



## Intermodal Industry Overview

- History of Containers and Intermodal Industry
  - Intermodal Operations
  - Chassis and Chassis Pools



TRAC Intermodal Investor Relations

# Index

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	<u>Page</u>
• History of Containers and Intermodal Industry	4
• Intermodal Operations	13
• Chassis and Chassis Pools	37



# What is Intermodal?

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- **Intermodal freight transportation** involves the movement of goods using multiple modes of transportation - rail, ship, and truck. Freight is loaded in an intermodal container which enables movement across the various modes, reduces cargo handling, improves security and reduces freight damage and loss.





Overview

# HISTORY OF CONTAINERS AND INTERMODAL INDUSTRY





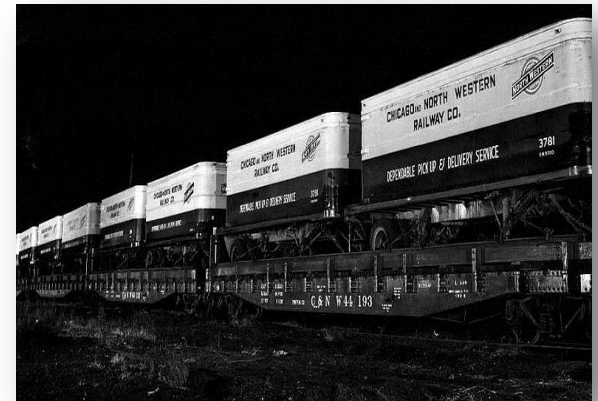
# Containerization Changed the Intermodal Industry

- Intermodal Timeline:
  - By Hand - beginning of time
  - Pallets
    - started in 1940's during the war to move cargo more quickly with less handlers required
  - Containerization: **Marine**
    - First container ship built in 1955, 58 containers plus regular cargo
    - Marine containers became standard in U.S. in 1960s (Malcom McLean 1956 – Sea Land, SS Ideal X, 800 TEUs)
    - Different sizes in use, McLean used 35'
    - 20/40/45 standardized sizes for Marine



# Containerization Changed the Intermodal Industry

- Intermodal Timeline:
  - Containerization: **Domestic Railroads**
    - Earliest containers were for bulk – coal, sand, grains, etc. – 1800's
    - Piggy backing was introduced in the early 1950's where regular trailers were placed directly on train flat cars.
    - Southern Pacific Railroad introduced the first double-stack intermodal cars in 1977
    - Railroads double-stacking fully introduced by 1984
    - 48/53 for US Domestic, Introduced in 1989 - 60% more capacity than standard 40'
    - Double-stack rail transport is approximately 70% of the United States' intermodal shipments, it transports more than one million containers per year



# Containerization Changed the Intermodal Industry

- Intermodal Timeline:
  - Containerization
    - 17 million intermodal containers in the world of varying types according to the World Shipping Council at 2010
    - 90% of non-bulk cargo worldwide is transported by container
    - Typical container has doors fitted at one end, and is constructed of corrugated weathering steel
    - Built to be stacked up to seven units high
    - Average life of 10 to 14 years depending on use
    - Cost \$3k to \$5k





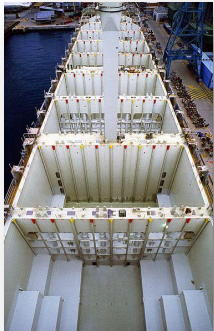
# Standardization / Variations of Containers

- Containers vary but the pin systems remain constant on ships and trains
  - Marine Standard 20'/40'/45'
  - Domestic Standard 53'
  - Other Types:
    - Tanker
    - Refrigerated
    - Bulk for minerals, heavy machinery



# Container Locking / Securing System

- A **twist-lock** and **corner casting** together form a standardized rotating connector for securing to:
  - Container Ships
  - Chassis
  - Railcars
  - Container cranes





# Rail

- Double-stack rail transport is approximately 70% of the United States' intermodal domestic shipments



# Container Ships Have Grown

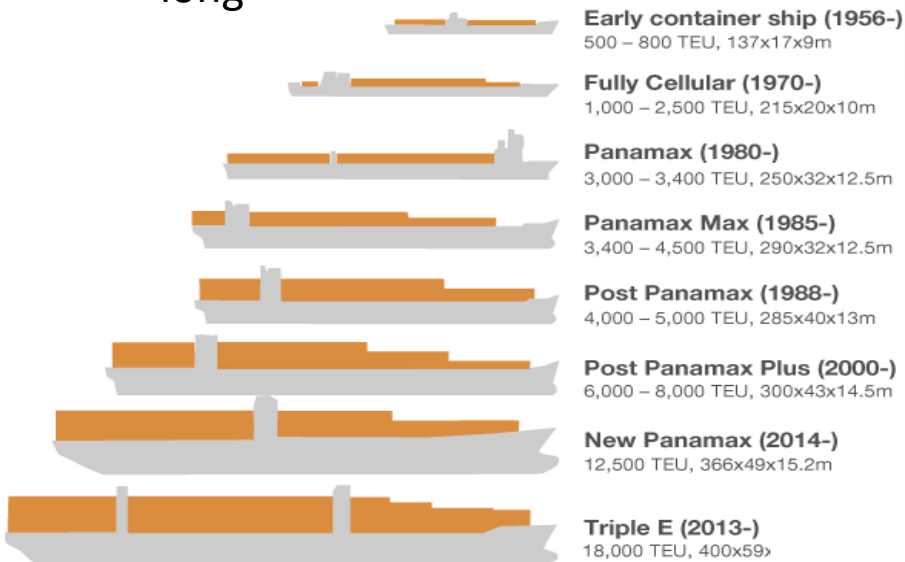
- First container ships were converted WWII surplus tankers – 1951 / 58 containers
- Modern container ships can carry up to 16,020 twenty-foot equivalent units (TEU)
- Maersk Triple E class "Economy of scale, Energy efficient and Environmentally improved", ¼ mile long



T2 Tanker- Ideal X type, 800 TEUs



Marco Polo, 16,020 TEUs



Triple E Class



# Container Ship Size has Limits

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- Most U.S. ports have bridge or depth limitations
- Panama canal has a TEU limit of approximately 5,000 TEUs<sup>1</sup>



<sup>1</sup> The \$5.3B Panama Canal expansion program will be done in 2016, allowing ship TEU limits to rise to 13,000.



