Ports & Maritime Logistics Trends

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Presented by:

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Topics on ports and maratime logistics trends

1. Types of marine Ports
2. Processes, Technologies and KPI's at ports
3. Stakeholder Models
4. Trends in global container industry
5. Shippers
6. Top world ports
7. Container traffic and utilization
8. Port development
9. World Trade Flows
10. Container Vessels
11. U.S. Ports
12. Share of Routes to U.S. ports
13. Panama Canal
14. Behind the ports: The North American Distribution Market
15. Siemens solutions

Topic 1

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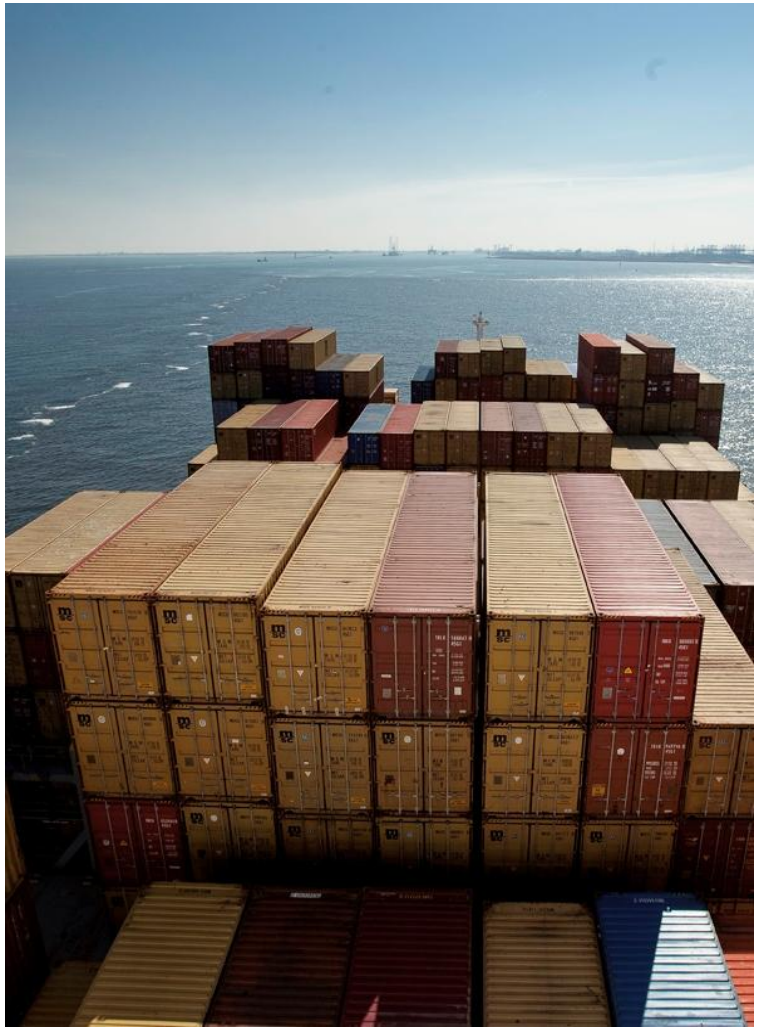

Types of marine Ports

- Multiple and single purpose
- Layout and equipment depends on port type

Type of marine ports: Multiple purpose and single purpose

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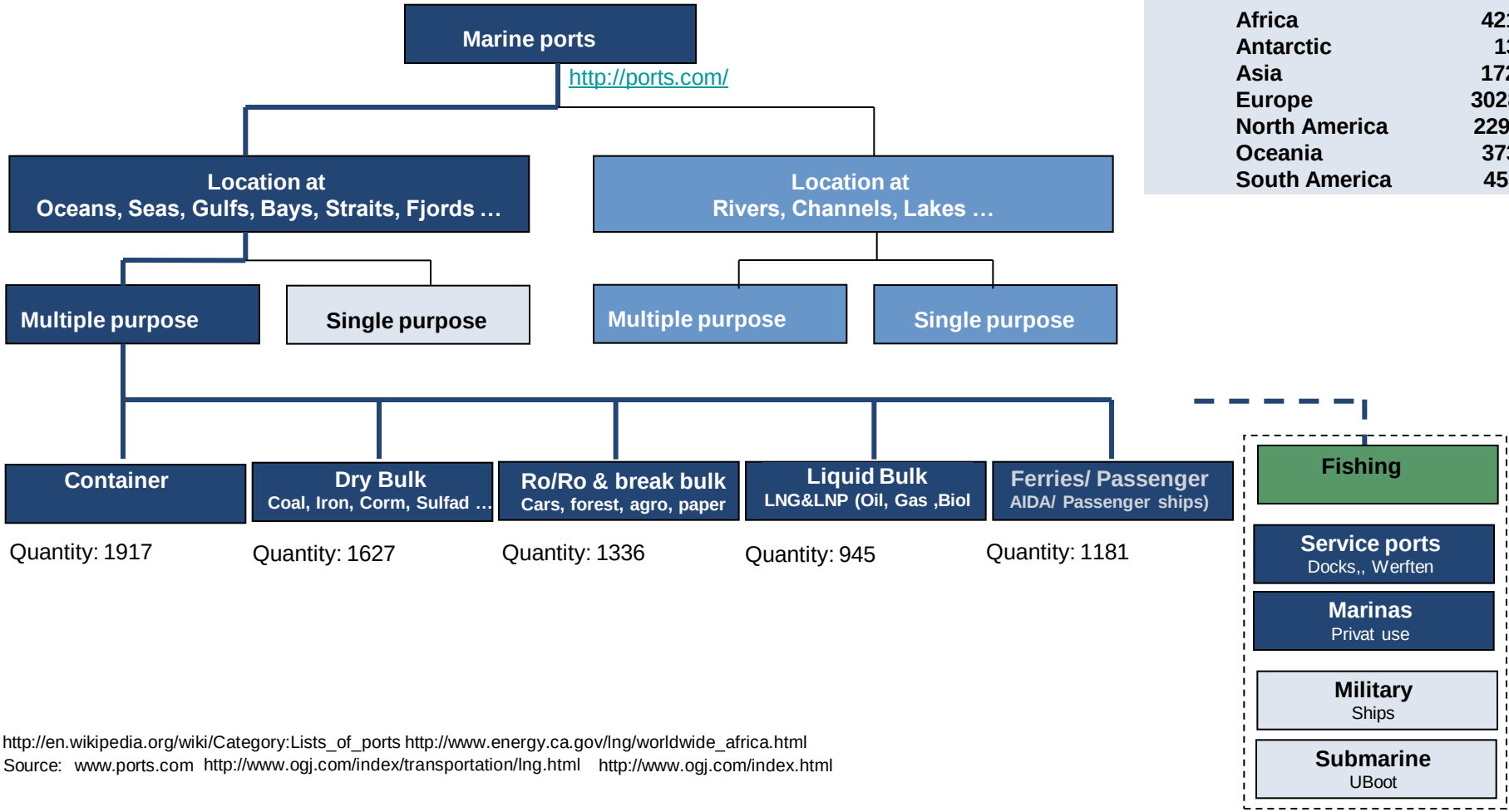
Ports world wide	8297
Africa	421
Antarctic	13
Asia	172
Europe	3028
North America	2293
Oceania	373
South America	453



http://en.wikipedia.org/wiki/Category:Lists_of_ports http://www.energy.ca.gov/lng/worldwide_africa.html
Source: www.ports.com http://www.ogj.com/index/transportation/lng.html http://www.ogj.com/index.html

Port lay-out and equipment depends on port type
Different types of terminal handle different cargo

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Container

Dry Bulk
Coal, Iron, Corm, Sulfad …

Ro/Ro & break bulk
Cars, forest, agro, paper

Liquid Bulk
LNG&LNP (Oil, Gas, Bio)

Ferries/ Passenger
Passenger ships)

Service ports
Docks

Marinas
Private use

Military
Ships

Submarine

http://www.ogj.com/index/transportation/lng.html http://www.energy.ca.gov/lng/worldwide_africa.html

Source: www.ports.com Note: Ferries can also be RORO http://www.ogj.com/index.html

Topic 2

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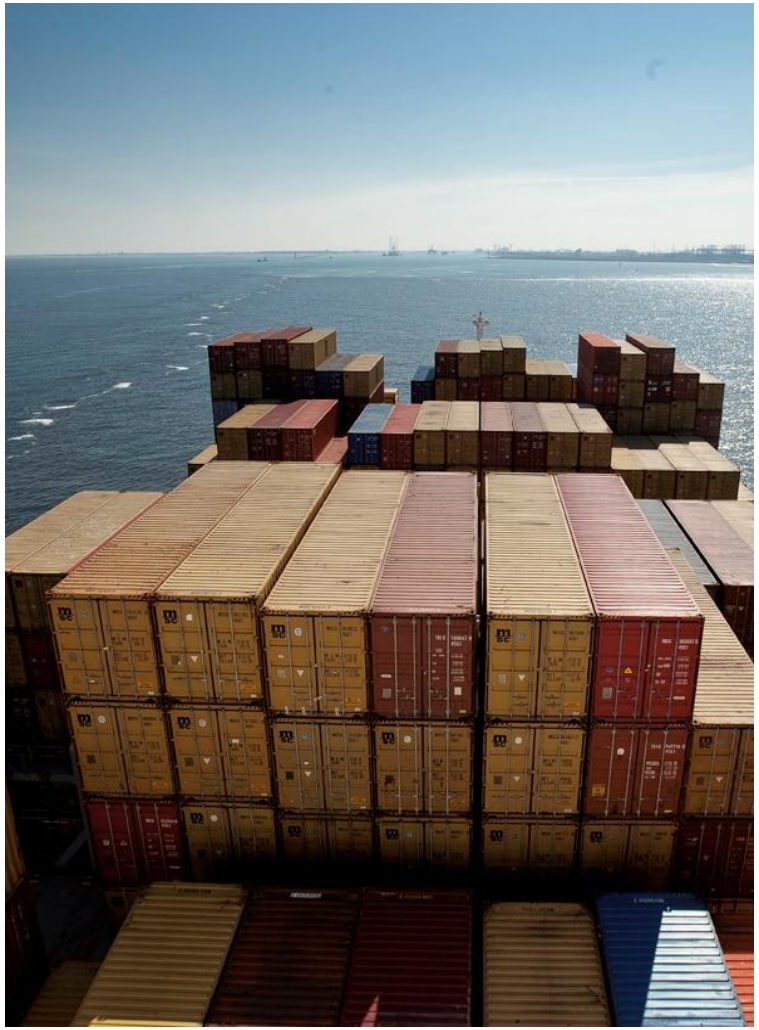

Processes, Technologies and KPI's

- Process in a container terminal
- Terminal Fields of Activity
- Indicators commonly used by terminal operators

Process in a container terminal

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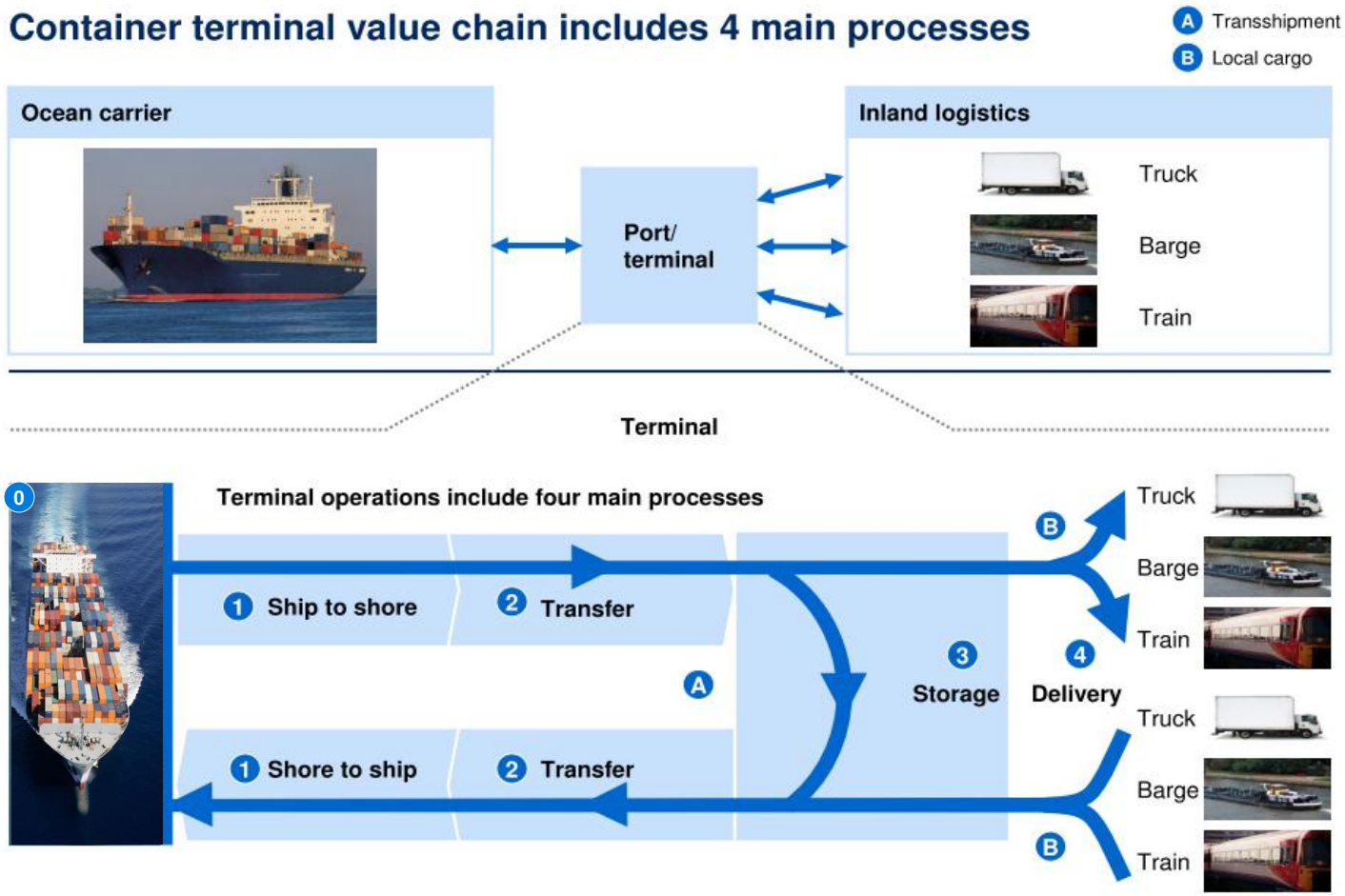

Terminal Fields of Activity

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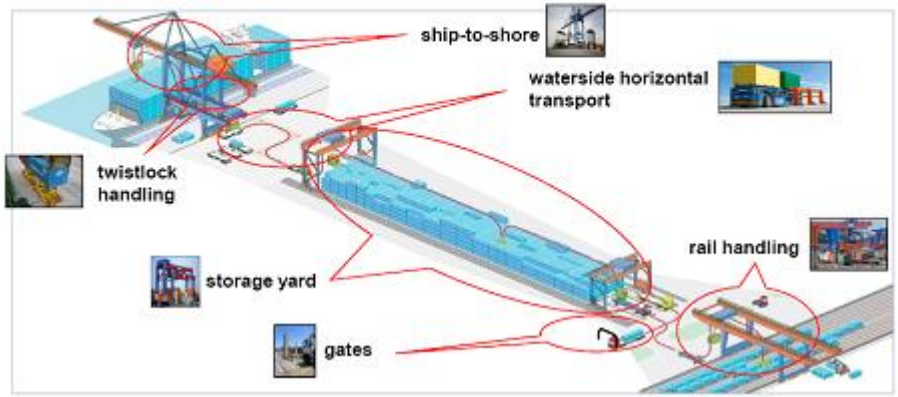
Fields of Technology Application
Presented on the example of CT Altenwerder (Hamburg)



Ship-to-Shore Equipment

- Ship-to-Shore Cranes

- Automatic Twistlocks

- Spreader Design

Horizontal Transport
Hybrid and e-drive systems

- Late 1980s: Introduction at ECT Delta Terminal
- 2005 Adoption of diesel-electric drives
- 2007 Lift-AGV concept
- Since 2009 battery AGV trial at CTA Hamburg

- Battery-Driven AGV
  - Diesel-Electric AGV 8-12 hours of operation
  - Automated battery change & charging station

- Lift AGV

- Terminal Tractor

- Cassette AGV

- SCs

Storage Yard
Hybrid and e-drive systems

RMG (twin configuration)

CTA, Hamburg

RMG (triple configuration)

CTB, Hamburg

E-RTG

- Cable Reel System

- Conductor Bar System

Indicators commonly used by terminal operators

	KPI	Unit of measure	Definition
Total	**Vessel turnaround time**	Hour	Time the vessels stay in the port
	Cargo damage rate	%	Ration of damaged goods to the total handled goods
	Accident rate	Number/thousand of ships	The ratio of the number of accidents (broken down by type) to the number of vessels
	Closure days	Day	The total time a port was closed, e.g., because of bad weather or strikes
Planning	**Vessel waiting time**	Hour	Total time the vessel takes to reach its mooring berth from the time it “calls”.
	Cargo dwell time	Day	The average time goods spend in the port stores/yards
	EDI accuracy	TBD	The ratio of inaccurate information compared to total information sent by carrier
	Actual vs. pro forma moves	Number of moves	Comparison of number of moves planned for a vessel in pro forma vs. actual number of moves
Operations	**Crane productivity**	Moves/Hour	Ratio of the moves completed by a crane to operating time of that particular crane
	Berth productivity	Units/Hour Moves/Hour	The average rate at which the vessel is loaded/unloaded
	Vessel productivity	Units/Hour Moves/Hour	Same rate as above, but measured as the ratio of the load to the vessel turnaround time
	Truck turnaround time	Hour	The average time a truck spends in the port.
	Berth occupancy	%	The ratio of the total number of berth to the total number of berth hours available
	Crane OEE	%	The ratio of the ideal time the crane would require to complete the moves it carried out to total available time for that crane
	Crane split	N/A	Total moves of the call divided by the largest number of moves in the bay
	Housekeeping moves	Number of moves	Number of housekeeping moves carried out at the yard

