transportation system

Questions

- How to minimize negative impacts of international trade flows fluctuations in:
 - Transportation infrastructure, that requires substantial funding and long time to plan, develop and build?
 - Transportation equipment?
- Is it possible to anticipate and be prepared for trade flow changes?
- What kind of research is needed to make better decisions? To be better prepare for these potential changes?

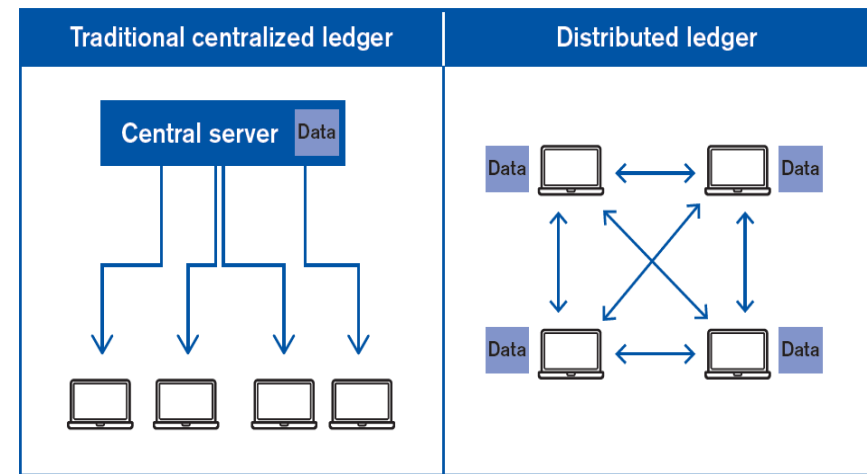
Chinese One-Belt-One-Road Initiative

Blockchain technology impacts in international trade and transportation

Blockchain: a tamper-proof, decentralized and distributed digital record of transactions that creates trust and is said to be highly resilient.

Blockchain ensures immediate, across-the-board transparency, and as transactions added to the blockchain are time-stamped and cannot easily be tampered with, blockchain technology allows products and transactions to be traced easily.

Smart contracts = computer programs that self-execute when certain conditions are met – can be used to automate processes, further reducing costs.



Source: Can Blockchain revolutionize international trade?, Emmanuelle Ganne, World Trade Organization

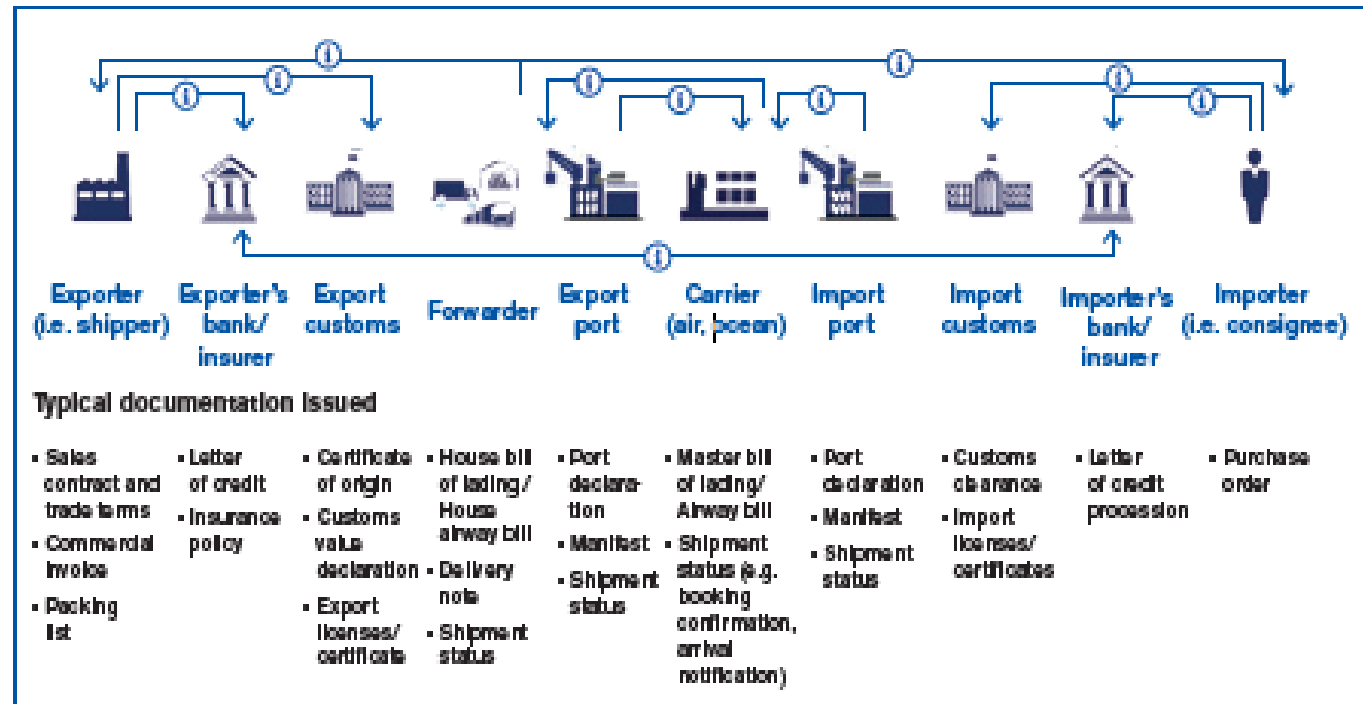
Blockchain technology impacts in international trade and transportation