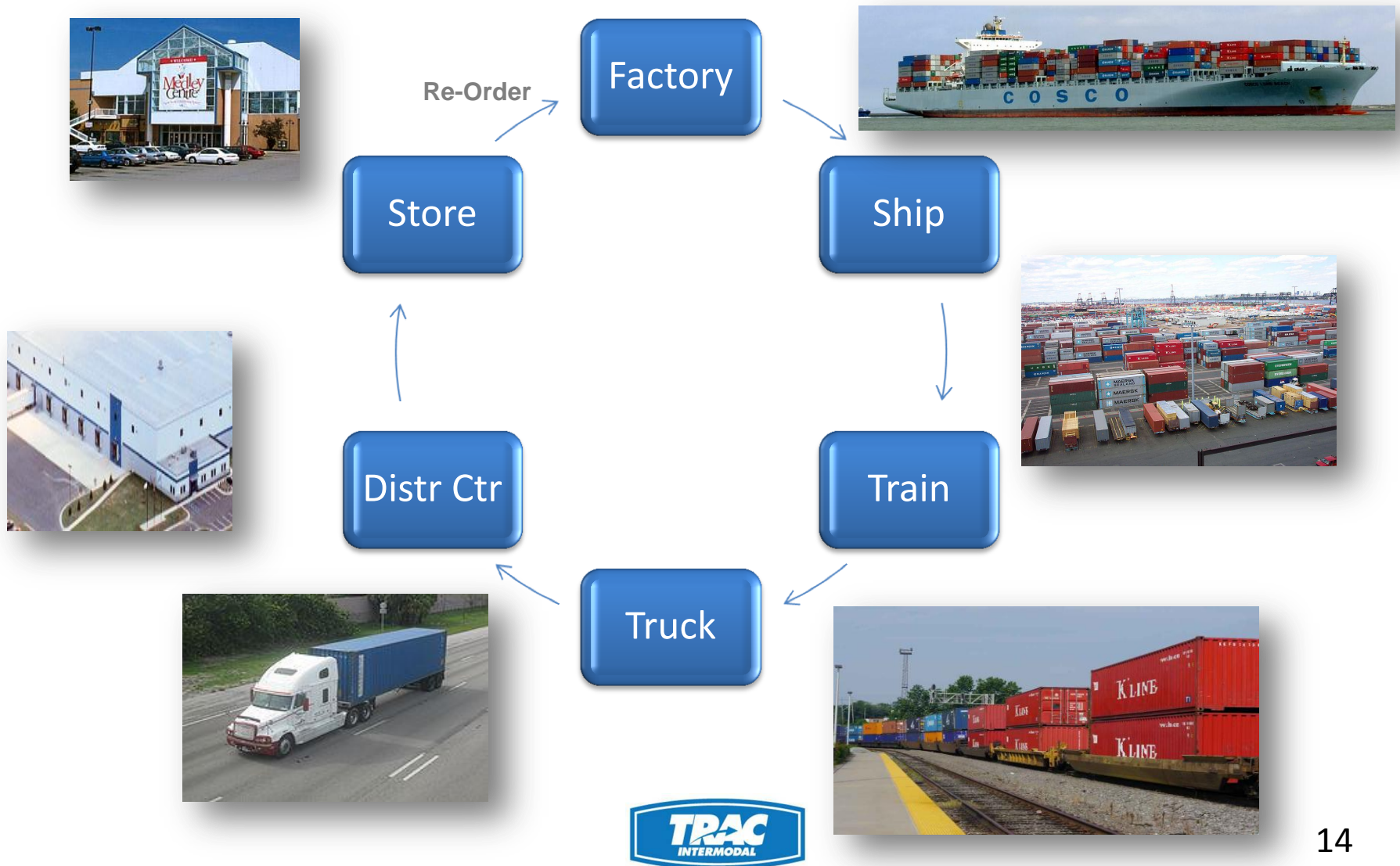
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Overview