Topic 3

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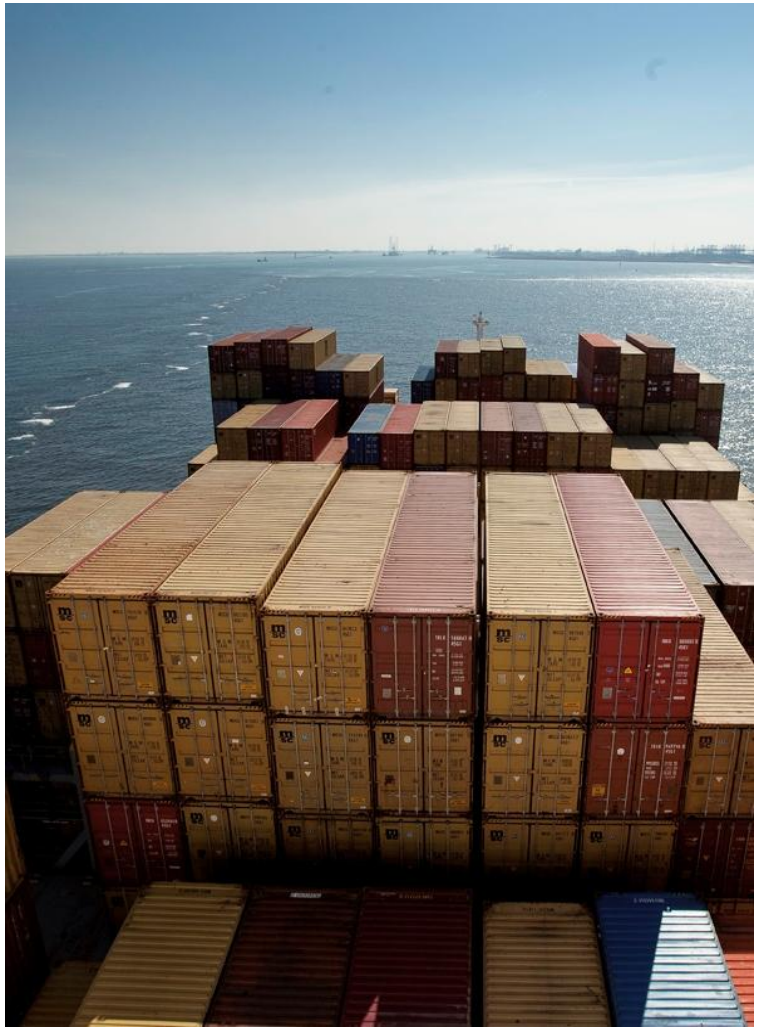


Stakeholder Models

- Typical ownership models at ports
- Overview on stakeholders at a port
- Stakeholder structure

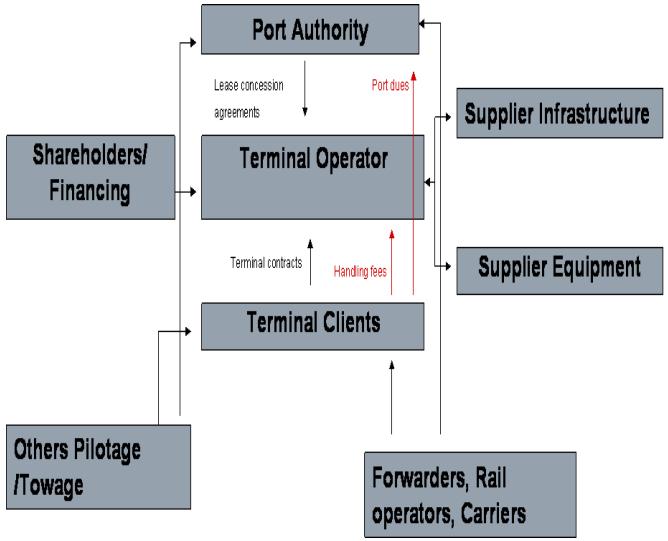
Typical ownership models at ports

Mode of Ownership	Land area	Terminal Infrastructure	Terminal Superstructure	Quayside Operations	Landside Operations	Examples
100% state owned & operated	State owned	Owned and construced by port authority	State owned	Port authority	Port authority	Haifa (Israel), Durban (South Africa)
Leased terminal	State owned	Owned and constructed by port authority	Privately owned or rented from port authority	Terminal operator	Terminal operator	Oakland Container Terminal (USA), ECT (Rotterdam)
Concession agreement	State owned	Owned and construced by port authority	Privately owned	Terminal operator	Terminal operator	Port 2000, le Havre (France), Santos Brasil (Brazil)
BOT concession	State owned	Construction privately owned	Privately owned	Terminal operator	Terminal operator	Laem Chabang International Terminal (Thailand), JNPT (Indria)
100% privately owned	Privately owned	Privately owned	Privately owned	Terminal operator	Terminal operator	Teesport (UK), Liverpool (UK)

Source: Drewry, 2010

Overview on stakeholders at a port

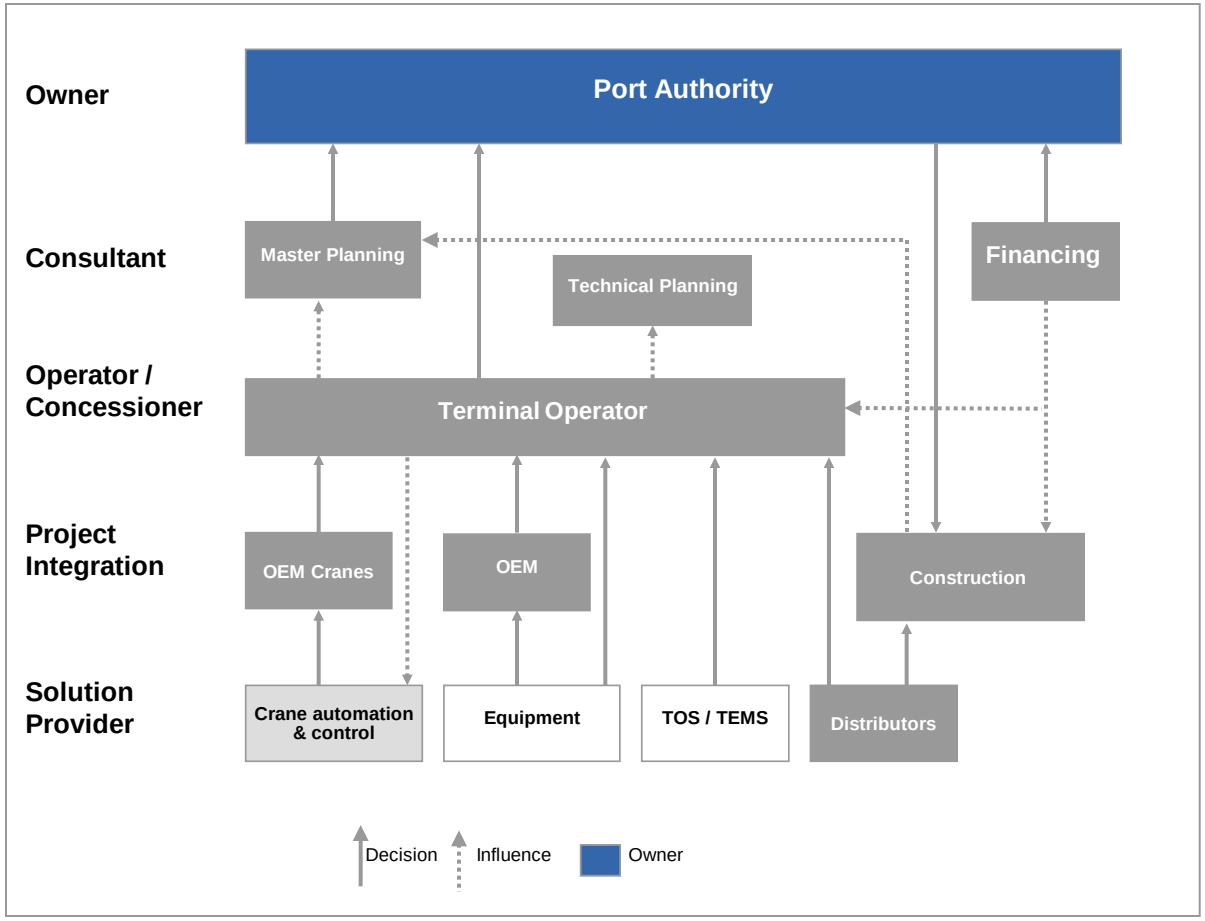
Stakeholder overview



- Port Authorities are landlords and own the ground, provide access to the port (streets, bridges), supply water, power and safety & security
- Port Authorities address environmental impacts to deal with projected growth in trade
- Port Authority creates rules in regards to fees
- Terminal operators are responsible for all means of storage and handling the terminal (inclusive the gates)
- Operators arrange contracts with railroads in regards to on dock rail
- Terminals ask for handling fees
- Clients of ports and terminals are freight forwarders, rail operators and carriers

Goal is to collaborate with industry partners to accommodate cargo demand and continuously improve quality of service with customers and supply chain partners

Fairly complex stakeholder structure with Terminal Operator as key customers and decision makers at ports



Ownership

- "Landlord port" is with 75% share the most common ownership model
- This means:
  - Port authority owns the port and provides the basic infrastructure
  - Terminal operators enter into a concession contract and invest on their behalf
  - Consequently, terminal operators are the main customers in ports

Source: IC MOL 3G, VDD Logistics Hubs

Topic 4

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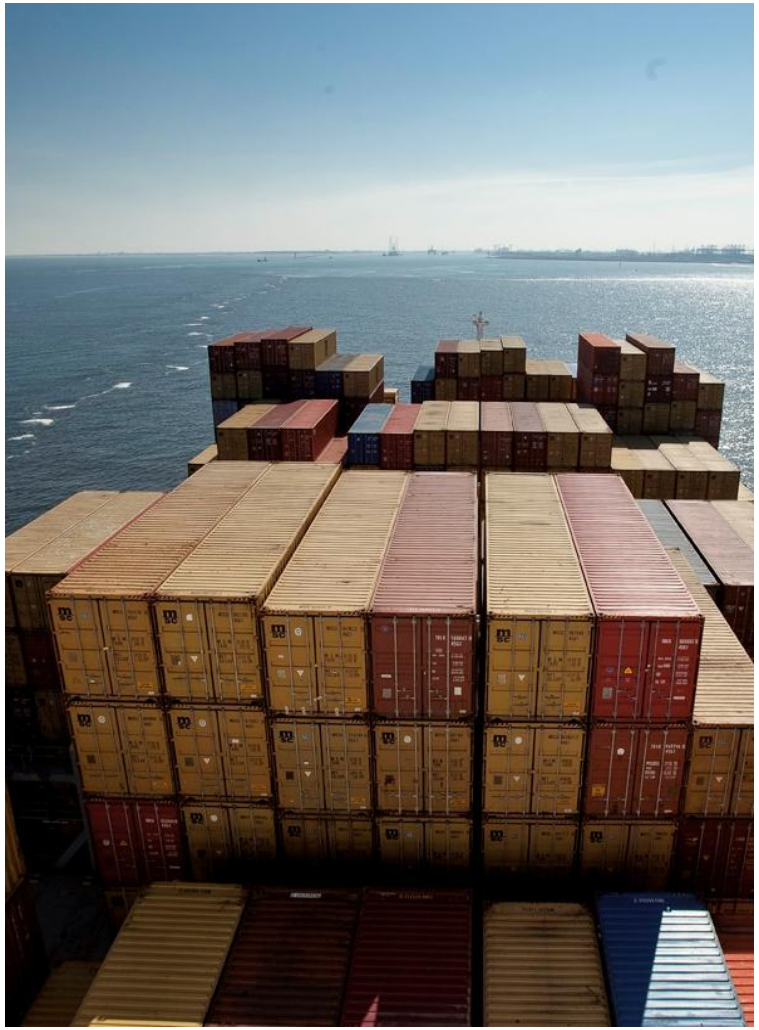

Trends in global container industry

- Trends in ports
- Political trends
- Economic trends
- Social trends
- Technological trends
- Legal trends
- Terminal trends

Main observed trends in ports

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Ports: Main observed trends

1. **Containerization and larger vessels:** Standard container sizes for increasing volumes of non-bulk cargo. Larger Container Vessels. Demand for more terminal capacity. Automation of terminal operations. Importance of Transshipment hubs
   - Total port management
   - Need for efficient stacking and terminal management systems
2. **Hinterland transport:** Efficient hinterland transport and intermodal network as competitive factor
   - Extended Gateway concepts to seaport terminals
   - Bundling of rail and barge container flows in the port area and the development of rail and barge shuttles
3. **Horizontal and vertical integration:** Need for improved cooperation between stakeholders
   - Better data exchange between all stakeholders
   - Optimized end-to-end supply chain
4. **Security and Environment:** ISPS code to protect terminal facilities against terrorist penetration. 100% X-ray of containers to US
   - Container and ship screening
   - Reduce CO_2 emissions
   - Optimize energy utilization and energy consumption

Source: Future of Hubs Team

Major Political Trends in Container Market and their Impact on Market Participants

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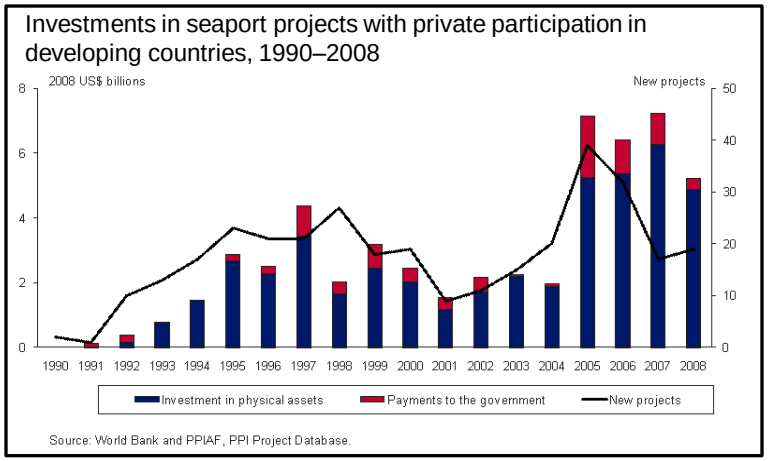

Featured Indicator,1990-2009	Value
Number of countries with private participation	59
Projects reaching financial closure	353
Region with largest investment share	East Asia and Pacific (38%)
Type of PPI with largest share in investment	Greenfield project (50%)
Type of PPI with largest share in projects	Concession (48%)
Projects cancelled or under distress	8 representing 2% of total investment

Source: World Bank and PPIAF, PPI Project Database.