Can we use blockchain to move towards paperless trade??

Documents:

- Commercial
- Trade finance
- Transport
- Border procedures

Typical international trade documentation issued



Source: Accenture.

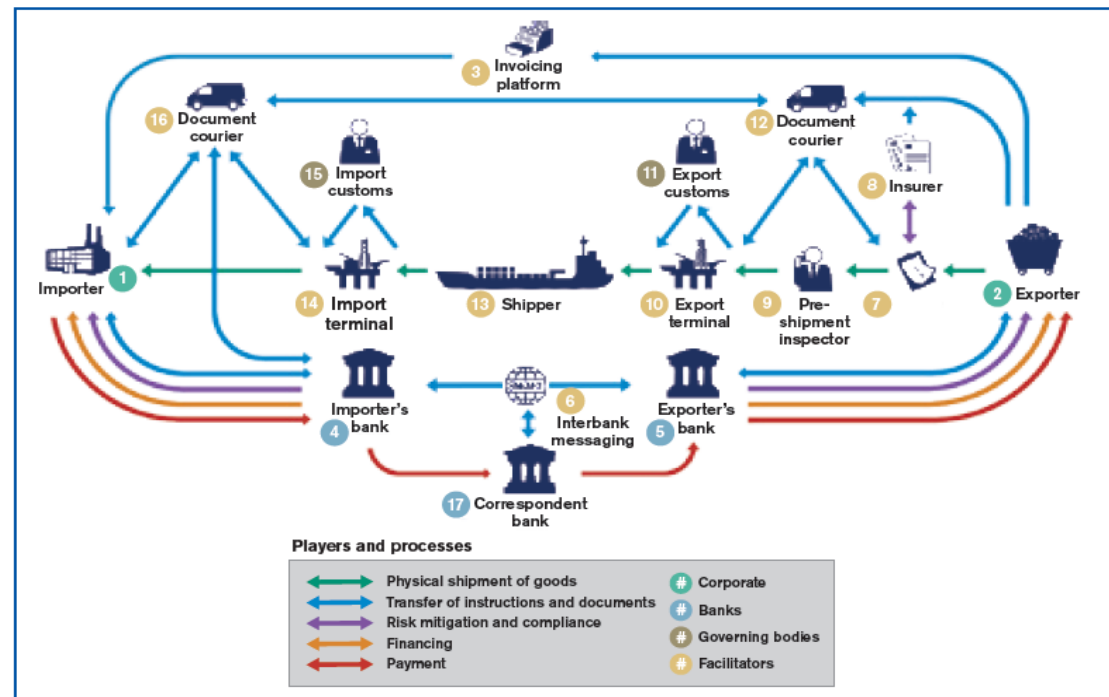
Blockchain technology impacts in international trade and transportation

Trade finance is one area of potential improvements

The traditional finance process is highly fragmented across multiple entities and processes



Streamline and automate letters of credit processes.