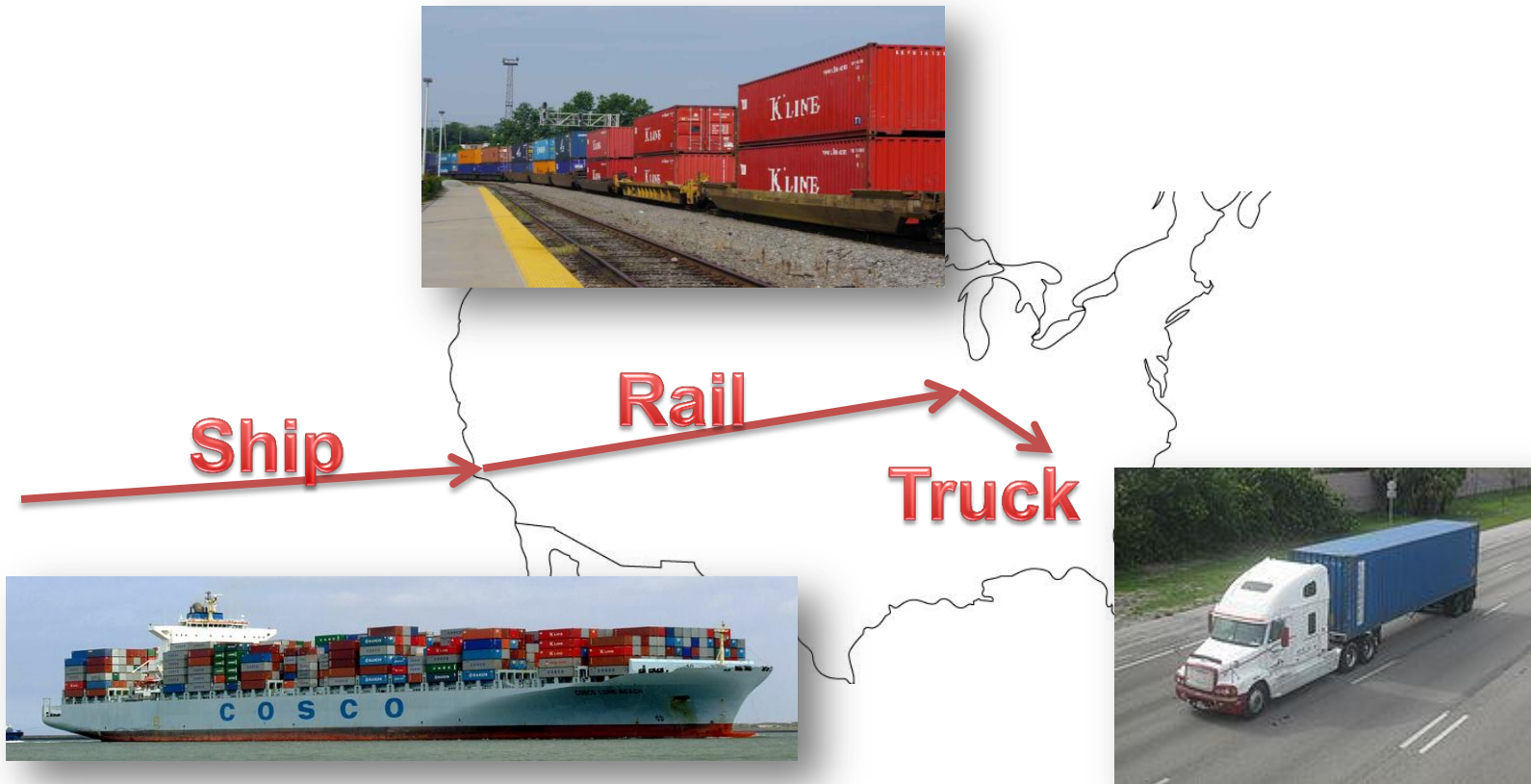
# INTERMODAL OPERATIONS



# Intermodal Transportation



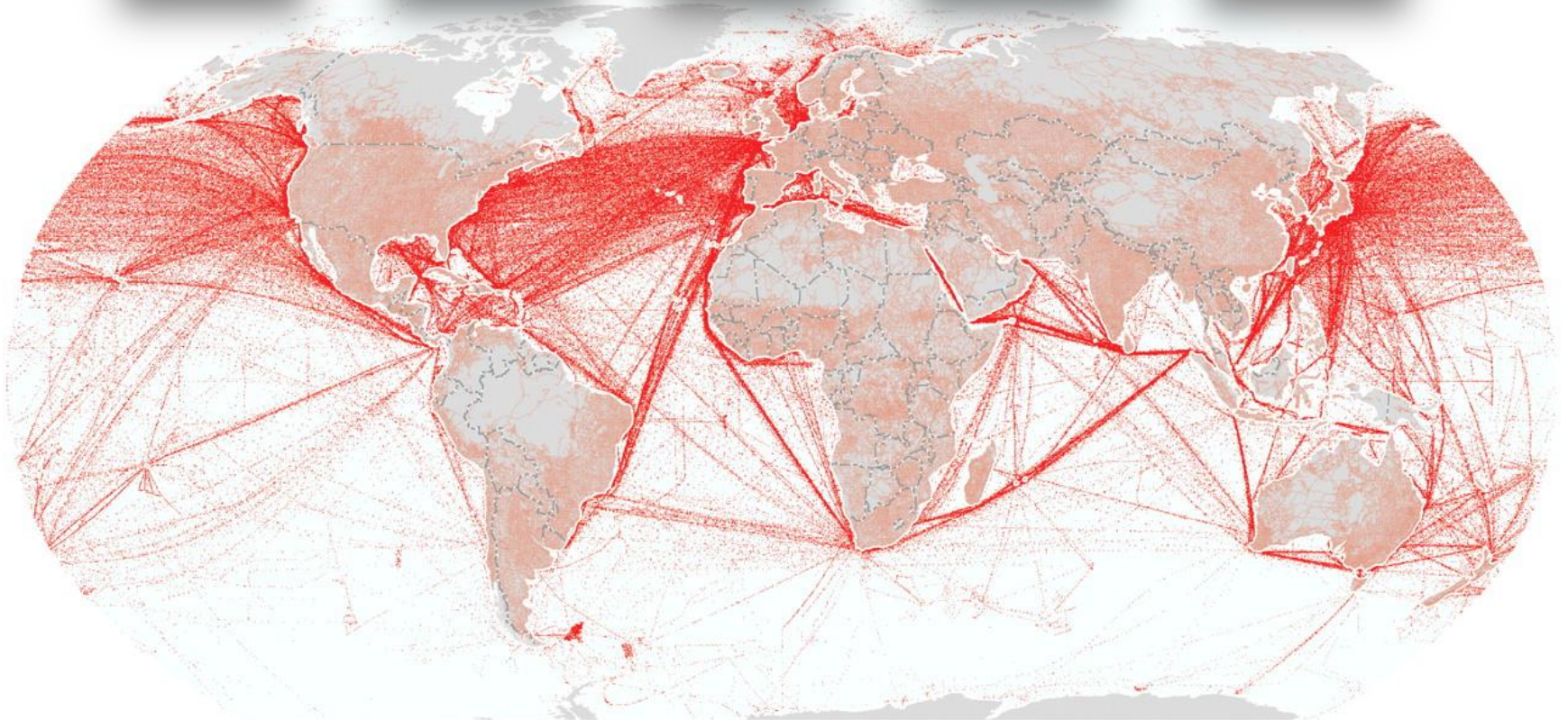
# Example of Freight Route – Asia to Eastern U.S.