Political Trends

- Strained public budgets
- Necessity to attract private investment (e.g. via PPPs) for port development projects
- Increasing privatisation of port operations
- High potential in emerging markets but limited by (weak) legal frameworks

Impact on Authorities

- Focus on utilities and infrastructure investment/maintenance

Impact on Operators

- Private investment not only in equipment but also in infrastructure

Impact on Logistics

- Private investment not only in equipment but also in infrastructure

Impact on Suppliers

- Investment decision increasingly driven by private entities
- Changes in procurement decision making
- Changes in product demand

Major Economic Trends and Their Impact on Market Participants

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Economic Trends

- Resumption of global economic growth after economic crisis (BRIC countries)
- Continuation of trade liberalisation (BRIC countries; emerging markets)
- Increase in containerisation
- Trade growth and area limitations in existing terminals (Far East, Middle East)
- Competitive pressures for continuous improvement efficiency and cost structure
- Consolidation in international port sector
- Increasing influx of private capital

Impact on Authorities

- Increasing demand for terminal capacity and sufficient hinterland access

Impact on Operators

- Increasing demand for terminal capacity
- Need for efficient stacking and terminal management systems

Impact on Logistics

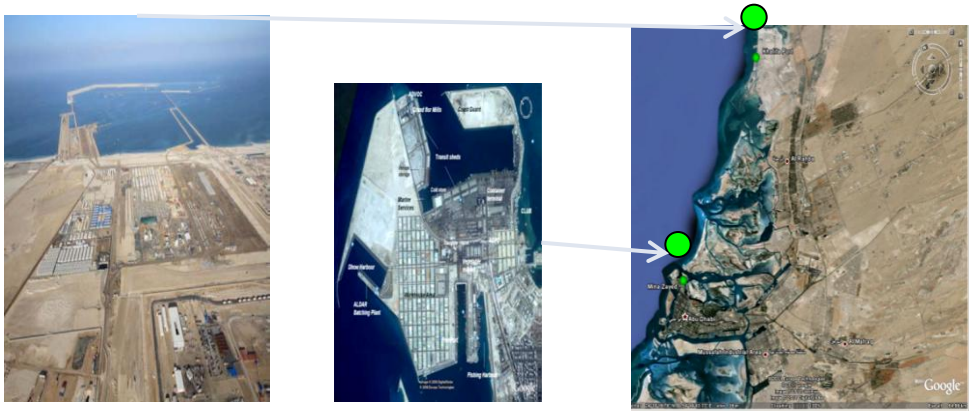
- Increasing demand for warehousing capacity
- Need for efficient stacking and warehousing mgmt systems

Impact on Suppliers

- Investment in new quay and road/rail infrastructure
- Investment in new equipment/infrastructure
- Demand for automated terminal operations
- Investment in new warehousing facilities
- Improved area utilisation via automation

Social Trends & Their Impact on Market Participants

Example: Khalifa Port, UAE



Social Trends

- Social acknowledgement of importance of port infrastructure for economic welfare
- Desire to shift port operations out of inner city locations
- Discontent about port related congestion on public road infrastructure
- But NIMBY phenomena: “Not In My Backyard”

Impact on Authorities

- Necessity to move

Impact on Operators

- Necessity to move

Impact on Logistics

- Opens new possibilities / new service concepts

Impact on Suppliers

- Demand for existing products
- Demand for new products / new markets

Technological Trends and Their Impact on Market Participants

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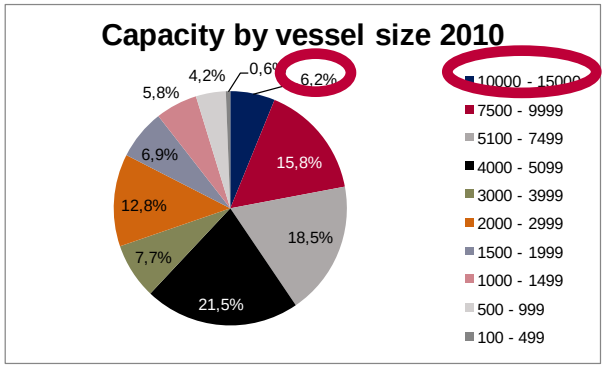
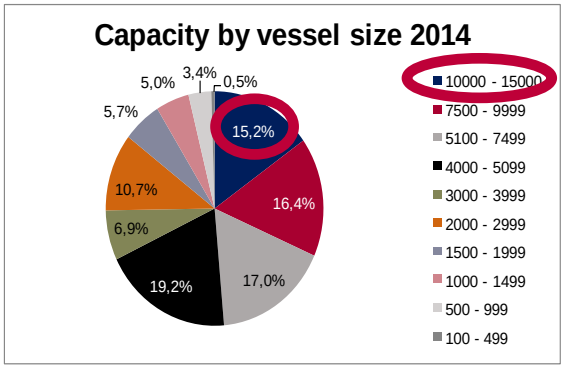
„Automation is one of the most practised means to improve productivity in the modern economy. [...] This trend and concept is continuing in the container-handling industry, especially for the larger sized terminals.“

Drewry, 2010.





Technological Trends

- Increasing vessel sizes (up to 18,000 TEU on order)
- Increasing automatisation of terminal operations in developed world
- IT based interfaces and coordination between stakeholders

Impact on Authorities

- Need for efficient hinterland intermodality
- Need for improved cooperation between stakeholders

Impact on Operators

- Higher peak loads
- New investment requirements
- Need for efficient handling systems
- Need for improved cooperation with shipping lines re planning

Impact on Logistics

- Higher peak loads
- New investment requirements

Impact on Suppliers

- Demand for increased water depth and improved quay infrastructure
- Demand for hinterland infrastructure that can cope with extreme peak situations
- Demand for bigger vessel handling equipment
- Demand for advanced TOS and interfaces
- Demand for AGV and ASC
- Increased system complexity
- Demand for advanced interfaces

Legal Trends and Their Impact on Market Participants

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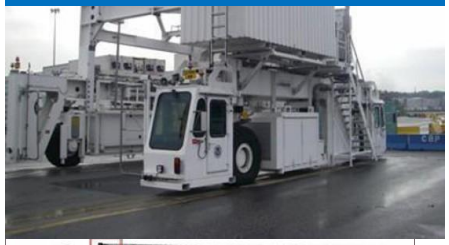
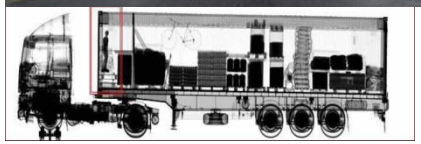
X-Ray Scanning Equipment





Improved Perimeter Protection

Legal Trends

- ISPS code to protect terminal facilities against terrorist penetration
- 100% X-ray of containers to US
- Increasing quality of frameworks for privatisation
- But NIMBY phenomena: "**N**ot **I**n **M**y **B**ack**y**ard"

Impact on Authorities

- Change in operating mode

Impact on Operators

- Change in operating mode

Impact on Logistics

- Change in operating mode

Impact on Suppliers

- Demand for cameras, fences, scanners, etc.
- Demand for new products
- Demand for new technologies

Terminal Trends

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Terminal Gate Requirements

Opportunities and Constraints for Automatio Hinterland Link

Road Transport	Rail Transport
✓ Auto-Identification ✓	
✓ Auto-Checking ✗	Mandatory physical inspections (industry regulations)
✗ Auto-Handling ✓ ✗	Safety regulations require human supervision and control / Actual container handling possible, frequent manned service operations prevent efficient automation
✓ ✗ Auto-Planning ✓	Appointments systems w. sufficient participation

Port Security Radiation and Detection Systems

➡ Integration of detection systems into terminal workflows is the actual challenge

Environmental Awareness

- Light & Noise Pollution

- Prismatic lenses to bundle the light beam and reduce scattered light emissions
- Automated container handling equipment prevent light & noise pollution

- Air Pollution
  - Increased electrification

  - Optimised fleet management

  - Reduced gas consumption

Trends in Future Container Terminals

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Stacking Equipment

- Increased automation
- Full electrification

Horizontal Transport

- Increased automation
- More flexible such as Lift-AGV
- Battery-AGV for fuel savings

Yard Configuration

- Container blocks served by stacking cranes
- RMG stacks with end-loaded container transfer

STS Cranes

- Meet specifications of “New Panamax” vessels (14,500+ TEU)
- High performance

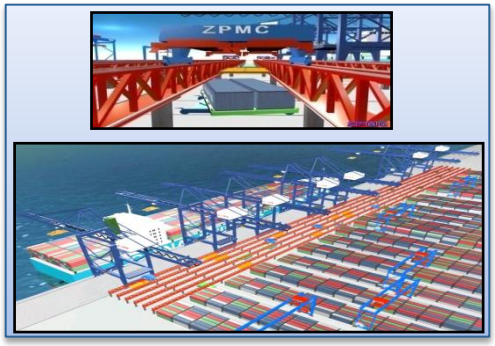
Environment

- Reduction of air pollution
- Reduced light & noise emissions

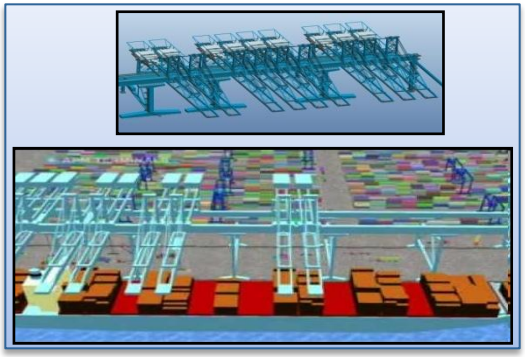
But….

- Increased amortisation periods
- Fixed layouts

- **Technologies could be like ZPMC development**



- **FastNet concept by APM Terminals**



Topic 5

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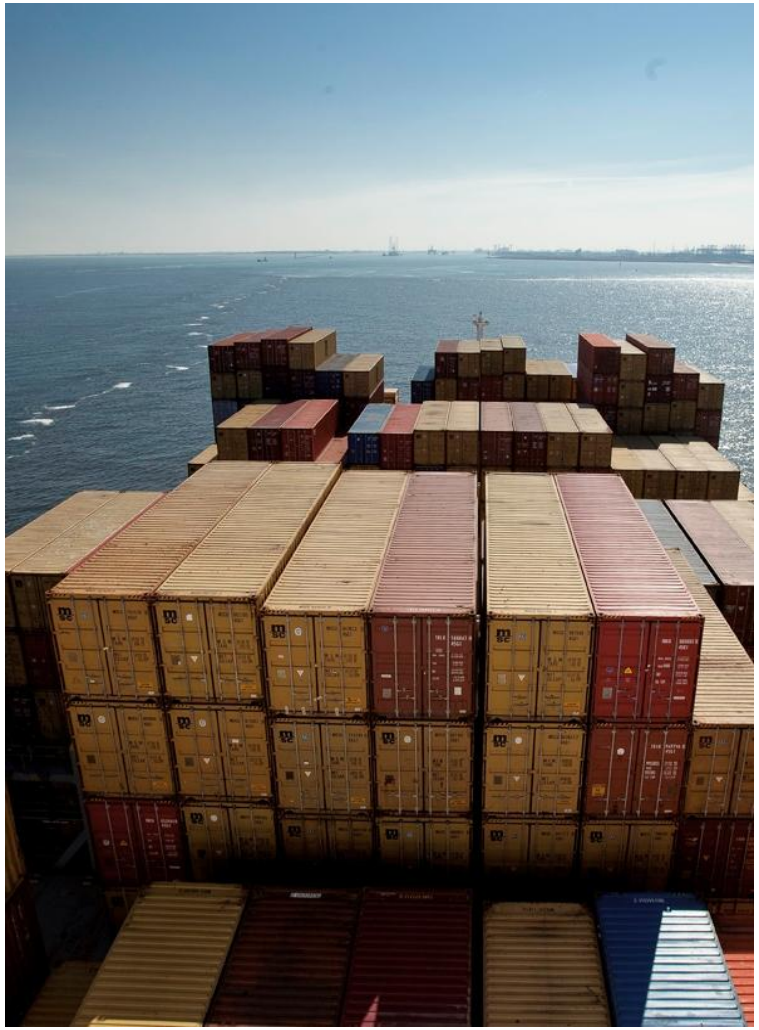

Shippers

- Shippers decision taking criteria

Shippers decision taking criteria

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Most important criteria in port choice decisions for shipping lines and the way of analysis

Criteria	How to analyze
Local cargo volume	Local incentive policy for local manufacturers and foreign logistics services providers (with value adding activities)
Terminal handling charge	Tariff comparison between ports
Transhipment volume	Comparison between ports of the year-to-year trends of the number of transhipment containers
Feeder connections	Comparison of the number of connections to different ports
Port capacity and berth availability (congestion in the port)	Comparison of utilization, average waiting times vessels during the week and future expansion plans between ports
Hinterland transport capacity	Comparison of rail and barge transit times and frequencies, utilization rail of the involved countries and future expansion plans
Port location	At sea or inland, central or peripheral

Topic 6

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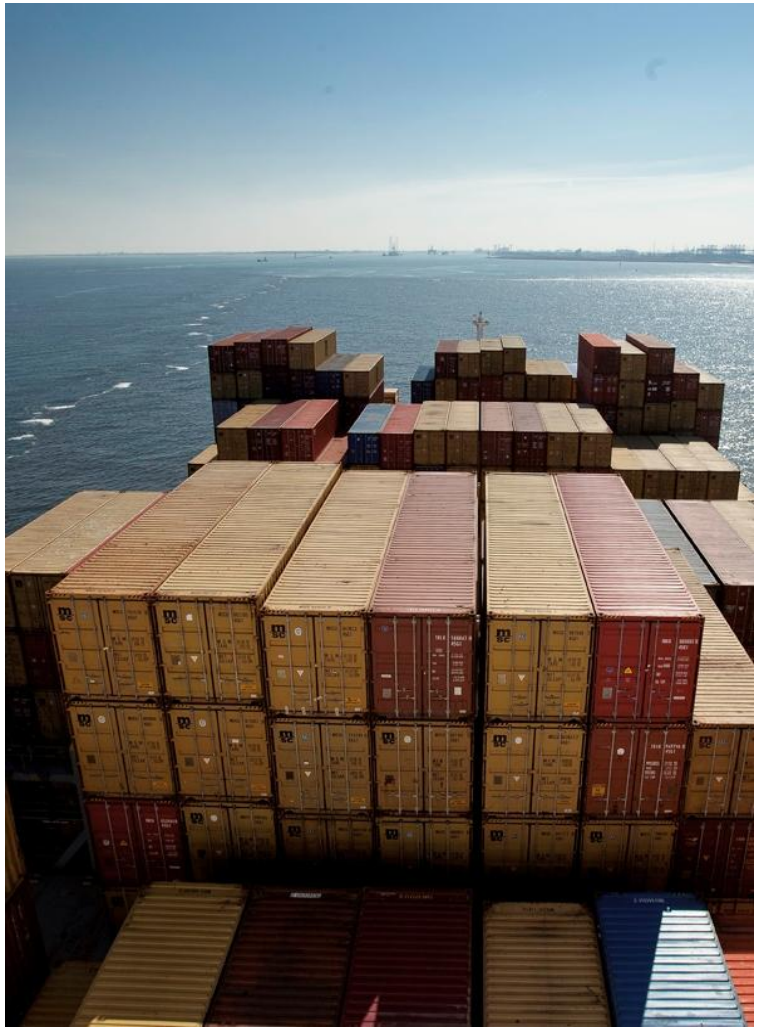

Top world ports

- Forecast growth in container activity

Ranking top world ports – Forecast growth in container activity

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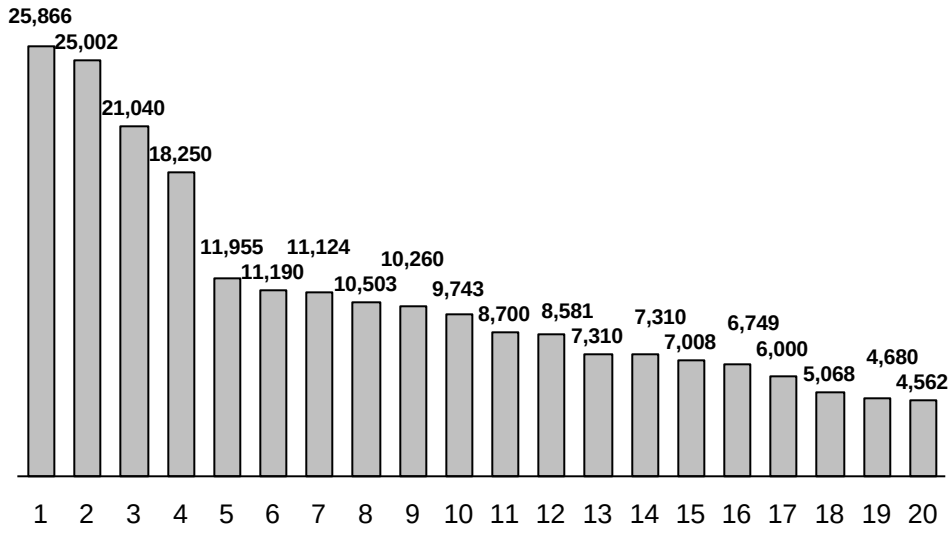
Ranking top world Ports

Asian ports rank first top six in 2009

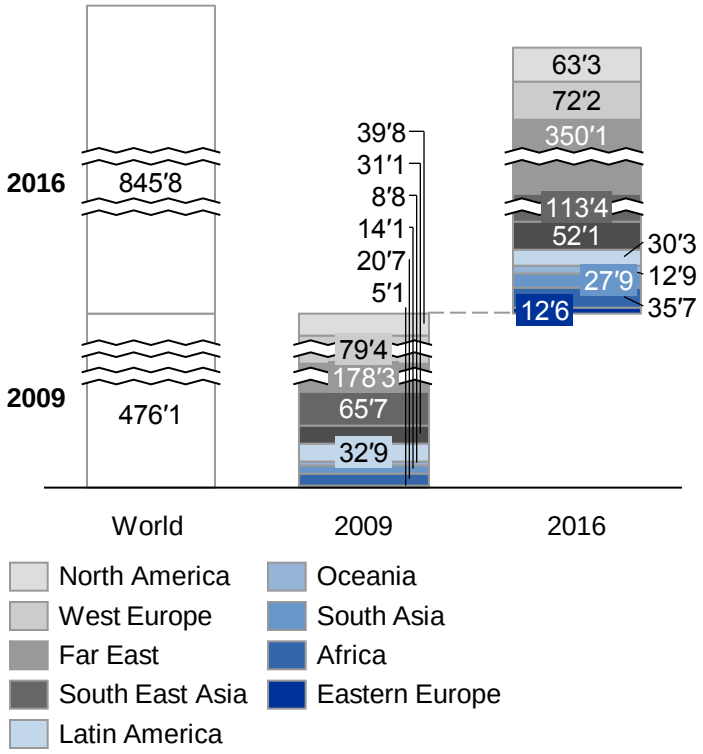


1. Singapore
2. Shanghai
3. Hong Kong
4. Shenzhen
5. Busan
6. Guangzhou
7. Dubai
8. Ningbo
9. Qingdao
10. Rotterdam
11. Tianjin
12. Kaohsiung
13. Port Klang
14. Antwerp
15. Hamburg
16. Los Angeles
17. Tanjung Pelepas
18. Long Beach
19. Xiamen
20. New York / New Jersey

Source: Containerization International

Forecast growth in container activity (mil. TEU)