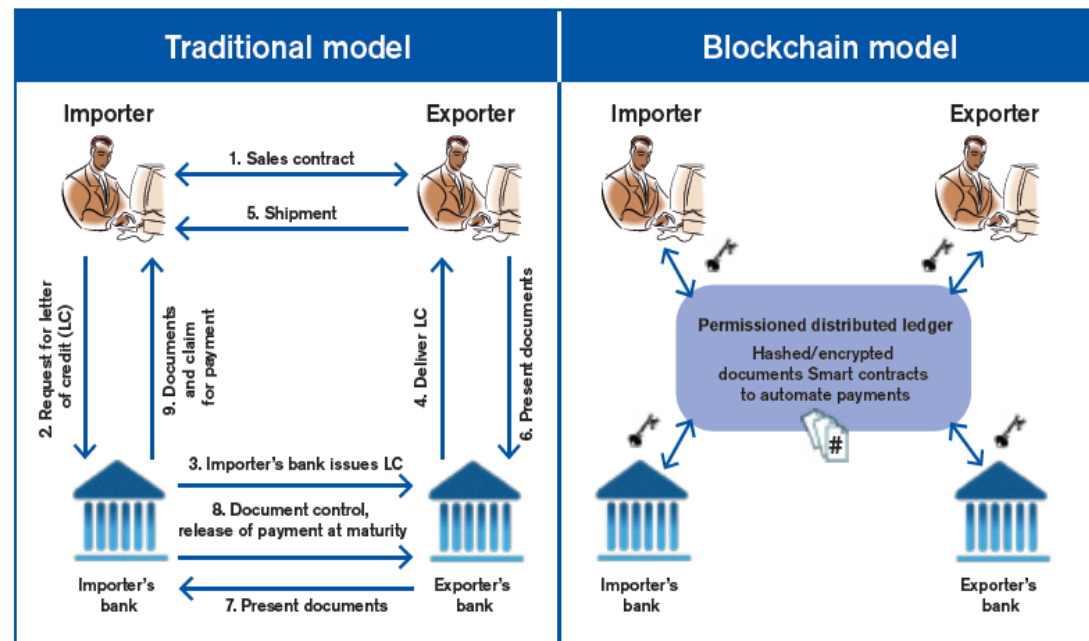


Source: Boston Consulting Group (2017).

Blockchain technology impacts in international trade and transportation

Letter of credit process using blockchain

The application shares information between exporters, importers, and banks on a distributed ledger



Blockchain technology impacts in international trade and transportation

Challenges?

- Scalability
- Security
- Interoperability
- Legal issues

What type of research is needed to move from proofs of concepts to real world applications?