# Steamship Lines Operate Regularly Scheduled Routes

- Top US ports – LA/LB, Newark, Gulf, S. Atlantic, Pacific / No. Cal



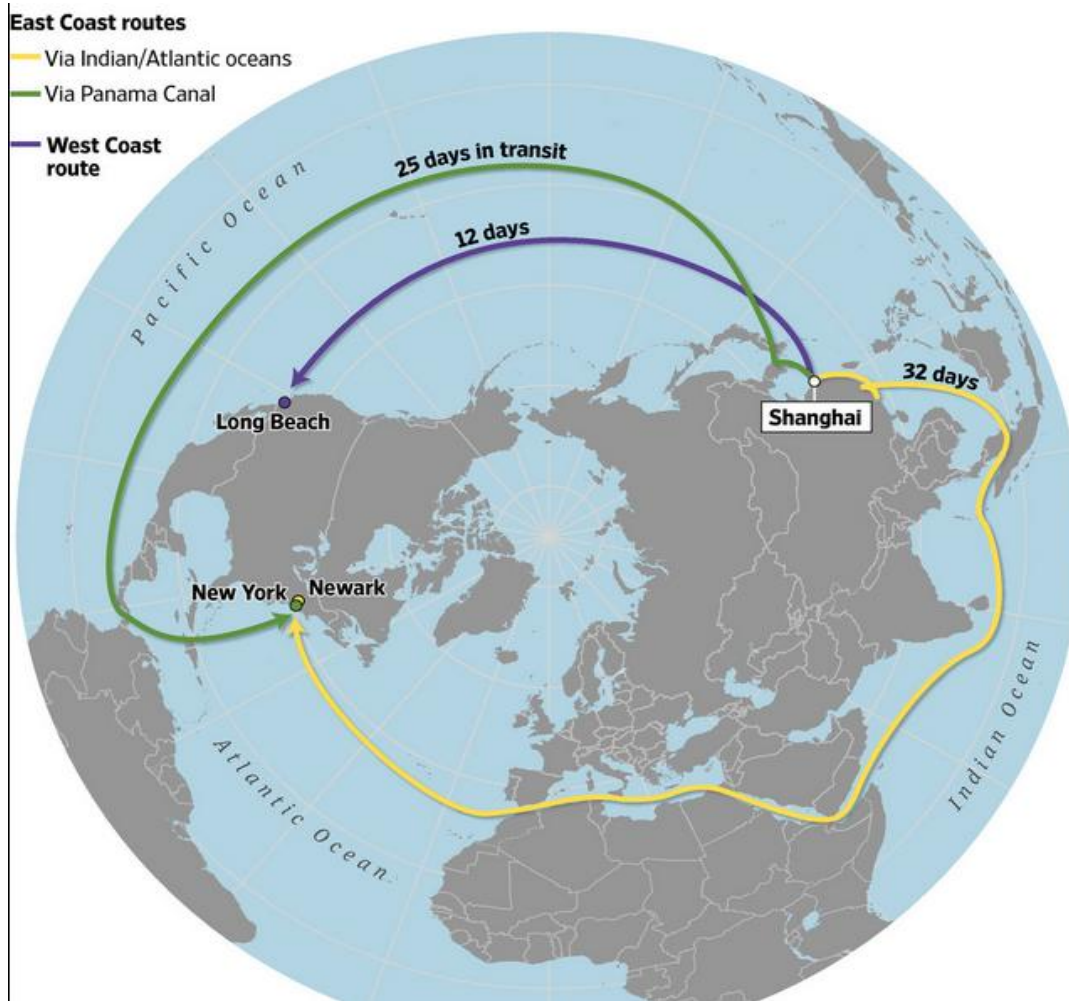
Shipping Lanes



Road Networks



# Shippers Alternative Routes



- Shippers can choose alternative routes in routing containers
- Items impacting a shipper's route selection:
  - Timing of when containers need to arrive
  - East versus West coast
  - Available capacity on ships
  - Port congestion



# Deliver Containers to Dock Side

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# Ports – Multiple Births – Some Specific to a SSL