Expected total will be 845,8 mil. TEU in 2016



Source: Drewry 2011

Topic 7

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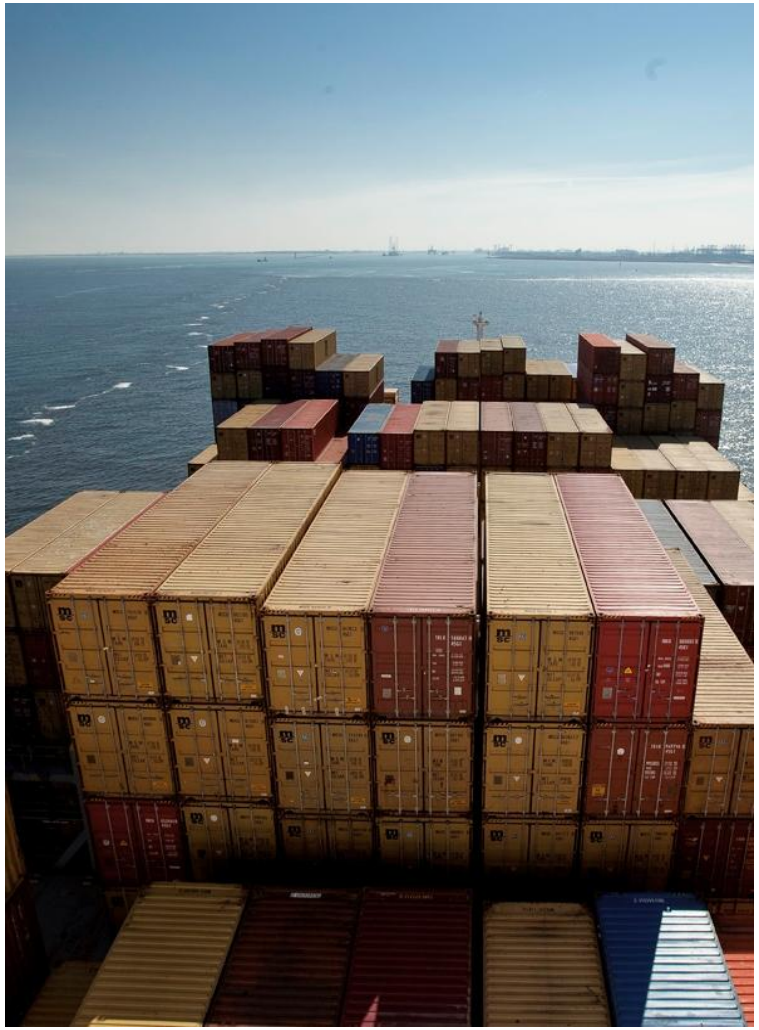

Container traffic and utilization

- Forecast
- Capacity Utilization today

Forecast Container Traffic Growth
Projected Container Handling Capacity Utilization

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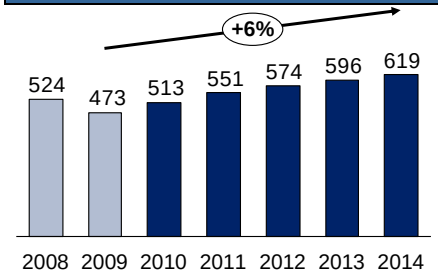
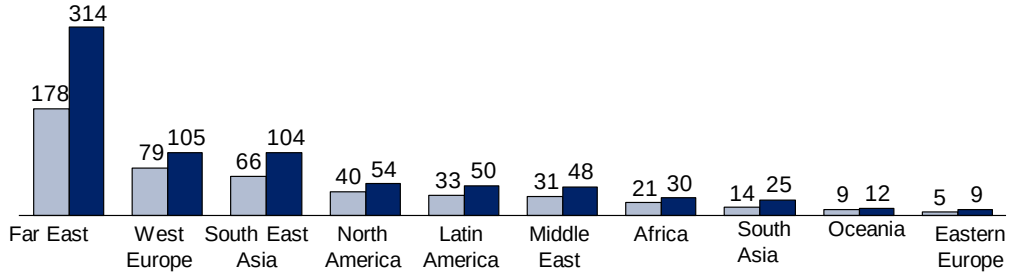
Projected Container Traffic Growth

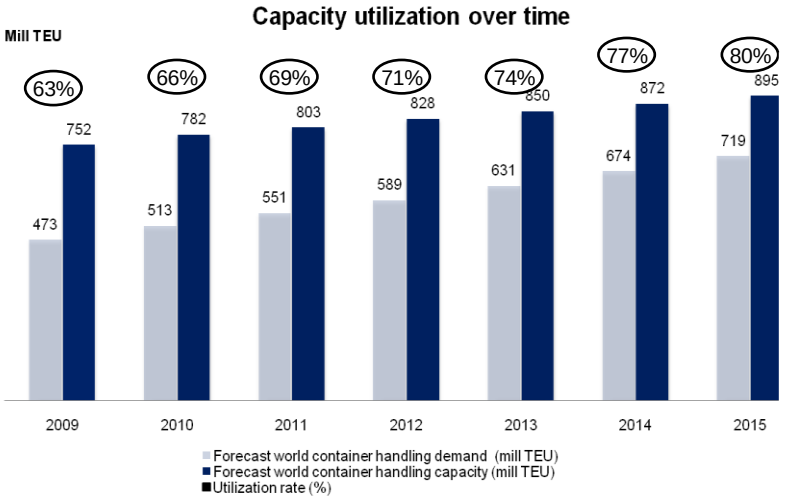


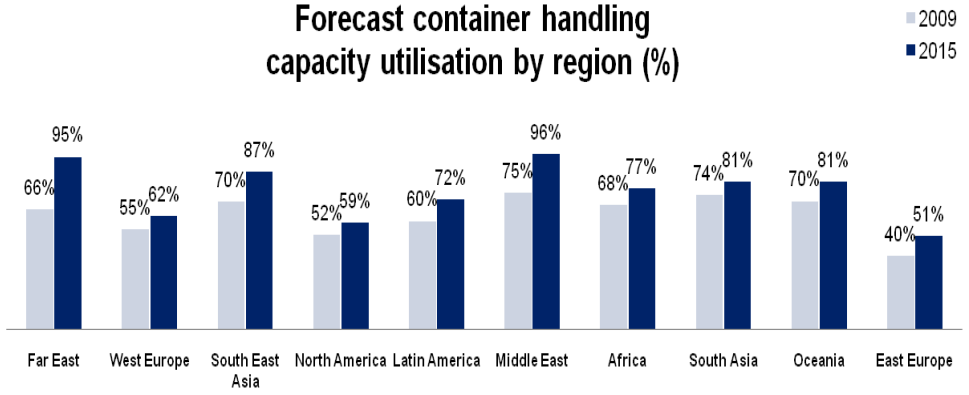
Forecast development of world port handling container traffic (million TEU)



Forecast container activity by region (million TEU)

Projected Container Handling Capacity Utilization





Source: Drewry, 2010.

Utilization rates already high today - many terminals operate close to capacity limits and need efficiency gains

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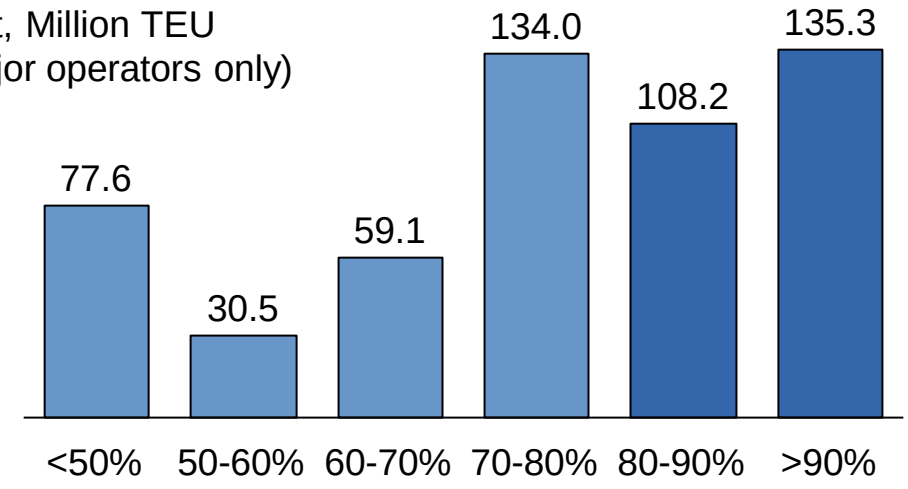
2010-Throughput, Million TEU
(Terminals of major operators only)



	<50%	50-60%	60-70%	70-80%	80-90%	>90%
Number of terminals	163	61	68	70	59	66
Large, global operators' share of terminals	38%	36%	41%	47%	64%	64%
Average capacity (in TEU mn)	1.3	0.9	1.3	2.5	2.2	2.1

Implications

- Customer need for technology increasing terminal performance:
  - Increase berth productivity (reduced vessel port stay)
  - Increase yard throughput
- Throughput and productivity identified as a need across geographies

Source: Drewry Maritime Research

Topic 8

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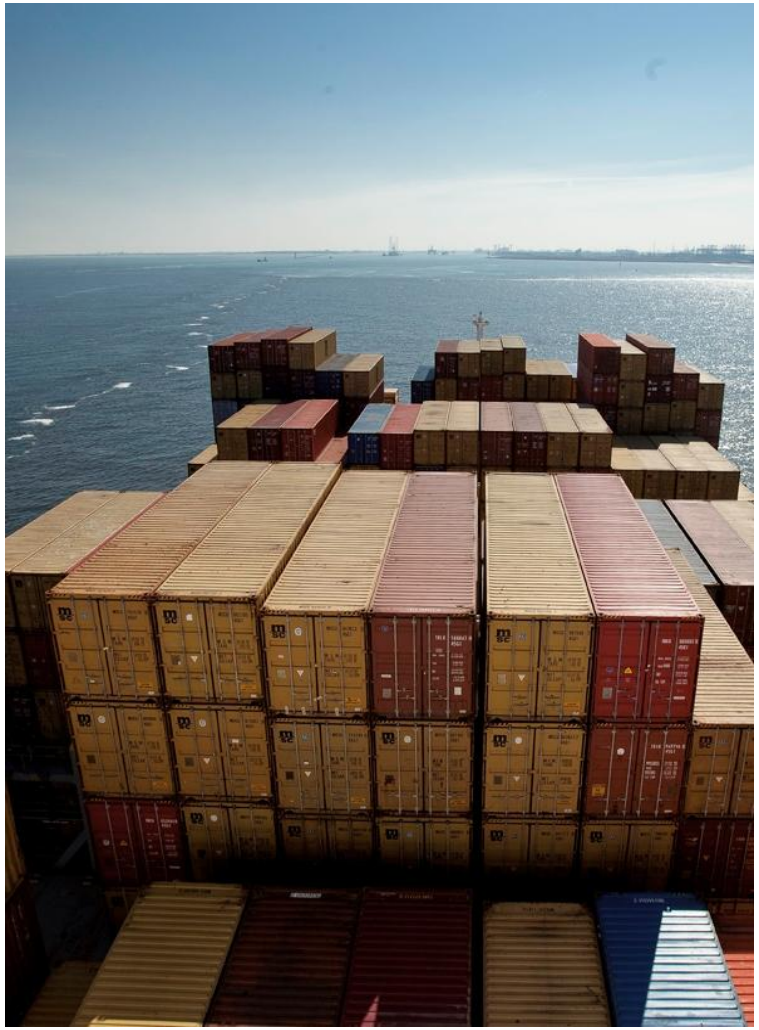

Port development

- Factors driving demand for infrastructure investments
- Hubs need to find some 830 billion US $ capital expenditure by 2030 for total infrastructure
- Classification of Container Terminal Development Projects and Investment fields

Factors driving demand for infrastructure investments at ports

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Many ports have realised the need to reduce congestion and minimise delays to earn a profit from rising imports & exports

- Insufficient access roads and intermodal connections
- Congestion at access roads and intermodal connections

- Construction of larger vessels "Triple E" 18.000 TEU
- Leads to signifi-cant upgrades to existing port infrastructure

- Piling of contai-ners at terminals due to trans-portation bottlenecks

- Costs due to delays
- Missed berthing slots
- Higher fuel costs to make up schedules
- Readjusted schedulde s

Increased demand for investments in ports and terminals and supporting infrastructure at ports

Source: holman fenwick & willan global investments in ports & terminals 2011

Hubs need to find some 830 billion US $ capital expenditure by 2030 for total infrastructure

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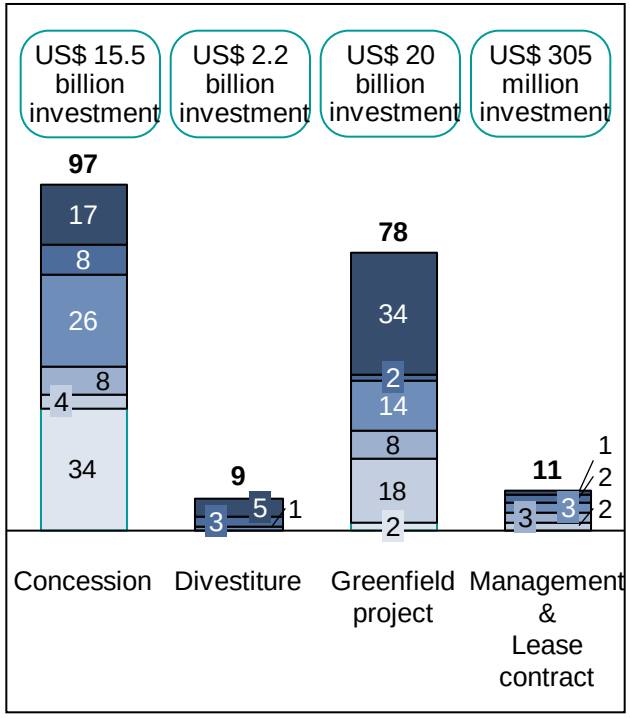
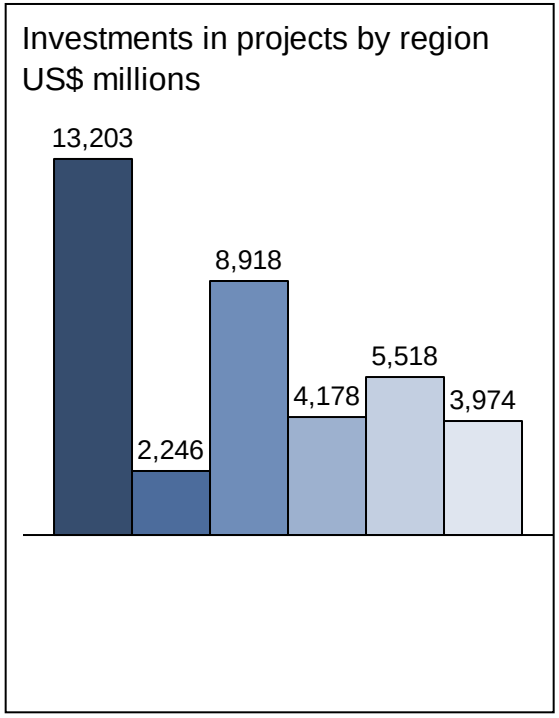
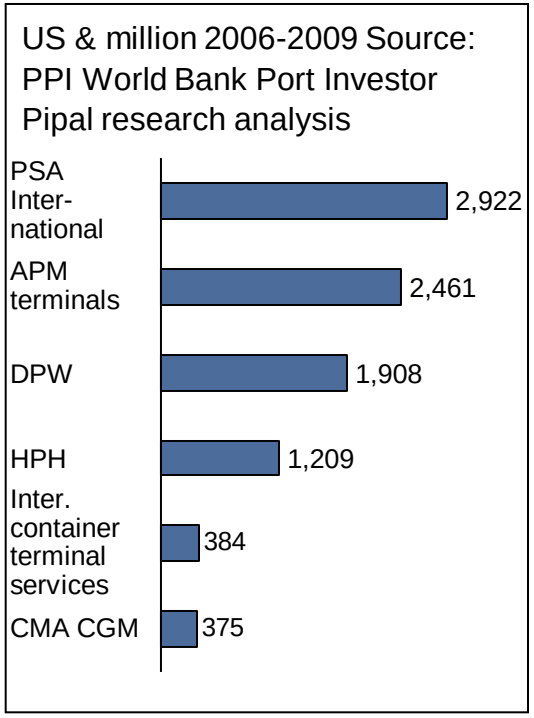
Investment from 2000-2009 including airport & port, road, rail, energy and water investment







There were over the last decade a total port investment of US$38 billion. 195 projects with private port investments (PPI). China (4 billion), India (2,5 billion) and Brazil (1,5 billion) recorded the highest number of PPI investments

East Asia & Pacific | Europe & Central Asia | Latin Amerika & Caribbean | Middle East & North Africa | South Asia | Sub Saharan Africa

Source: holman fenwick & willan global investments in ports & terminals 2011

Classification of Container Terminal Development Projects and Investment fields

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Classification of Container Terminal Development Projects

Greenfield
–Political framework conditions and sets timelines
–Interferences with general infrastructure project challenges
–Upgrading of external infrastructure
→ **Key focus: Commencement date and stakeholder expectations**

Brownfield
–Interferences with general infrastructure project challenges
–Upgrading of external and internal infrastructure and terminal equipment
–Removal of abandoned sites
→ **Key focus: Commencement date and cost of modification**

Terminal Upgrade / Conversion
– Scope of automation and resulting process changes
– Proper phasing of conversion of capacities
– Acceptance within existing labour organisation
→ **Key focus: Least disruption of existing processes and smooth transition**

Terminal Extension
– Greenfield vs. brownfield extension
– Smooth integration into existing operations
– Possibility to combine extension with terminal upgrade
→ **Key focus: Capacity increase and smooth integration**

Investment Fields

Civilworks
- Nautical Access
- Hinterland Access
- Terminal Infrastructure
- Buildings