IMO's bunker regulations

IMO relevant regulations in force

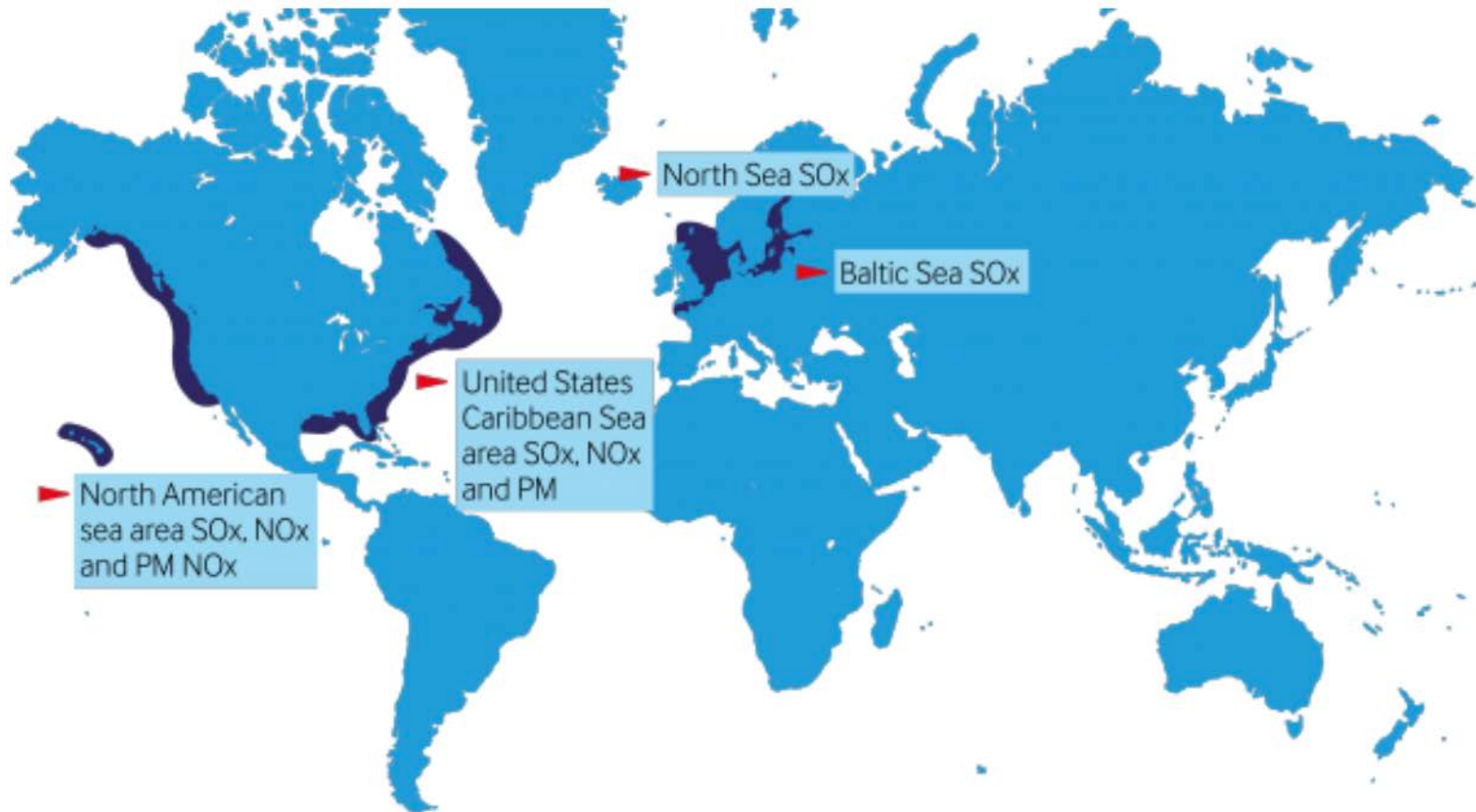
MARPOL Convention

- Annex VI: Prevention of air pollution from ships (SO_x, NO_x, OCS, VOC, shipboard incineration)

1997	2005	2008	2010	2012	2015
IMO adopts MARPOL – Annex VI	Annex VI enters into force. Global sulphur limit of marine fuels set to 4.5% m/m. ECAs introduced – lower limit of 1.5% m/m applied	IMO revises Annex VI and strengthens requirements. Timeline set for sulphur limit reductions	Planned reductions enter into force. Sulphur limit in ECAs reduced to 1.0% m/m	Global sulphur limit reduced to 3.5% m/m. New ECAs introduced	Sulphur limit in ECAs reduced to 0.1% m/m

IMO relevant regulations in force

Emission Control Areas (ECAs)