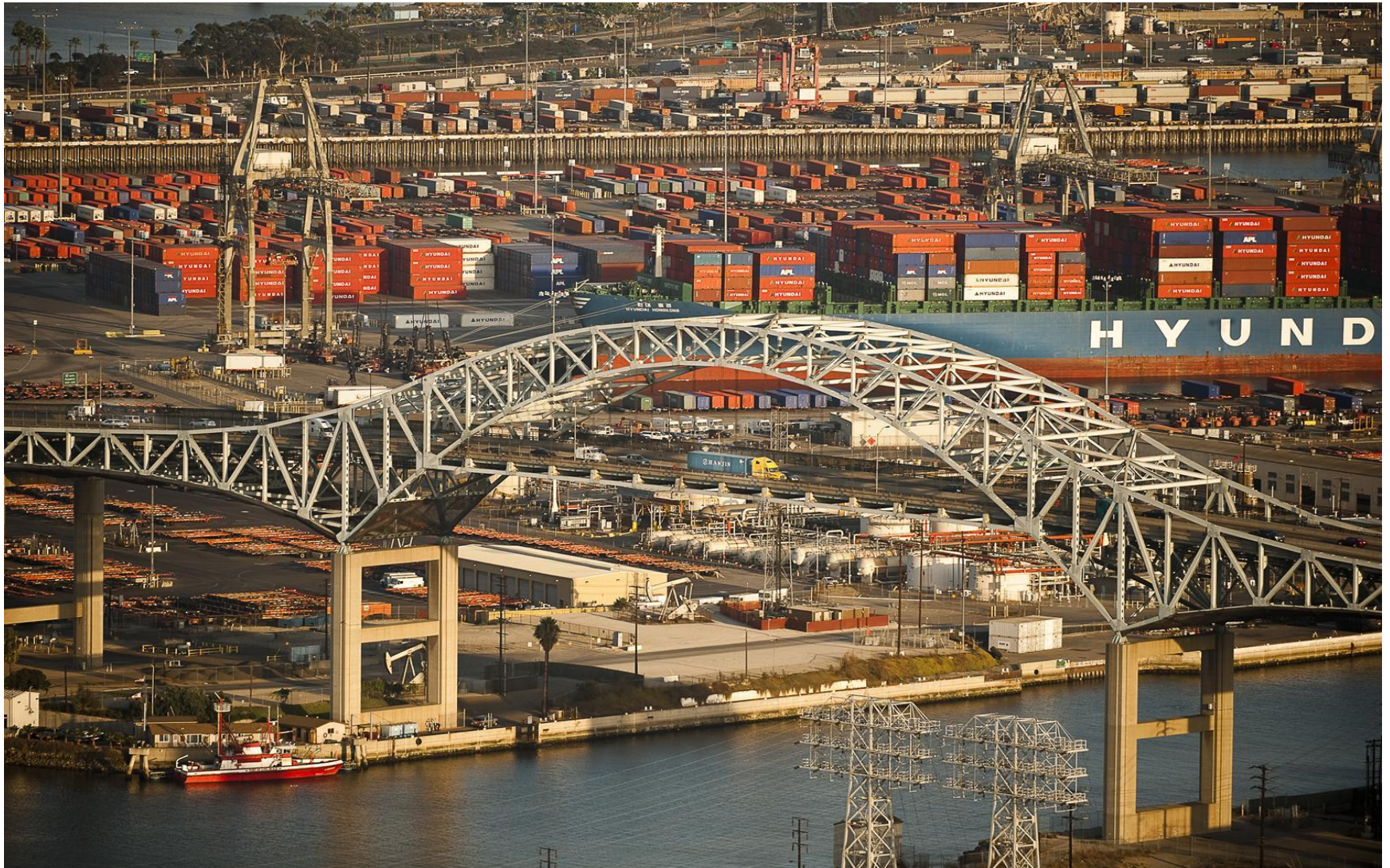


OOCL Ship at Port Long Beach





# Port – Some congested with limited space



Hanjin Ship at Port LA



# Gantry Cranes Load / Unload Containers

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# Gantry Crane Loading Containers into Ship





# Loading Container on 'Port Chassis'



# Stacking Containers

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# Ports – Stacked Containers (Grounded Operating Model)