Equipment
- Quay
- Yard
- Horizontal transportation

IT
- TOS
- CTIS
- Terminal Star
- NAVIS

Rail Infrastructure & Mngm
- Signalling
- Control, IT
- Tracks
- Electrification
- Rail automation

Rail Infrastructure & Mngm
- Signalling
- Camera
- Road Management systems
- Traffic control & Information
- Parking Management

Security
- Container scanning
- Nuclear detection
- OCR sensors
- OCR for container Number,
- RFiD for container seals,
- Nuclear Detection Sensors,
- Container weight sensors,
- Driver ID verification
- Container trace detection

Value added consulting
- Green ports
- Simulation (Berth capacity, Yard and transport equipment handling, Yard storage, Terminal gate)
- Planning Capacity analysis, Comparison of operating alternatives, Hinterland connections, Terminal layout, Specification of operating systems, Logistics process

Topic 9

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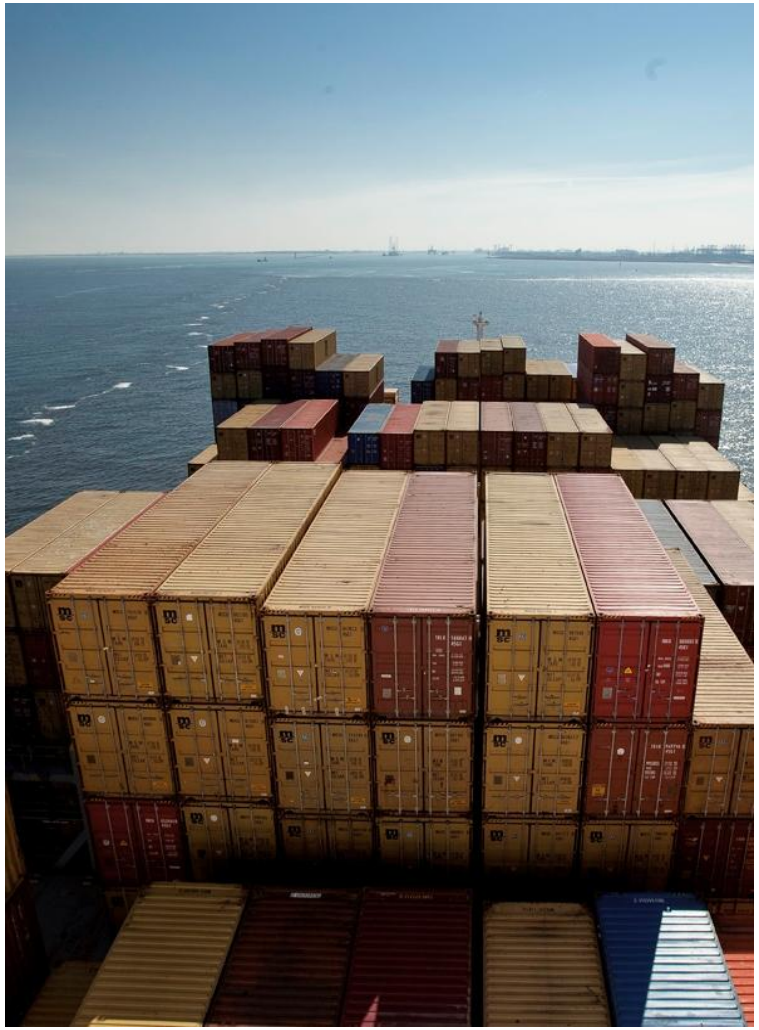
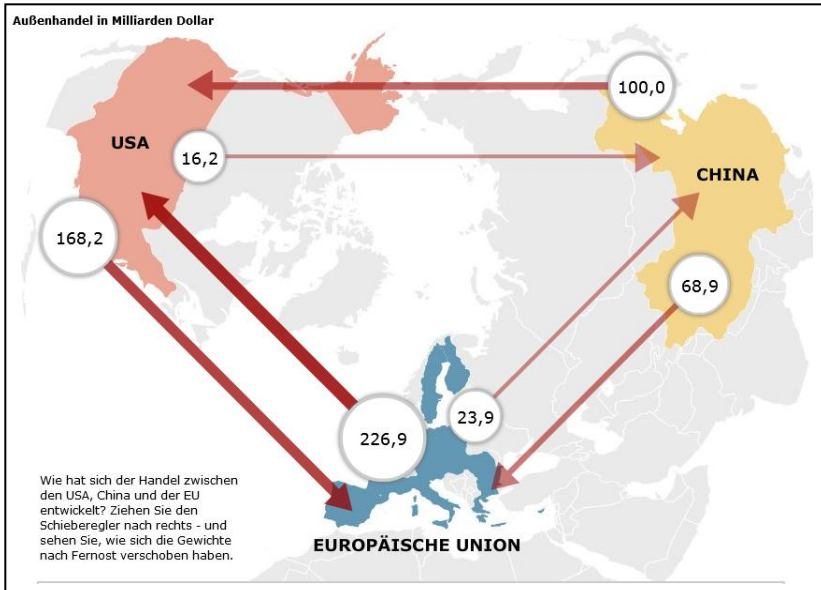
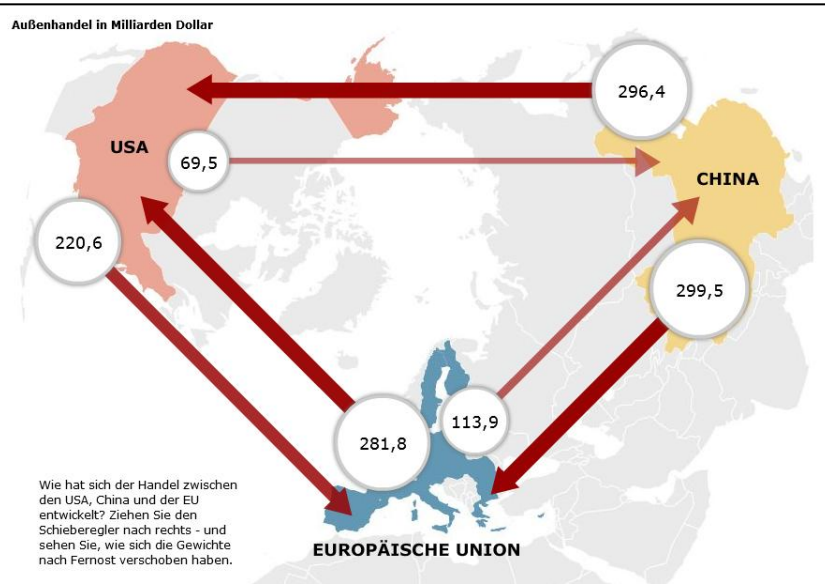


World Trade Flows

- Development

Development of World Trade Flows





2000		
	US - EU	US$ b 58.7
	US - China	US$ b 83.8
	EU - China	US$ b 45.0
	Total	US$ b 187.5

2009			
	US - EU	US$ b 61.2	+4.3%
	US - China	US$ b 226.9	+170.8%
	EU - China	US$ b 185.6	+312.4%
	Total	US$ b 473.7	+152.6%

Topic 10

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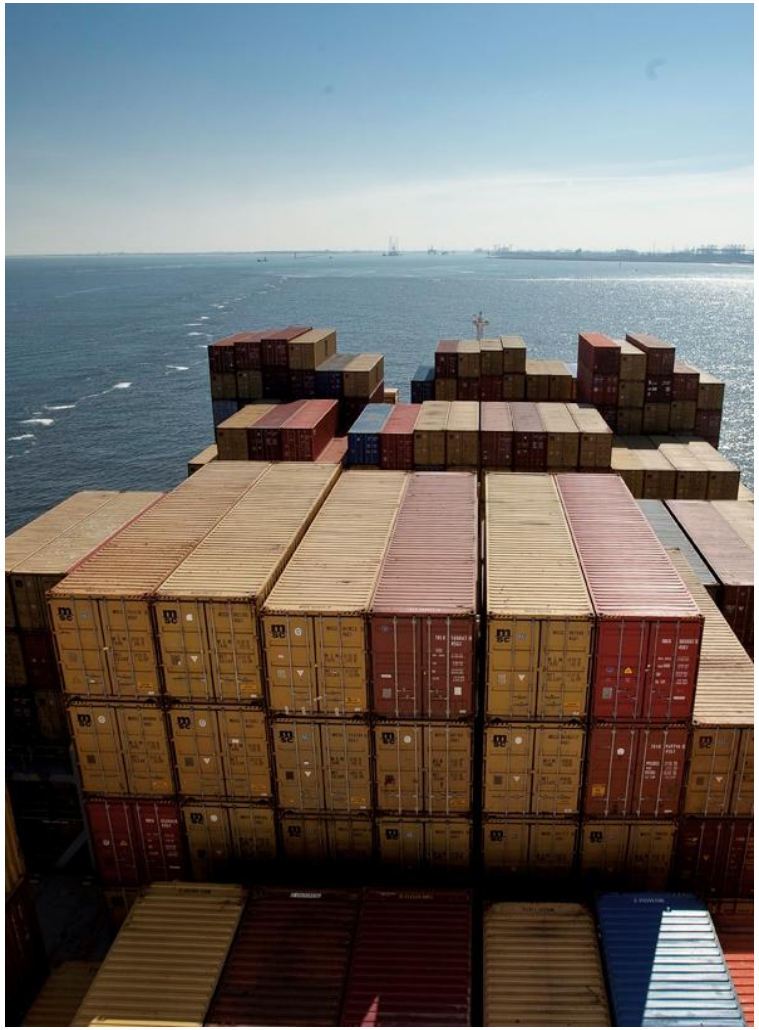

Container Vessels

- Fleet Development and order book segmentation
- Panamax vessels as global leader

Container Vessel Fleet Development & Order Book Segmentation

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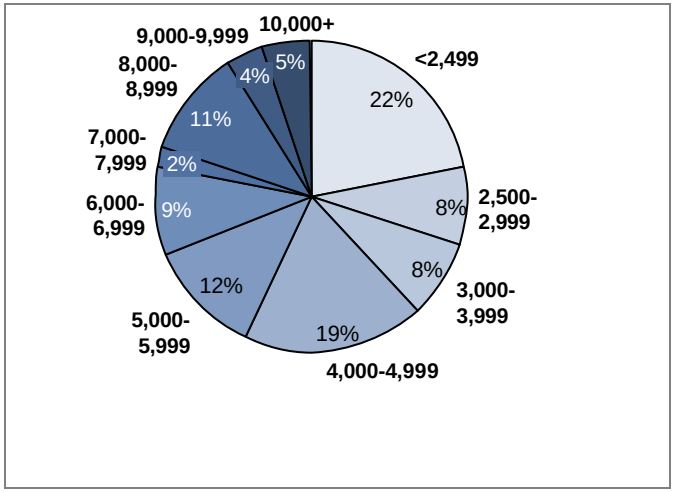
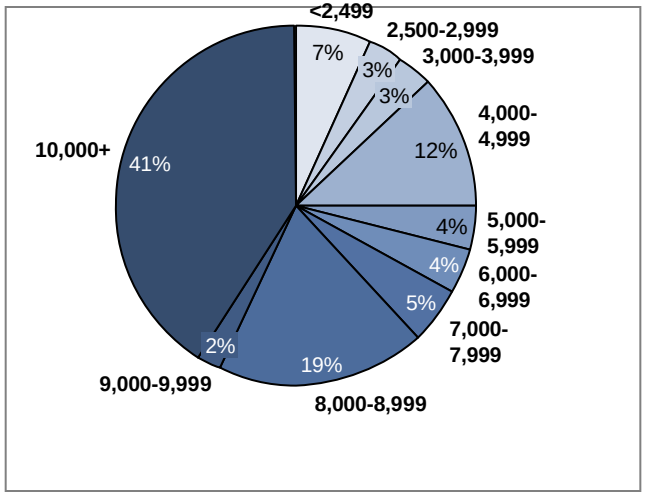
Evolution of Container Vessels



Fleet Segmentation
2011 (% of total TEU capacity)



Order Book Segmentation 2011- 2015
(% of TEU order capacity)

Technological Trends

- Increasing vessel sizes (up to 18,000 TEU on order)
- Increasing automatisation of terminal operations in the developed world
- IT based interfaces and coordination between stakeholders

Source: HPC Hamburg Port Consulting GmbH

By 2014 post- Panamax vessels are expected to account for 48% of the global container fleet

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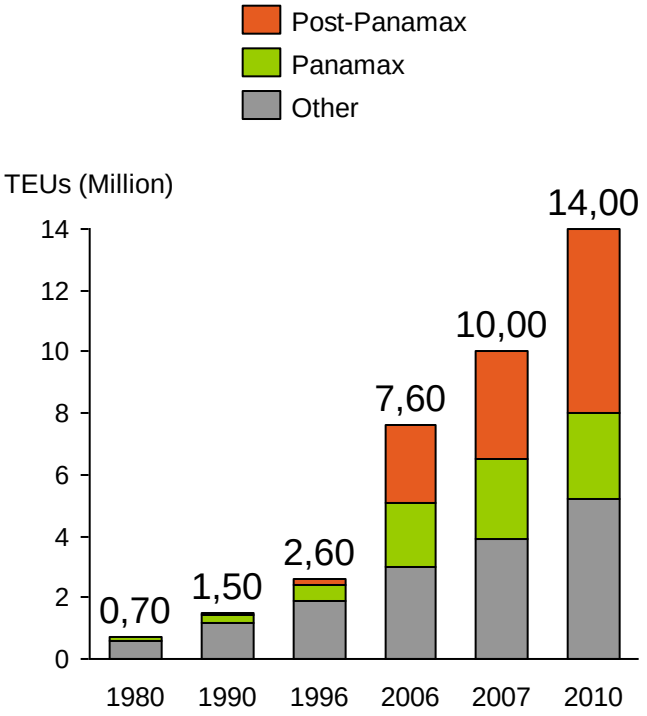
1 4 types of main container vessels

Year built			Length overall (LOA) Meter	Capacity TEU	Beam Meter	Max draft Meter
2007	1 Emma Maersk class		397	14,770	56 (22 rows)	16.0
2002	2 Super post-Panamax class		367	8,500	41.4 (17 rows)	15.5
1996	3 Post-Panamax class		318	6,500	41.4 (17 rows)	14.5
1988	4 Panamax		289	4,800	31.6 (13 rows)	13.0



- Post-Panamax vessels are effective for long distances and between large ports
- Post- Panamax ships have operating costs of about $ 9 mio. per year. Most expenses are related to fuel (46%) and port charges (21%)

Source: Factors impacting North American Freight Distribution

Topic 11

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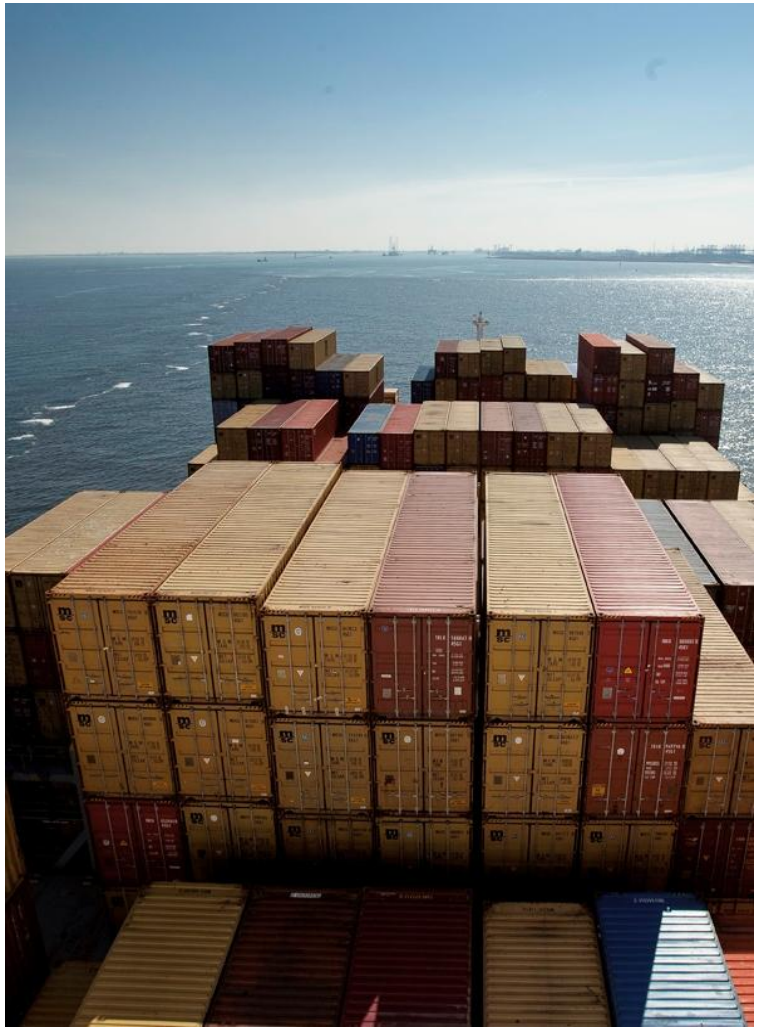