IMO relevant regulations – upcoming reductions

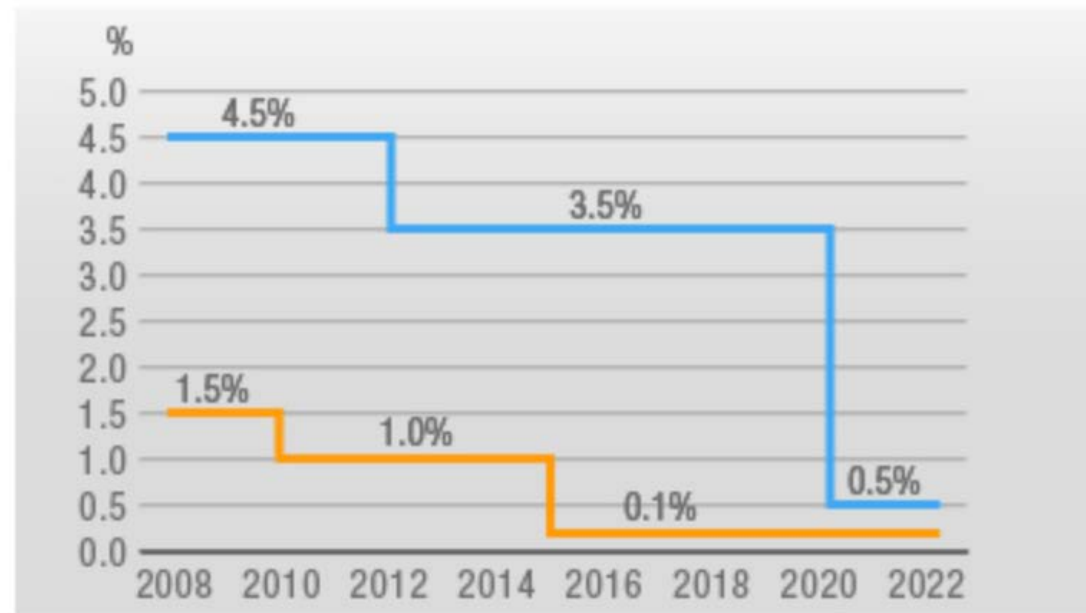
2020

Global sulphur limit to be reduced to **0.5% m/m** (January, 1st)



Confirmed by IMO in 2018

Emission legislation – IMO fuel Sulphur cap
Fuel sulphur content



— ECAs
— Global

IMO recent new strategy

Marine Environmental Protection Committee (MEPC)

72nd session (April 2018)

'Initial IMO strategy to reduce GHG emissions from ships'

Ambitions

- Reduce CO₂ emissions per transport work by at least 40% by 2030 pursuing efforts towards 70% by 2050 compared to 2008
- Reduce total annual GHG emissions by at least 50% by 2050 compared to 2008, while pursuing efforts towards phasing them out
- Strengthen the energy efficiency design requirements for new (EEDI) and existing (SEEMP) ships

Intersessional Working Group
on Reduction of GHG emissions
from ships



Development of a programme
of short-term follow-up actions

IMO additional recent regulation

Marine Environmental Protection Committee (MEPC)

↓
73rd session (October 2018)

Adoption of a MARPOL amendment to prohibit the carriage of non-compliant (to the global 2020 sulphur cap) fuel oil for propulsion or operation on board a ship *unless* the ship has an exhaust gas cleaning system ('scrubber') fitted

↓
To come into force in March 2020

Options for complying to the new 2020 global sulphur cap

- Use of compliant fuels (distillates, 0.5% sulphur fuel oil or compliant fuel blends)
- Uptake of Exhaust Gas Cleaning Systems – EGCS ('scrubbers') to existing ships or new-builds
- Use of alternative fuels



Each option coupled with significant capital investments, long-term implications, certain complexity and level of risk

Use of compliant fuels

Challenges:

Refining capacity to meet the expected increase in fuel demand

↳ Two main contradictory studies

- CE Delft (commission by IMO):
In all scenarios assessed, the refinery sector presents the capability to meet the demand of marine fuels with 0.5% and 0.1% m/m sulphur content while also meeting demand for non-marine fuels
- Ensys and Navigistics (supported by BIMCO and IPIECA):
Refining capacity will not be sufficient and 60-75% additional sulphur plan capacity needs to be built by 2020

Type of compliant fuel available in ports

↓
The range of available compliant fuels can be limited in smaller ports

Fluctuations of bunker prices

↓
Forecasts of 0.5% bunker prices average to about \$240/mt higher than sulphur fuel oil in 2020 and even \$400/mt in 2022

Uptake of EGCS ('scrubbers')

- Despite a recent surge in demand, the number of vessels with EGCS already installed or on order is very limited (983 vessels as of May 31st, 2018 according to EGCSA – 3% of global fleet)
- Significant capital investment (e.g. according to Wartsila for a container with 20MW engine, the cost is about €5.3 million with payback period of around 5 years)
- Wider regulatory risk, since they are not designed to cope with all environmental regulations likely to be imposed in shipping
- Ro-Ro, ferry and cruise operators first adopters. Bulk carriers have now taken over with containerhips and tankers following

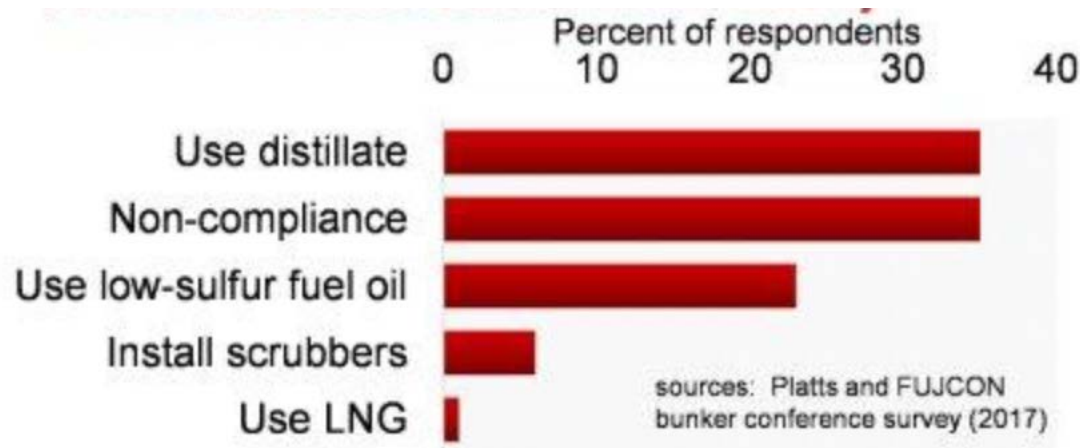
Use of alternative fuels

- LNG as the main option (253 vessels in service and on order as of May, 1st 2018) – however bunkering infrastructure still an issue
- Fully electric vessels as well as vessels exploiting renewable energy sources (e.g. Flettner rotors) are currently under investigation, pilot-testing and/or early deployment
- Other alternative fuel sources (e.g. methanol, fuel cells, hydrogen) have not yet reached the required level of maturity but are likely to share the marine fuel market in the future

Key issue for the success of the 2020 global sulphur cap



Enforcement – monitoring of non-compliance and sanctioning of violations



Enforcement – monitoring of non-compliance



46 shipping companies committed to support robust and transparent enforcement of sulphur regulations as well as to comply with said regulations

↓ *Ensure*

Fair level-playing field

Key question:

How can the new regulations be successfully enforced and violators be identified and sanctioned?