# Ports – Wheeled Containers (Wheeled Operating Model)





# Truckers Check-In to Port



# Truckers Exiting Port Terminals



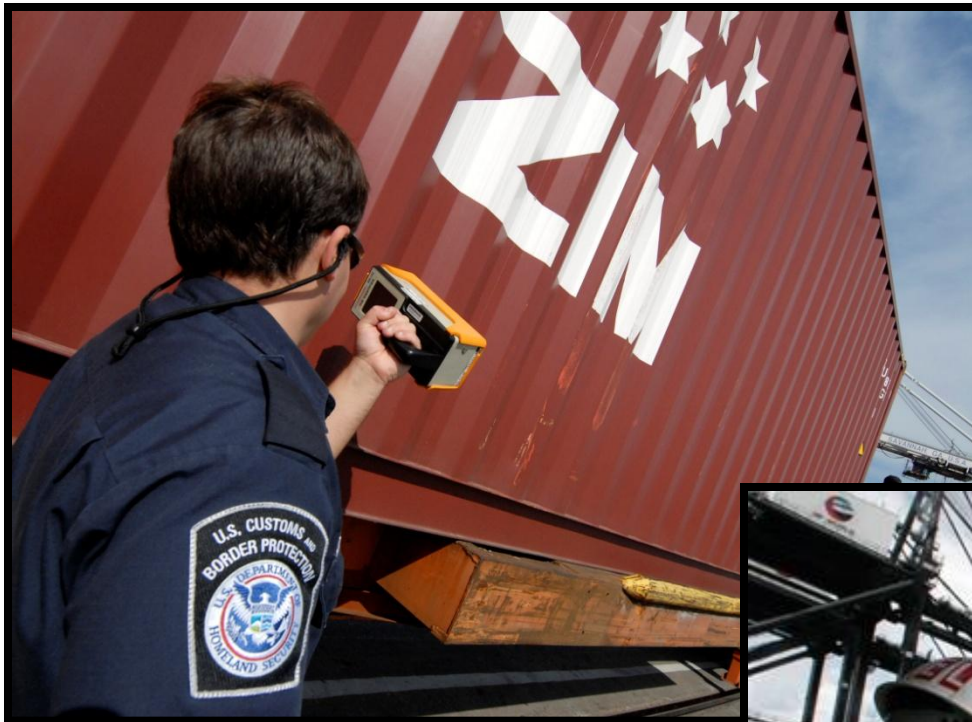


# Long Beach Gate Operations





# Ports and Rails are Secure Facilities / Customs





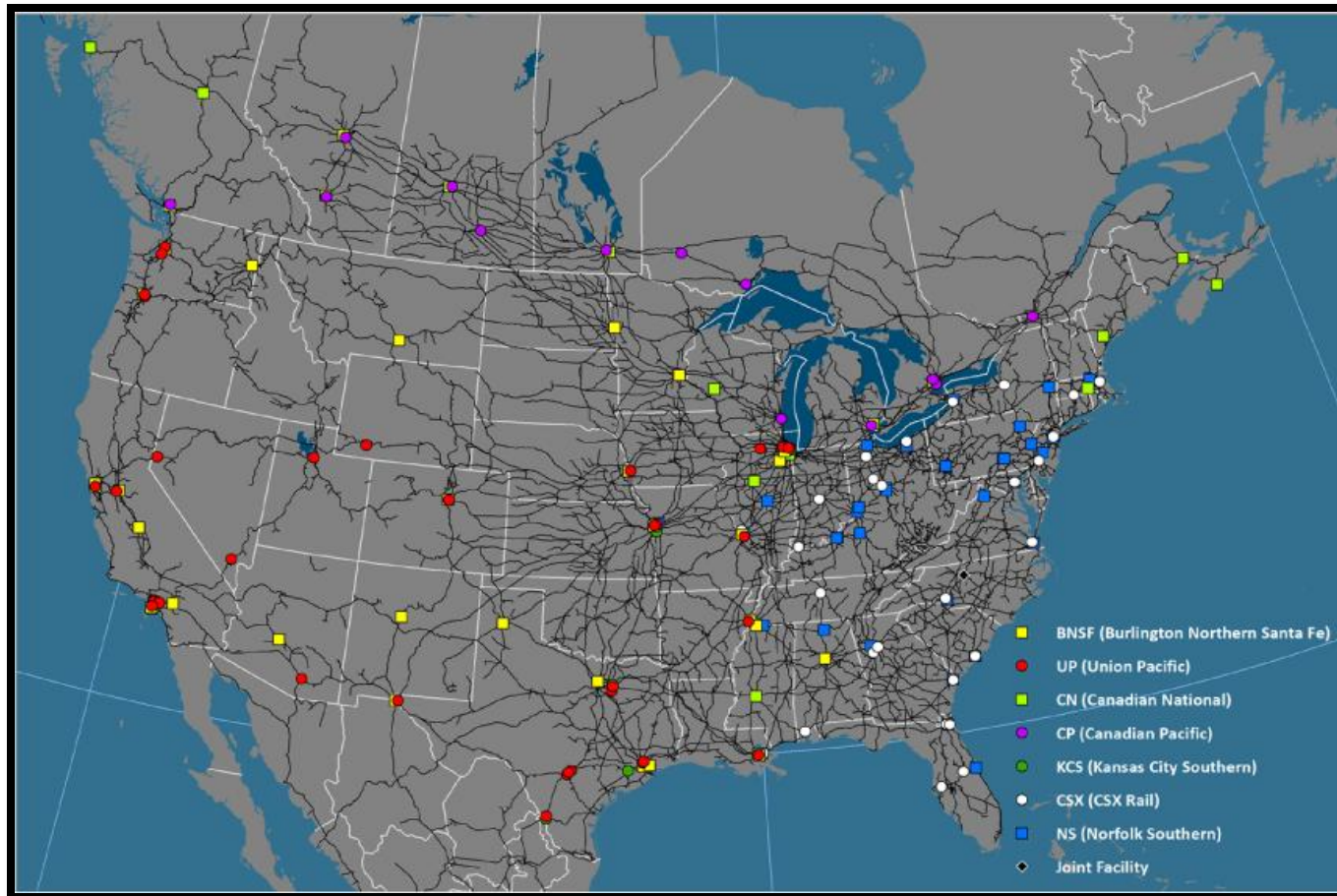
# Rail Heads at Marine Ports





# Rail Terminals

- Over 2000 rail terminal, 10% handle 90% of intermodal freight
- Most intermodal terminals are clustered around major ports



# Rail Terminal Inland





# Rail Modes – Piggyback, Trailer on Flat Car (TOFC) and Double Stack in Background



# Transloading – Marine or Bulk to Rail

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- Transloading is the process of transferring a shipment from one mode of transportation to another
- 3 x 40' Marine = 2 x 53' Domestic Containers
- Shippers increase / decreasing Transloading depending on shipping costs on rails and truck travel distances.
- 46% Domestic Containers in Southern California Leaving by Rail were Transloaded<sup>1</sup>, up from 33% a decade ago.



<sup>1</sup> Alameda Corridor Transportation Authority, April 2013



# Container Delivered to Customer

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Overview

# CHASSIS AND CHASSIS POOLS



# Chassis in North America

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- The North American chassis market is unique versus the rest of the world. Chassis have historically been provided by steamship lines.
  - Origins of this difference: Sea-Land started the container business and needed to compete with truckers who provided a trailer as part of their service.
  - Container and chassis became a package in competing with trucker's trailer.
  - Chassis have an investment, storage, repair and logistic element that steamship lines no longer wanted to manage.
  - All steamship lines are expected to exit the chassis provisioning business by 2016.





# Chassis in North America

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- **Key Drivers of Chassis Usage**

- Import / export volumes
- Type of Port: wheeled containers or stacked containers
- Type of Rail Ops: mostly wheeled
- Warehouse operations: shippers use 'drop & pick' or a 'live' upload model
- Wait time and 'turn times' for chassis are approximately 6 to 7 days
- Average time on the 'street' / on-hire is five days

- **Owners of Chassis**

- Steamship lines exiting ownership
- Pool and leasing companies – TRAC, Flexi, DCLI, banks
- Railroads and Truckers – prefer not to own chassis

- **Operators of Chassis**

- Truckers, Railroads, Ports, Shippers
- Pool Managers – TRAC, Flexi, CCM



# Chassis Types for Containers

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- 20' x Chassis
- 40' x Gooseneck Chassis
- 40'- 45'- 48' x Adjustable Chassis
- 45'- 53' Adjustable Chassis
- 53' x Domestic Chassis
- Tri-Axle Chassis





# Chassis at Ports – location depends on port





# Chassis Pools – On Terminal or Off





# Chassis Service Depots

- Chassis Inspections
  - Truckers before checking out a chassis
  - Pool operators / staff
- Chassis Repairs
  - At depots which are usually offsite but near a port or rail terminal
  - \$600-\$800 annual chassis repair in the industry for inland operations
  - Higher costs at port locations
  - Largest repair costs
    - Tires
    - Lights
    - Brakes



# Chassis Pools

- Efficient and effective
  - Higher asset utilization
  - Centralize repairs
  - Ease of pick-up & return
- Provide chassis to truckers on a per diem basis.
  - Check out – then load container
  - Check in – remove container and return chassis
  - Billing is usually pool gate to gate





# Port Newark – Chassis Pool on terminal





# Stacking Chassis for Storage

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# Chassis Manufactured

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- Chassis Manufactured
  - New chassis being manufactured, primarily for Domestic market, Marine market has tended to use remanufactured chassis which are more economical to build
  - Chassis manufacturers are mostly in U.S., Mexico and China