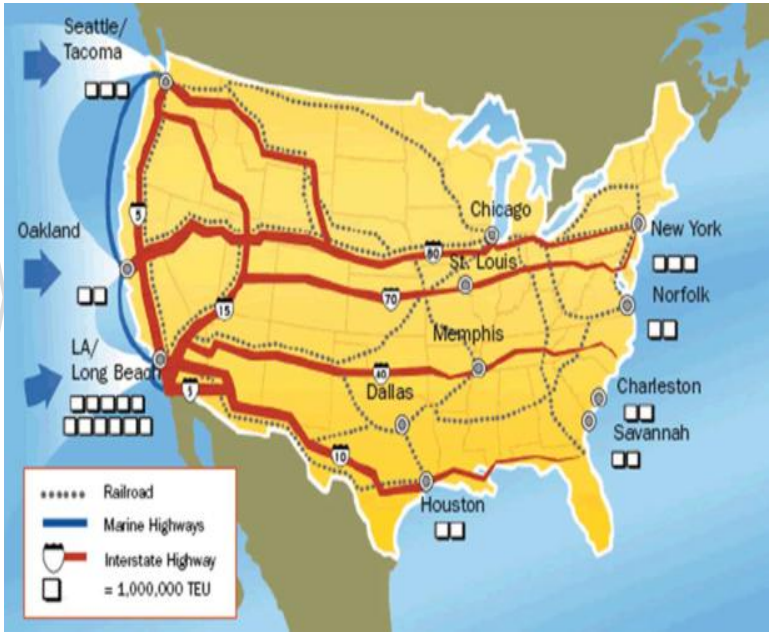
U.S. Ports

- Facts on U.S. ports
- Ports of LA / LB
- Clean Air Action Plan
- PierPass Study
- Mobile sources are the biggest source of air toxics
- I-710 is the arterial road for the cargo transport

Facts on U.S. ports

Facts and Current bottlenecks at US ports

- More than 95% of US cargo imports arrive by ships (DOT 2009)
- Some U.S. ports such as port of LB, Sabannah, Oakland, Charleston and Seattle can receive the post panamax vessels.
- Port of LA and LB count 43% of total TEU imported in the United States.
- U.S port container traffic is expected to double by 2030 (DOT 2009)
- Efficiency of the above mentioned ports is reduced by congestion caused by inland rail and road chokepoints.
- In coming years transportation costs will rise because of
  - switching to low sulfur fuels to reduce air pollution
  - Improving terminal facilities, efficiency hours of operations
  - Reducing congestion



Ports of LA / LB belong to top world ports and further increase of cargo volume is foreseen

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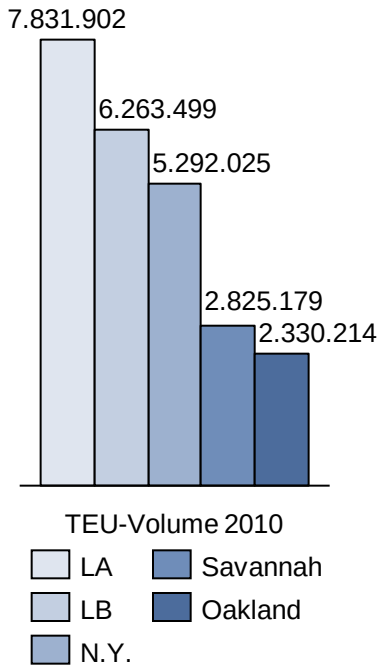
2 Facts and figures

Ports of L.A. & Long Beach



- The ports are strongest ports in USA with ~14 Mio. TEU cargo volume in 2010
- The ports are the entry point for 40 % of all imported goods in the US
- Cargo Volume in both ports will grow up to 43 Mio. TEU in 2035
- Port of LA consists of 4.300 acres. Port of LB 3.200 acres
- Port of LA has 9 container terminals, 26 berths and length of berths 10,046 meters
- Port of LB has 6 terminals, 31 berths and length of berths 7902
- Port of LA has 997 employees, Port of LB 400 employees

Both ports belong among top 20 world ports

Source: L.A. Metro / Containerisation International / Drewry

In both ports more than 10.000 trucks are registered and thereof ~80% are active

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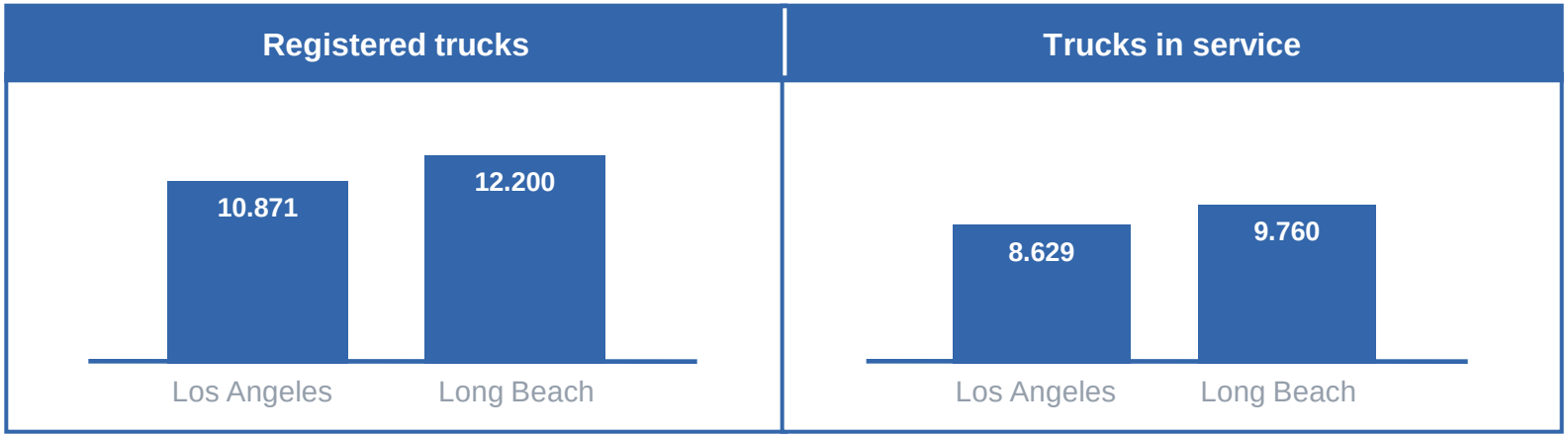
2 Overview on port trucks



Key data:

- >10,000 trucks are registered in both ports in 2010
- ~80% of the registered trucks are active, i.e. “in service”
- ~22,000 independent owner-operators in 2009 who conduct drayage at ports and intermodal rail yards

Significant growth in number of trucks is expected until 2035

Sources: Clean Truck program – Gate Move Data analysis; California Air Resources Board, Appendix C

The 2006 initiated Clean Air Action Plan consists of initiatives to reduce port-related emissions

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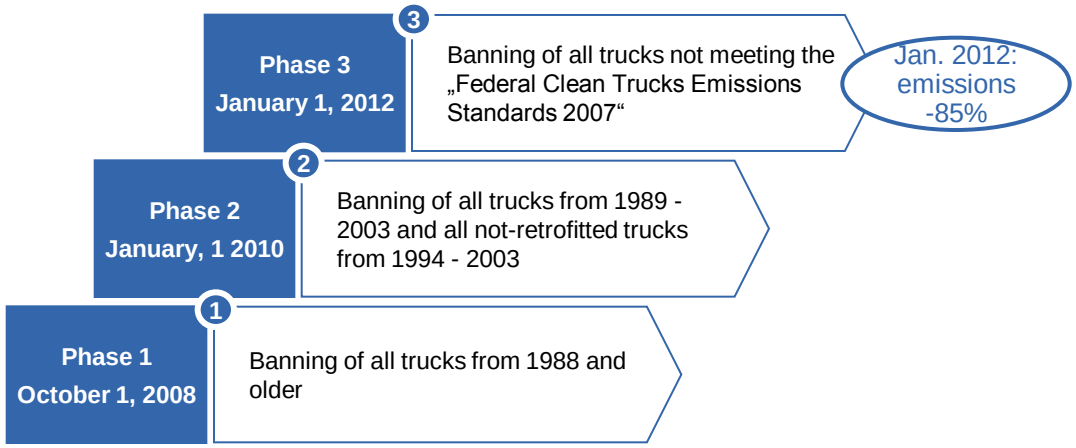
2 Clean Air Action Plan and Clean Truck Program

Clean Air Action Plan

- The Clean Air Action Plan should reduce port-related emissions from 2006 to 2011 by 45 %
- The Clean Truck Program is part of the Clean Air Action Plan
- The Clean Air Action Plan consists, beside activities for trucks, of more initiatives for ships, trains, cargo handling equipment and harbor craft

Clean Truck Program

- Goal of the Clean Truck Program is the reduction of truck emissions up to 85 % by 2012
- To achieve this goal truck drivers/companies get financial support to renew their truck fleet
- The 85 % emissions reduction should be reached by banning old trucks step-by-step. This happens ins 3 phases:



Source: Port of Los Angeles/Port of Long Beach

The ports already decreased the environmental impact of port operations from 2005 to 2010

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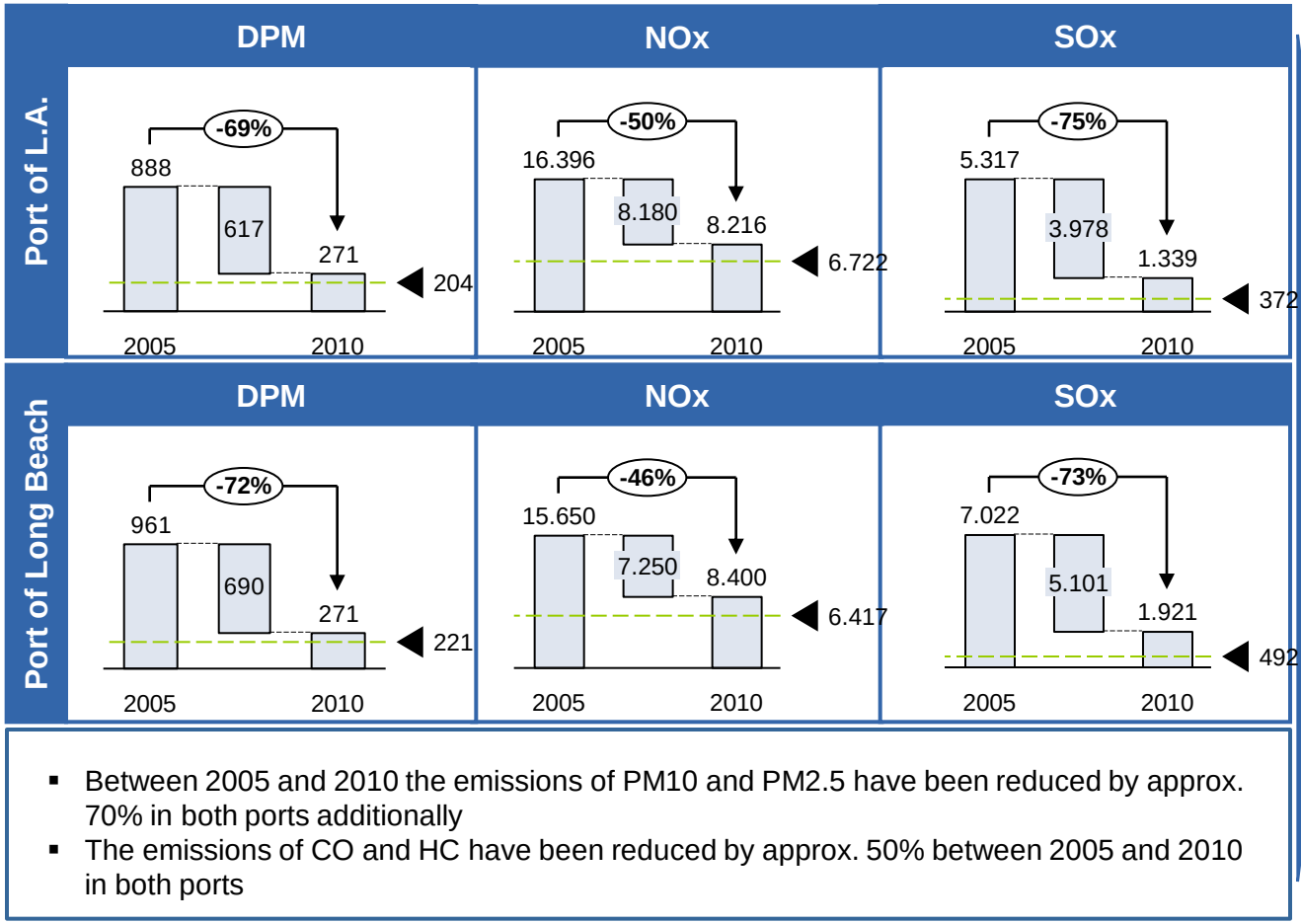
2 Emissions on ports [in tons p.a.]



- Between 2005 and 2010 the emissions of PM10 and PM2.5 have been reduced by approx. 70% in both ports additionally
- The emissions of CO and HC have been reduced by approx. 50% between 2005 and 2010 in both ports

Key data:

- The ports are responsible for ~20% of all DPM emissions in Southern California
- The goals for 2023 for DPM and NOx are nearly achieved
- SOx emissions also reduced significantly but still challenging
- Reductions of PM10 and PM2.5 as well as CO and HC are significant
- Goal 2035 not specified or not identified yet

Sources: Emission inventory LB and LA 2010

The “PierPass Study” identified weaknesses at the ports and made several recommendations

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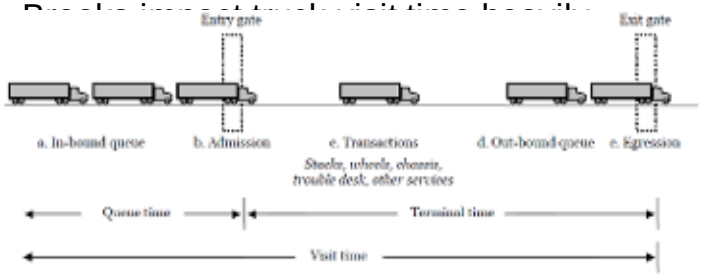
2 Recommendations of PierPass Study

Findings

1. 86% of visits take 0 – 2 hours; 12% take 2 – 4 hours and outlier cases take up to 8 hours
2. Trucks wait outside the terminals in the 16.00 - 17.00 period to avoid Traffic Mitigation Fee
3. Differences in terminal performance, e.g.
   - 3 terminals account for 10% of all visits associated with 28% of long visits
   - 2 terminals that move 25% of the cargo are linked with 2% of long queues
4. Breaks impact truck visit time heavily



Recommendations

- Review breaks; Have a high influence on truck visit time
- Review the „all-or-nothing“ structure of the TMF (Traffic Mitigation Fee)
- Establish terminal-specific performance standards, supported by a continuing process of monitoring visit time
- Expand land-bridge services (e.g. pre-removal of import containers to off-dock yards for pickup), and improved communication between trucks and terminals

Source: PierPASS, Inc, Ability/TriModal Transportation Services, Inc, Taking the Pulse of the Ports, March 2011

In addition to emissions of local industries mobile sources are the biggest source of air toxics

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3 Overview on surroundings

Emitting industries[1]:

- Petroleum Refineries, 43%
- Nonferrous Metal Smelting, 23%
- Semiconductor Manuf., 17%
- Metal Working, 5%
- Chemical Manufacturing, 2%

Biggest companies[1]:

- BP West Coast Products
- Exide Technologies
- Sanyo Solar LLC
- Valmont Coatings
- Conocophillips L.A. Refinery
- Johnson Laminating & Coating Inc.
- Triumph Processing Inc.
- Western Tube & Conduit C.
- INEOS Polypropylene LLC
- Equilon Carson Terminal

Residents:

- Approx. 19 municipalities[2] and approx. 1 million residents along the road I-710
- Within ¼-Meile from the I-710[2]:
  - 10 schools
  - 6 day-care centers
  - 5 Mobil-Home Parks
- Approx. 2,000 premature deaths are associated with diesel emissions in Southern California[1]

Despite local industries the largest sources of air toxics are the mobile sources (e.g. cars, trucks, construction equipment, trains)[1]

Source: [1]US Environmental Protection Agency. Toxics Release Inventory, I-710 Corridor / Reporting Year 2009
[2] I-710 Corridor Project Factsheet, Fall 2009

I-710 is the arterial road for the cargo transport to and from the Ports of L.A. & Long Beach

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3 Overview on I-710 traffic

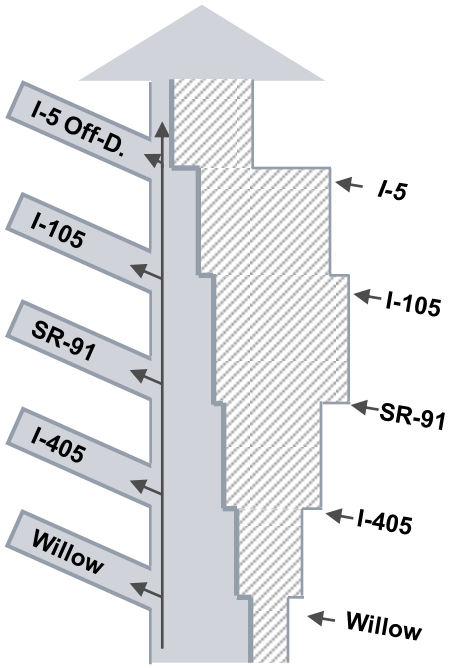
NUMBERS TO BE VERIFIED

Traffic Volume in sections of the I-710 (2007 based on 2003)

Highway	Segment	Length of segment (in miles)	Total Daily Vehicle Volume	Total Daily Truck Volume	Daily Port Truck Volume
I-710	GDB to PCH	1.5	Assumption: Like next segment		**23,900**
I-710	PCH to Willow	1	146,000	25,400	**23,900**
I-710	Willow to I-405	1.5	161,000	27,100	**23,235**
I-710	I-405 to SR-91	3.6	186,000	31,400	**20,045**
I-710	SR-91 to I-105	2.7	227,000	38,300	**15,315**
I-710	I-105 to I-5	7.2	237,000	34,600	**11,685**
I-710	I-5 to SR-60	1.4	199,000	24,200	**1,025**
I-710	SR-60 to I-10	1.9	132,000	11,300	**845**