- Sanctions are enforced by individual parties to MARPOL (i.e. flag and port states). However several key flag states are not signatories to MARPOL
- The EU and US have traditionally been stricter enforcers of environmental regulations (ECAs), but few other countries are expected to develop a robust enforcement system
- Penalties for non-compliance vary significantly

Challenges

Key shipping emissions measuring techniques

Technique / approach	SO ₂ measurement	NO _x measurement	Coverage	Remarks
Measuring techniques				
Continuous emissions monitoring	Measured	Measured	Anywhere, anytime	Relatively high cost
Sniffers (aeroplanes, helicopters, Unmanned Aerial Vehicles)	Derive sulphur content from SO _x /CO ₂ ratio	Derive NO _x emissions from NO _x /CO ₂ ratio, assumption of SFC needed	Local	Reliable
Differential Optical Absorption Spectrometry - DOAS	CEM: Measured AQM: SO ₂ concentration and wind speed gives flux, estimate of fuel consumption needed	CEM: Measured AQM: NO _x concentration and wind speed gives flux, estimate of fuel consumption needed	CEM: Anywhere, anytime AQM: local (e.g. port entrance)	Accurate enough to check sulphur content, accuracy for NO _x not sufficient
Light Detection and Ranging (LIDAR)	SO ₂ flux (g/s) measured, estimate of fuel consumption needed	-	Local (e.g. port entrance)	Sensitive to wind speed and direction, not all sulphur oxidises to SO ₂
Ultraviolet (UV) camera	SO ₂ flux (g/s) measured, estimate of fuel consumption needed	-	Local (e.g. port entrance)	Still experimental, limited accuracy and precision, further developments required
Satellite monitoring	-	Concentration must be converted to emission	Anywhere, anytime	For large areas, not for individual ships

May be efficiently exploited / combined in new enforcement systems to be introduced

Key shipping emissions modelling approaches

IMO DCS
&
EU MRV

Modeling approaches				
<u>Fuel consumption monitoring and emissions modeling</u>	Apply emission factors (gSO ₂ /kg_fuel)	Apply emission factors (gNO _x /kg_fuel)	Country level	Sulphur content and activation of after treatment unknown
Fuel consumption and emissions modeling	Apply emissions model	Apply emissions model	Individual ship	e.g. ENTEC model, TNO model, STEAM model, etc.

Can support the development of proper indexing schemes that may provide a first level environmental screening layer

Implications for international trade

- Trade flows of residual fuel and distillates will both be shifted. Estimations indicate that for 0.5% fuel blend, only Asia will be self-sufficient. All other continents will need to import
- Lloyd's List estimates shipping costs could rise between 20% to 85%, as a result of the 2020 global sulphur cap, depending on vessel speed and size

Key question:

Will increases in maritime transport costs lead to lower international trade flows?



- Will shipping absorb the cost increases?
- What will be the cost increases for shippers and cargo owners?
- Could these cost increases be mitigated?

Will shipping absorb the cost increases?

Depends on *competitive pressure* and *profitability*

Container shipping:

- Increasing concentration (top 10 carriers control almost 70% of capacity)
- Intensified cooperation (global alliances)
- Decrease of containerized freight rates
- Difficulties in achieving profits on a more that occasional nature



Less choices for shippers and fewer risk management tools



Limited possibility that container shipping lines will absorb the cost increases → likely to transfer them to shippers

What will be the cost increases for shippers and cargo owners?

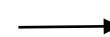
Imported value that can be attributed to shipping:

- 5% for manufactured goods
- 11% for agricultural goods
- 24% for industrial raw materials



Cost increases for shippers

- up to 3.5% for manufactured goods
- up to 7.5% for agricultural goods
- up to 16.5% for industrial raw materials



Possible relocation
effects for certain
industries

Could these cost increases for shippers be mitigated?

- The expected cost increases for shippers can be lower in certain cases where mitigation opportunities still exist (e.g. further implementation of slow steaming)
- Generally, however, they are likely to moderate the modal shift from air to ocean trade expected for certain industries (e.g. automotive, electronics) and consequently the market shares that would be gained

Thanks for Volunteering!

Juan Carlos Villa

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979-862-3382