# Chassis are Remanufactured

- Chassis Re-Manufactured
  - At end of useful life
  - Use existing axles
  - Cost effective
  - Results in a new chassis





# Remanufactured – Marine Chassis





# Remanufactured – Domestic Chassis







# APPENDIX



# Biggest Shipping Companies

As of March 2015

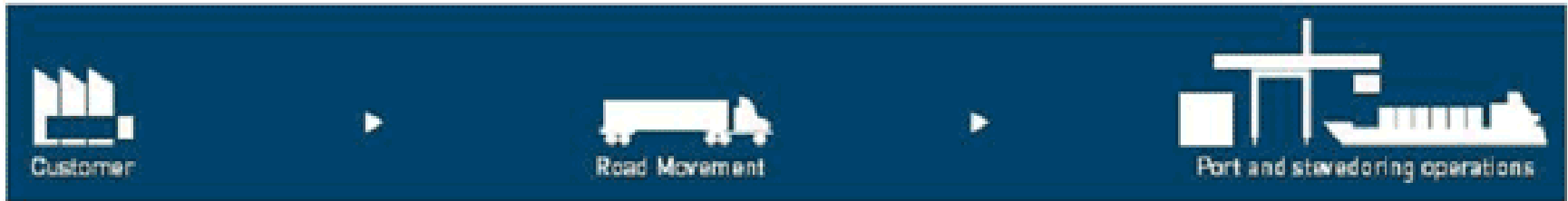
Rnk	Operator	TEU	Ships
1	APM-Maersk	2,970,899	605
2	Mediterranean Shg Co	2,548,841	499
3	CMA CGM Group	1,683,611	457
4	Hapag-Lloyd	974,072	184
5	Evergreen Line	953,670	196
6	COSCO Container L.	811,762	159
7	CSCL	703,591	141
8	Hanjin Shipping	620,205	100
9	MOL	594,310	111
10	APL	546,074	89
11	Hamburg Süd Group	544,675	114
12	OOCL	525,572	97
13	NYK Line	490,592	104
14	Yang Ming Marine Tran	440,914	92
15	UASC	412,149	56
16	K Line	391,637	78
17	Hyundai M.M.	382,812	58
18	PIL (Pacific Int. Line)	361,739	151
19	Zim	325,966	76
20	Wan Hai Lines	205,491	88
21	X-Press Feeders Group	123,673	84
22	HDS Lines	88,608	22
23	KMTC	82,115	50
24	SITC	77,618	66
25	NileDutch	63,750	23
26	TS Lines	58,239	30
27	Simatech	54,594	22
28	Quanzhou An Sheng S	53,387	45
29	Arkas Line / EMES	52,249	35
30	UniFeeder	50,680	46
31	Sinotrans	44,754	32
32	RCL (Regional Contain	42,816	30
33	Heung-A Shipping	39,232	32
34	Grimaldi (Napoli)	38,249	37
35	CCNI	37,896	12
36	Swire Shipping	37,846	29
37	OEL / Shreyas (Transw	37,501	25





# Intermodal Types

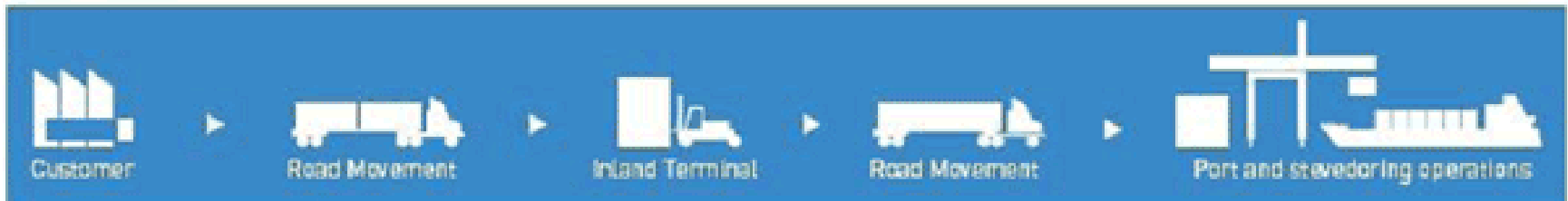
## Direct Road Movement to Port



## Intermodal/Export



## Intermodal



## Intermodal/Domestic



# Marine Container - Standards

- 40' Shipping Container
  - External Dimensions

Container Length (feet)	Container Width (feet)	Container Height (feet)	Inside Capacity (cubic feet)	Floor Area (sq feet)	Container Weight (tons)	Door Width (feet)	Door Height (feet)
40'	8'0"	8'6"	2,360	305	4	7'6"	7'5"

- Internal Dimensions

Container Length (feet)	Container Width (feet)	Container Height (feet)	Inside Capacity (cubic feet)	Floor Area (sq feet)	Container Weight (tons)	Door Width (feet)	Door Height (feet)
39'4"	7'7"	7'9"	2,360	305	4	7'6"	7'5"