Exit to off dock rail stations

The traffic volume is for both directions.
Traffic volume on the interstate will grow by 85 % in 2035.
= Daily Port Truck Trips Volume 2035 – in Segment PCH to Willow – 44,215



Port trucks Total trucks

The I-710 currently is utilized by any kind of truck traffic – not only port trucks

Source: U.S. Department of Transportation - Federal Highway Administration (FHWA) operations support – port peak pricing program evaluation; Multi-County Goods Movement Action Plan (MCGMAP)

The current LA / LB port related traffic flow can be clustered in three categories including the I-710

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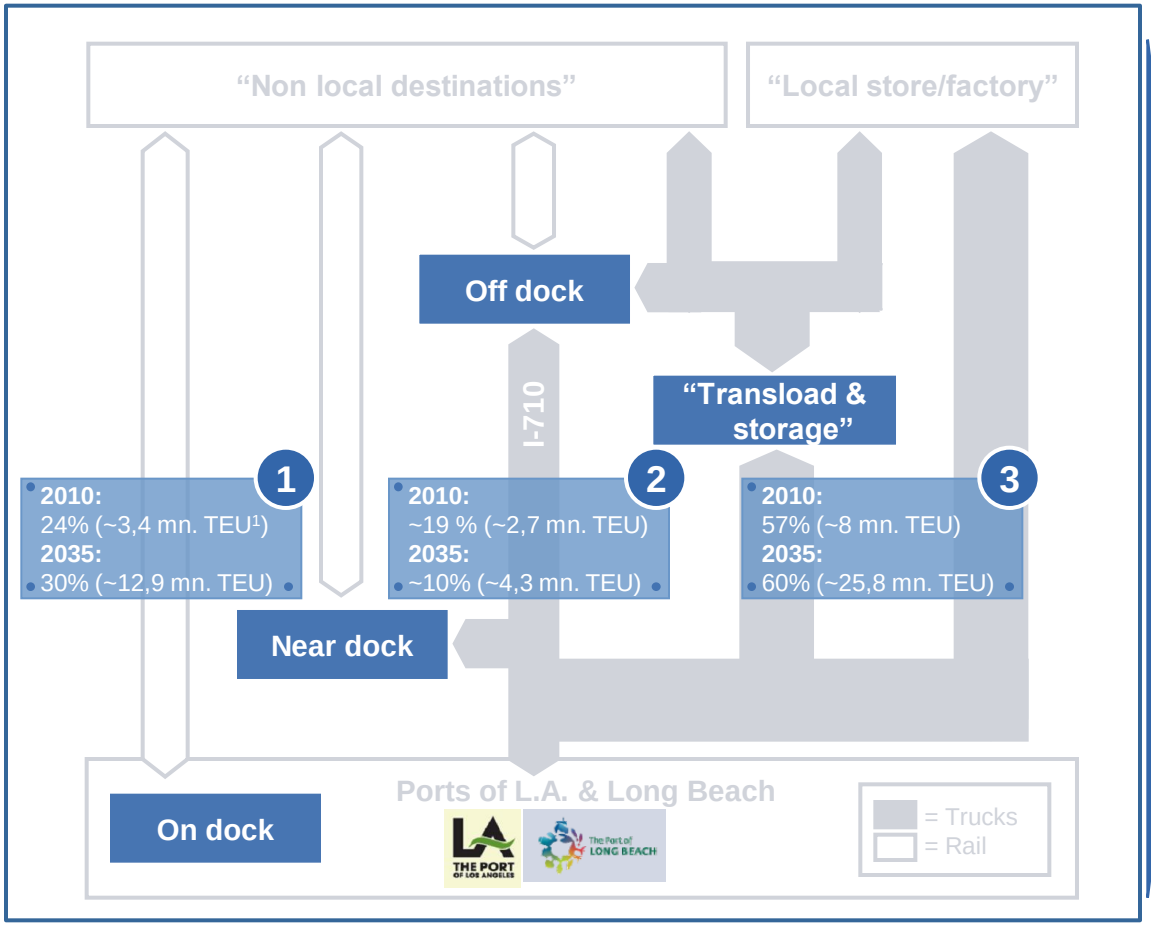
3 Summary on traffic flow



Key data:

1. **Rail:**
   - ~ 24% of volume transported via on dock rail
   - Proportion expected to increase in the future
   - Additional near dock rail terminal planned
2. **Trucks on I-710:**
   - ~19% of volume Near / Off dock assumed to be "I-710"-relevant
   - Proportion to be decreased; volume increasing strongly
   - Assumption 2010: ~20.000 - 25.000 daily port truck trips
3. **Other truck routes:**
   - ~57% of volume on other roads then I-710
   - Assumption 2010: ~65.000 - 70.000 daily port truck trips (calculated)

Sources: Port of Los Angeles/Port of Long Beach, TEU Statistics 2010; Port of Los Angeles, Intermodal Logistics & Ports of L.A./Ports of Long Beach Rail Infrastructure, Port of Los Angeles Public Rail Workshop Oct. 22, 2009; [1] Twenty Foot Equivalent

Topic 12

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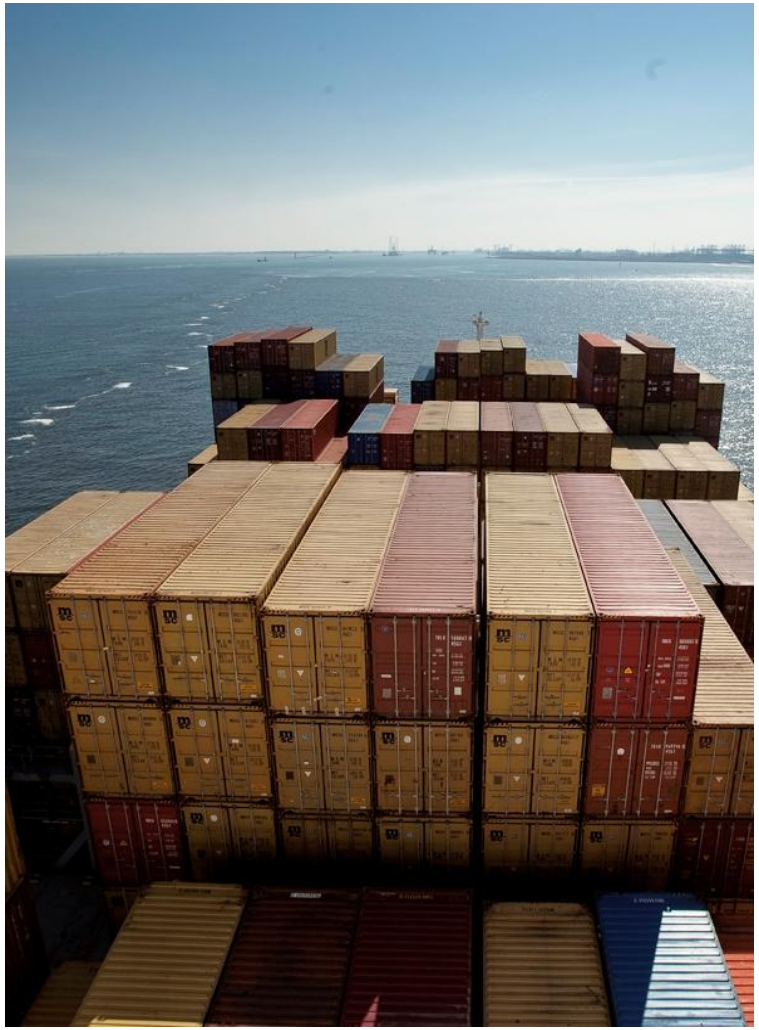

Share of Routes to U.S. ports

- Share of North East Asia – U.S. East Coast Route

Share of North East Asia – U.S. East Coast Route by option

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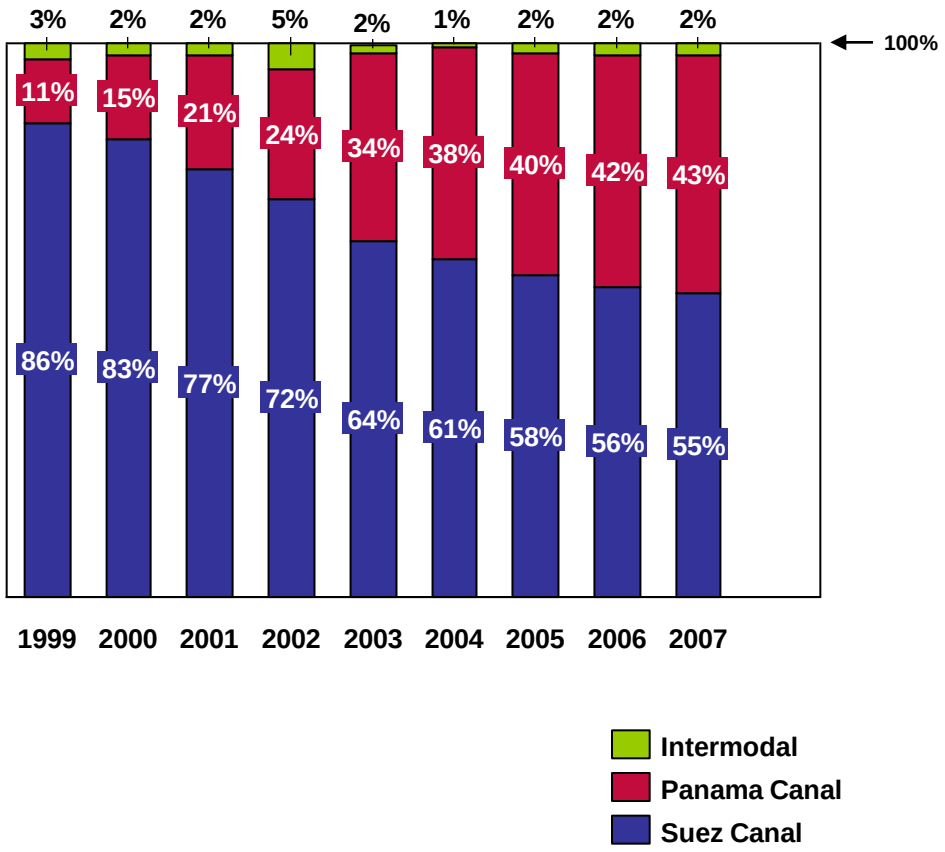
- Main cargo destinated for U.S. moves mainly through the Panama canal, Suez canal and the cape of good hope and the US intermodal system.
- Major advantage of U.S. intermodal system is frequent usage of Post Panamax ships as it requires 5 ships for a weekly service rotation compared with eight ships required by the panama canal route.
- Routing of freight depends on different criteria:
  - **Cost**: expansion of the canal is expected to reduce costs
  - **Time:** cargo that has higher value or is perishable takes the routing option which is faster (intermodal system in this case). Panama canal will have marginal impacts on time
  - **Reliability:** Panama canal leads to less congestion and more reliability



Source: Factors impacting North American Freight

Topic 13

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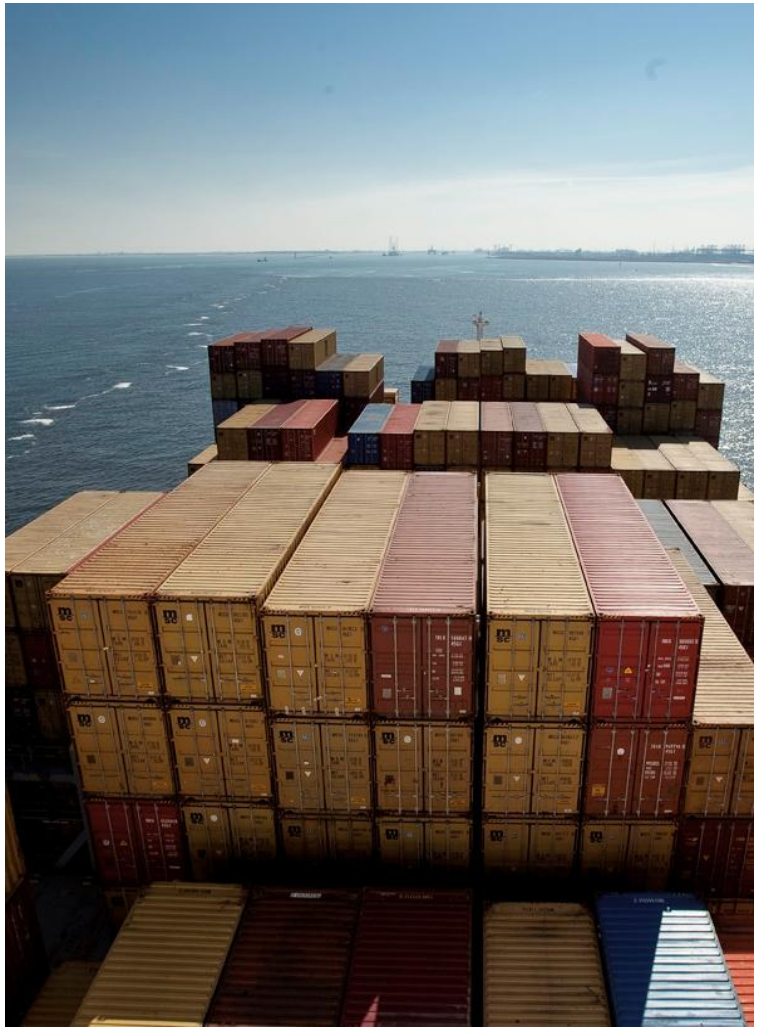


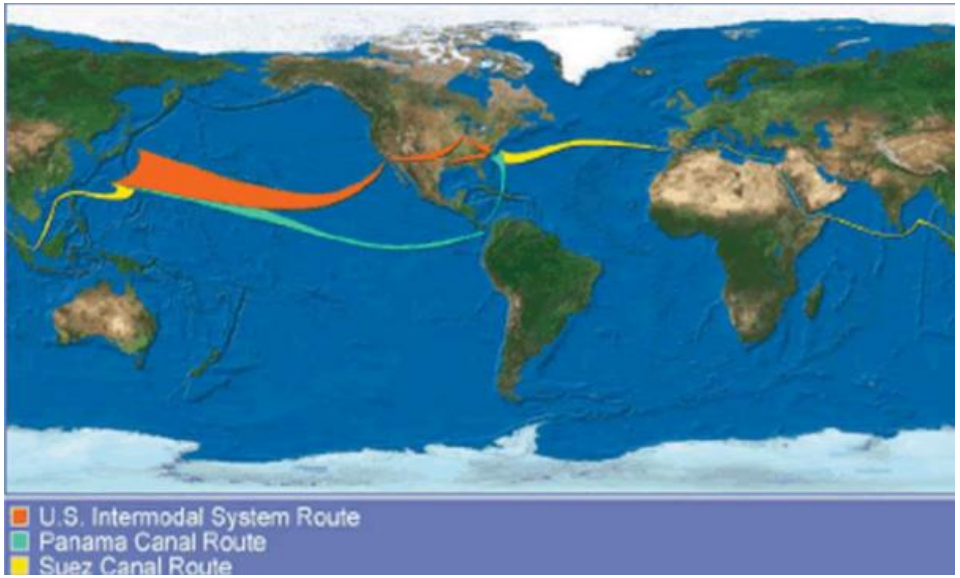
Panama Canal

- Facts and impact of expansion

Facts on Panama Canal and impact of expansion

Facts on Panama Canal

- Canal is 64 km long and handles 5% of global seaborne trade and 12% of American international seaborne trade
- Authority generates revenues by collecting tolls. Average toll is about $45.000. In 2008 $1.32 billion in tolls were collected.
- The average in transit time has increased from 9 hours in 1999 to 13.04 hours in 2008
- Canal is reaching its maximum capacity and does not have the infrastructure to handle Post -Panamax vessels.
- Expansion of canal was decided in 2008 and will overcome its capacity challenges by 2014
- Main competitor of Panama canal is the U.S. intermodal system and the Suez canal
- The costs of panama canal expansion will cause significant pressures to increase tolls.
- The role of west coast ports as gate way to North American freight distribution will not be compromised by the expansion



- The canal route is less costly and highly reliable but has a longer navigation time (21.6 days) than the U.S. intermodal system (18.3 days)
- The expansion will increase efficiency to U.S. intermodal system by decongesting the west coast main port of LA/LB
- Trade can be delivered faster to East coast ports
  More integrated approach is needed to reduce bottlenecks in current system