# First Container Ship

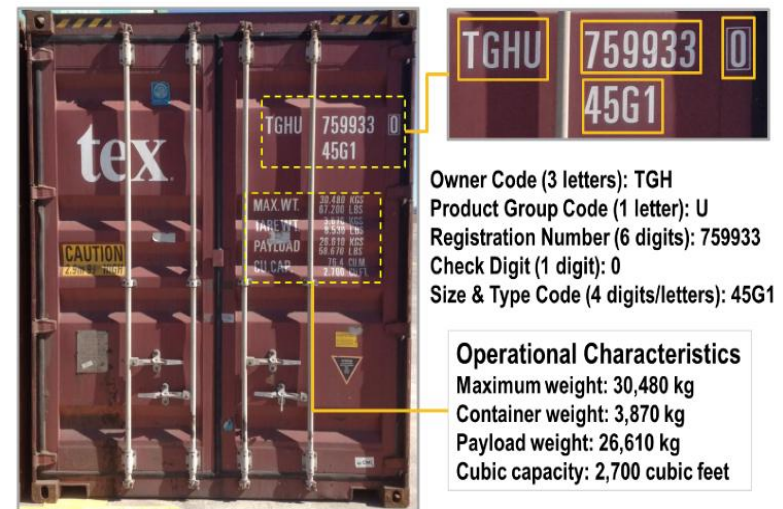
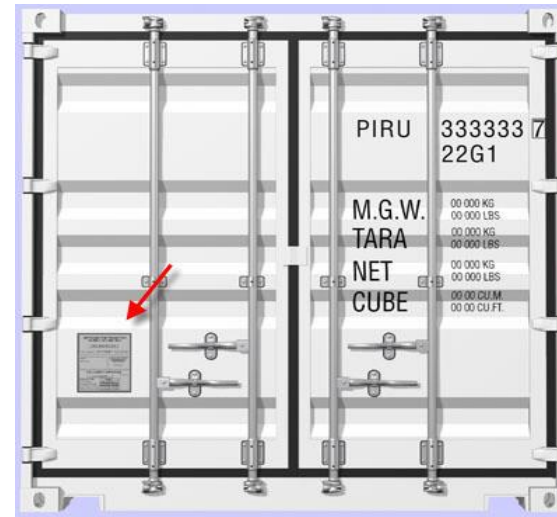
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- 1955
- Clifford J Rodgers



# Standardization of Containers

- The International Convention for Safe Containers is a 1972 regulation by the Inter-governmental Maritime Consultative Organization on the safe handling and transport of containers. It decrees that every container travelling internationally is supplied with a "CSC-Plate".
- Container identification system is an ISO standard (ISO 6346), used to manage the movement and tracking of shipping containers.





# Container / Chassis Regulations

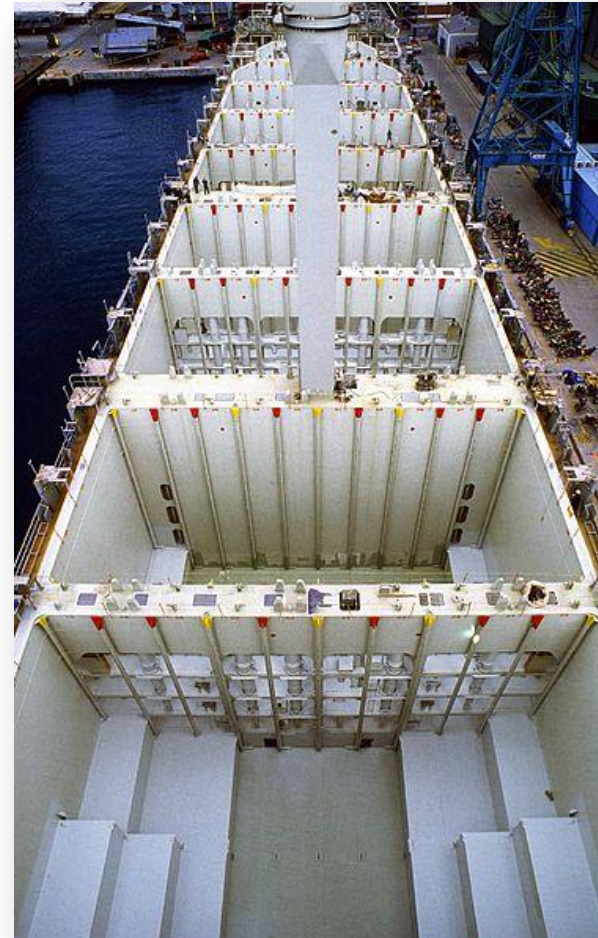
Container and chassis are covered by laws, regulations, conventions and standards on both an international and national basis. Many of the international conventions have been established under the umbrella of the United Nations and its sponsored organizations. National laws and regulations have been developed to apply the international conventions and national requirements.

- **Customs Convention on Containers, 1972**
  - Entered into Force: December 6, 1975  
Oversight: World Customs Organization (WCO)  
Synopsis: Recognizes containers as Instruments of International Traffic (IIT) and establishes framework for containers to be used in international transportation.
- **TIR Convention, 1975**
  - Oversight: UNECE  
Synopsis: Establishes framework for International transport by road
- **ISO Standards**
  - The International Organization for Standardization's (ISO) International Standards for freight containers and chassis have allowed "the box" to become the backbone of global supply chains. To date, over 30 International Standards exist in this domain. They cover a wide variety of aspects of different types of freight containers that include air/surface/(intermodal) containers, containers on board vessels, tank containers, platform and platform-based containers.
- **Roadability Regulations, effective 2009**
  - Oversight: US Federal Motor Carrier Safety Administration  
Synopsis: Establishes regulatory requirements for safe operation, inspection, repair and maintenance of intermodal chassis in the United States
- **U.S. Safe Port Act of 2006**
  - Oversight: US Department of Homeland Security  
Synopsis: Establishes certain regulatory security requirements for the operation of intermodal containers in the United States



# Container Locking / Securing System

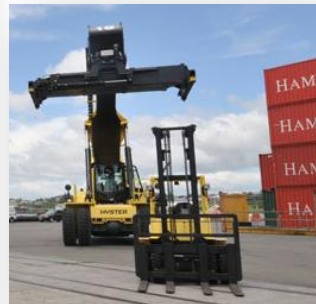
- Locking systems on Ships
  - Cell guides / racks
  - Container guides, locating cones, and anti-rack spacers to lock the containers together
  - Container Locking / Securing System





# Types of Container Lift Systems

- Reach and Straddle Stackers
  - used for handling intermodal cargo containers in small terminals or a medium-sized ports
- Forklifts
  - Multi purposed, versatile
- Gantry Cranes
  - Marine port terminals





# Port – Some Newly Built with Ample Space





# Containers Stacked on Ship / Secured



# Container End Of Life

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- Storage
- Offices
- Homes
- Scrap