Source: Courtesy of the panama canal Authority

Topic14

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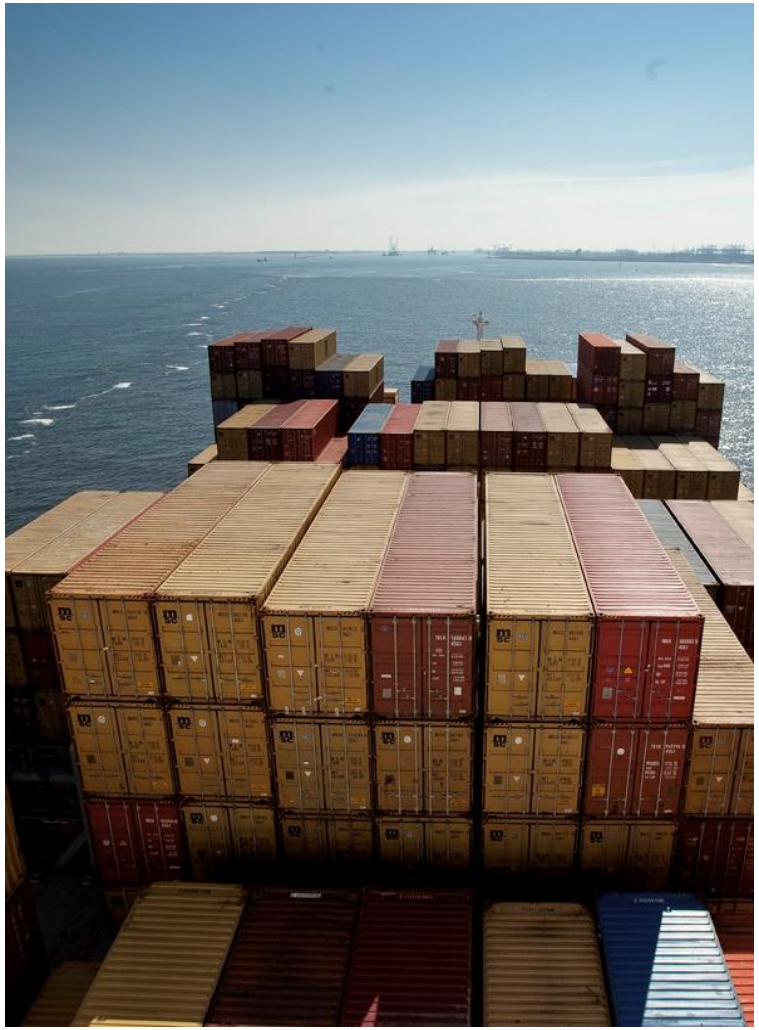

Behind the ports:
The North American Distribution Market

- Key trends

Key Trends impacting the North American Distribution Market

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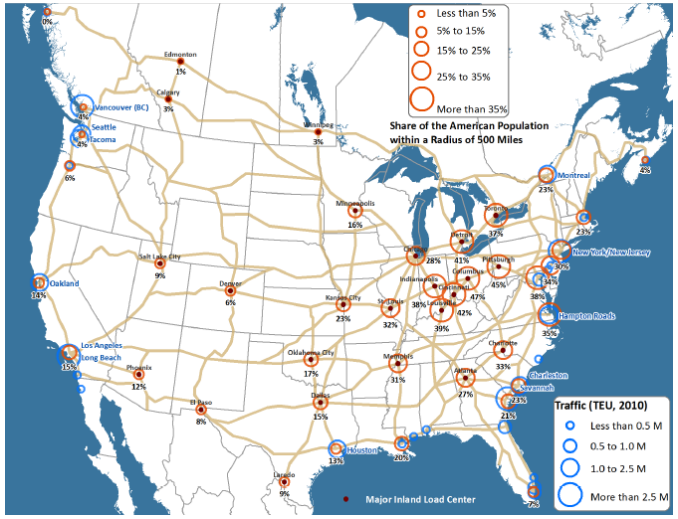
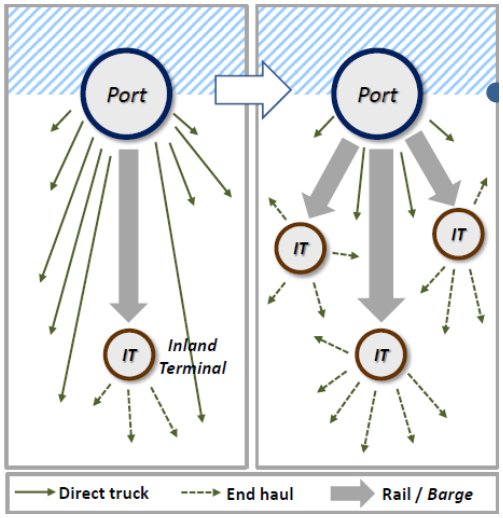
1. **Oil Prices**:
   Rising oil prices have resulted in some companies re-evaluating supply chains and distribution networks in an attempt to offset cost increases.
3. **Increase in inventory levels**:
   As a result of higher transportation costs, many shippers are likely to move away from quick and frequent deliveries to slow and less frequent shipments, thus driving up inventory.
4. **E-commerce**:
   To support online sales, many brick and mortar retailers are expanding their distribution facilities..
5. **Intermodal transportation**:
   The transport of freight via several modes of transportation – ship, rail and truck, has increased over the past few years by setting up multimodal connections and terminals
6. **Larger space**:
   Throughout 2010-2011, companies took advantage of lower vacancy rates and "traded up" to larger warehousing and distribution facilities.
6. **Near-shoring**:
   A shift towards regional supply chains, or nearshoring, is resulting in manufacturing moving closer to customer-bases.
7. **Containerized imports:**
   Over the past ten years, containerized imports have become one of the most important drivers of demand for warehousing and distribution centers in the US



Inland Load Center Network Formation



Source: Rodrigue Hofstrau

Topic 15

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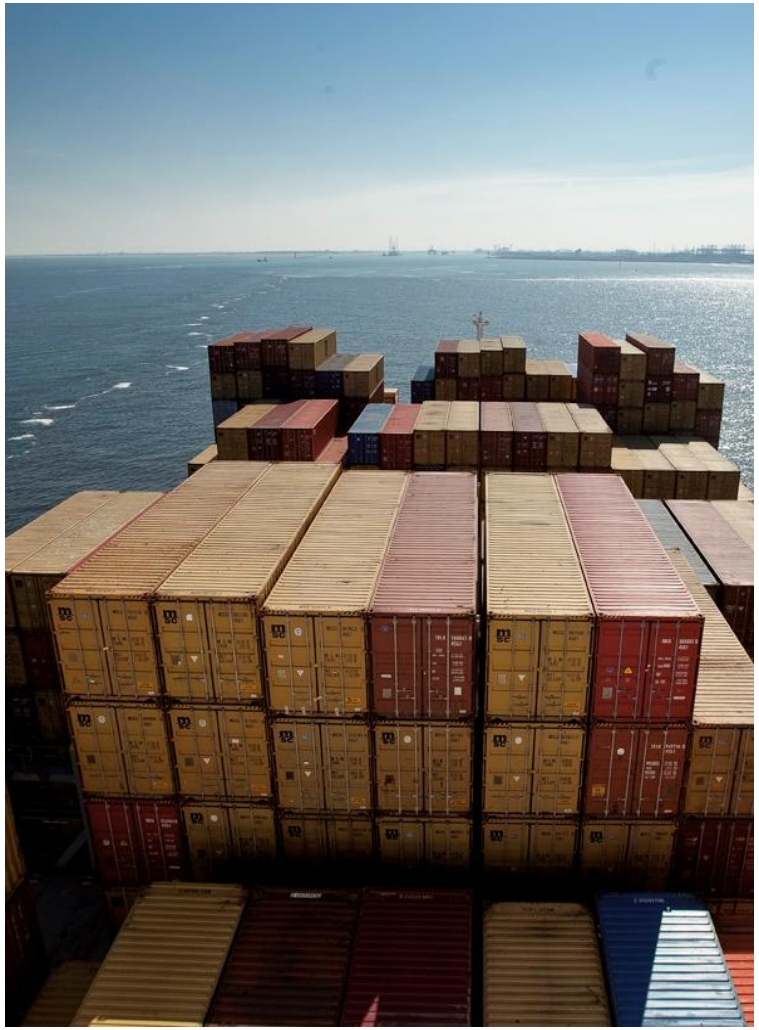


Siemens solutions

- Transfer expertise from other industries to terminal operations
- Pregate solutions
- Gate automation
- Siemens perspective

Transfer of expertise from industrial automation, airports and cranes to terminal operations

SIEMENS

Siemens brings broad expertise relevant for terminal operators, e.g.,

Manufacturing

- **Industry leader in manufacturing automation** and material flow control, e.g., deployed in automotive manufacturing plants

Cranes

- World-known **expertise in cranes for terminal operations** with leading market share (e.g., globally installed base of 1203 STS cranes, 599 RMGs and 2206 RTGs)
- Global presence of crane specialist via regional service organizations

Airports / Air Cargo / Postal Automation

- Knowledge and technology around fully automated container handling
- High Speed Container Loading
- Automatic Container supply to the platform level
- Example: Dubai airport cargo city, REMA (Switzerland)

Global presence

- Global presence with over 350’000 employees
- More than EUR 73 Bn revenues in 2011

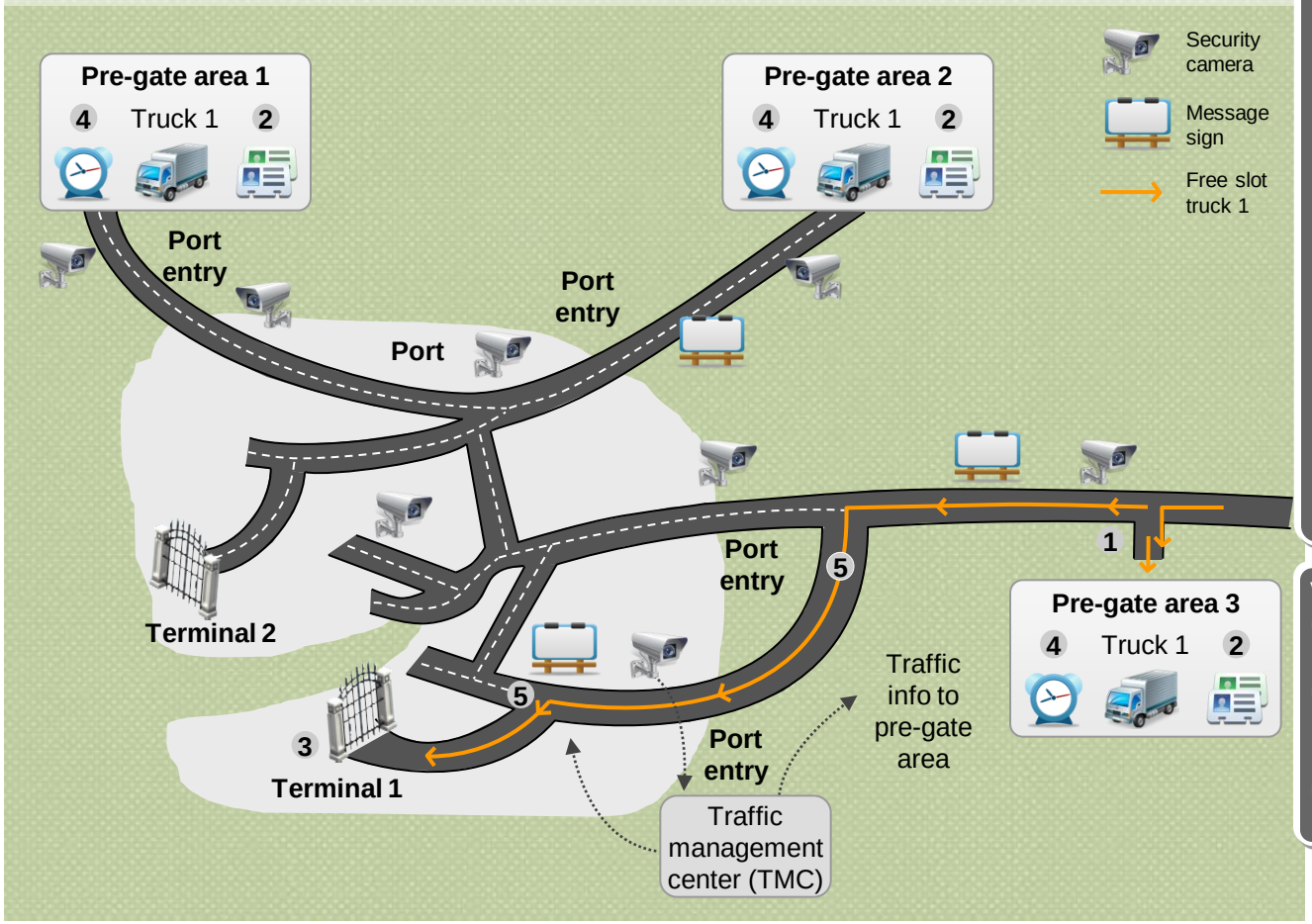
Enhanced Capabilities in

- SW development, project realization, integration, material handling processes

Pre-gate solution – Process and value proposition

SIEMENS

Potential layout of pre-gate solution



Process:

1. Truck arrives at pre-gate area
2. Pre-gate area identifies truck and announces arrival of truck to terminal
3. Terminal assigns time slot to truck (with terminal operating system)
4. Pre-gate area announces time slot and travel time (based on data from TMC) to truck
5. Message signs guide truck to terminal (based on real-time traffic data from TMC)

Value proposition

- Reduction of traffic congestion, e.g., trucks
- Active control of truck arrivals, e.g., slot assignment to optimize handling in terminal
- Advance notification of arrivals, e.g., of trucks

Source: IL "deep-dive ports"

Gate-automation – Modules and value proposition

SIEMENS

Modules of gate automation

Document Reading
- Automatic recognition, scanning and interpretation of all written elements on the documents
- Manual data-entry to supplement

Damage check
- Automatic scanning of containers through cameras at gates and berthing places to check for damages and broken seals

Video Gate
- Recognition of truck-ID, truck signs (e.g., dangerous good signs) and Container IT (ISO)

Number plate recognition
- Automatic number plate recognition at gate

Extensive OCR expertise within Siemens:
- Leader in postal automation (all sorting centers in Germany and U.S.)
- Highest recognition rates, highest reliability

Value Proposition

- **Automatic and seamless tracking** of documents, containers and their state, e.g., for liability purposes
- **Cost reduction via automation**, e.g.,
  - Reduction of staff via automation and pooling, i.e., less manual effort
  - Centralization of recognition and documentation
- **Direct linkage to databases**
  - Land registers, European/National libraries
  - Enterprise mail rooms / Trust-Ebox
  - Cross-Check within image management
- **Generation of service and performance reports**

Source: IL "deep-dive ports"

Siemens MOL/ I&C perspective

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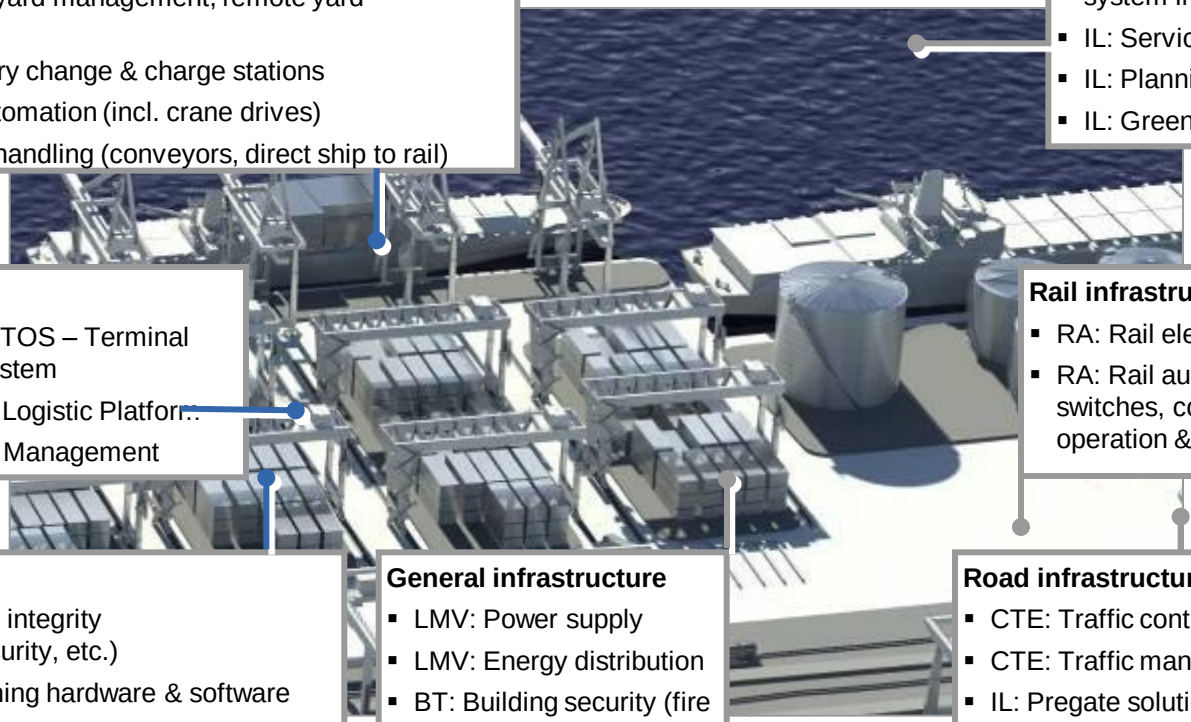

Equipment
- IL: Gate automation (incl. ANPR, container localization)
- IL: Dock-and-yard management, remote yard management
- IL: AGV Battery change & charge stations
- DT: Crane automation (incl. crane drives)
- IL: Container handling (conveyors, direct ship to rail)

Value added services
- IL: Project management and system integration
- IL: Service / maintenance
- IL: Planning & simulations
- IL: Green solutions

IT
- IL: Extended TOS – Terminal Operating System
- IL: Transport Logistic Platform
- IL: Total Port Management

Rail infrastructure & management
- RA: Rail electrification
- RA: Rail automation components (e.g., switches, communication, signaling, operation & disposition systems)

Security
- II/BT: Process integrity (container security, etc.)
- IL/ BT: Screening hardware & software
- BT: Yard security (access, intrusion …)

General infrastructure
- LMV: Power supply
- LMV: Energy distribution
- BT: Building security (fire solutions, video surveillance, etc.)

Road infrastructure & management
- CTE: Traffic control (incl. signaling)
- CTE: Traffic management
- IL: Pregate solution (incl. truck identification)
- CTE: e-Highway

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