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Marine & Energy

Accumulation of Exposures
Ports and Terminals

Prepared by
ARGO ASIA

Presented by David Lim

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Purpose of Presentation

Part 1

- ✓ To identify why there is a growth in the potential for accumulation of risk specifically in port locations.

Part 2

- ✓ To highlight the challenges of accumulation identification.
- ✓ To demonstrate how interdependent risks can be mapped and cargo exposures modelled.
- ✓ To highlight future exposure management initiatives.

Part 3

- ✓ To summarise insurance coverage

Part 4

- ✓ To summarise as an example the Tianjin explosion in 2015

Part 1 – Growing Accumulations

- There are approx. 4,160 shipping and container ports globally of which 172 are located in China (4.2%)

- Typical port operations will include following properties:

  - ✓ Piers
  - ✓ Wharves
  - ✓ Docks
  - ✓ Dispatch Terminals
  - ✓ Loading / Unloading Logistics
  - ✓ Warehouses / Storage

- Port areas will vary according many factors (geographical, economic, operational) however these are getting larger to accommodate increased dimensions of vessels and volumes of cargo.

Part 1 – Growing Accumulations

- Transport capacities by sea, land and air are increasing
  - For example, modern container ships carry up 15,000 standard (20 ft.) containers compared to the 700 carried in the late 1960s
- Trade globalisation and greater connection between distant economic regions
- Port logistics and speed of trans-shipment are increasing
- Higher value concentrations on board vessels and in ports

“CSCL GLOBE” – World Largest Container Carrier

Owner: **China Shipping Container Lines**

Builder: Hyundai Heavy Industries

Launched: 2014

Dimensions: L – 400mts
W – 58.6mts
H – 73 mts.

GRT / DWT: 187,541 / 184,605

Speed: 16 knots

Trade Route: Asia - Europe

Capacity: **19,100** Containers
or…….
115.5m (pr) trainers
or ……
189m i-Pads
or ……
37,400 cars

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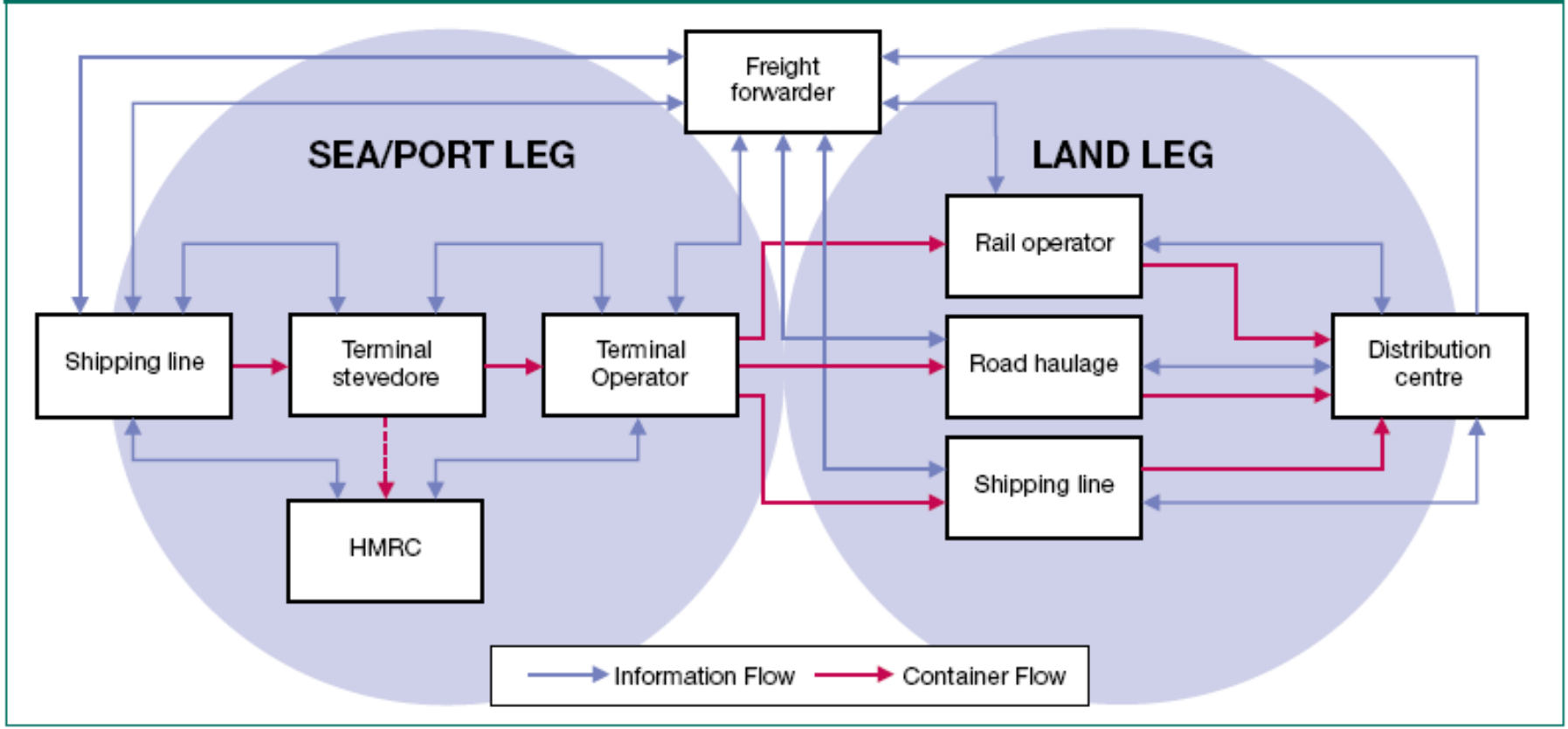
Part 2 - Managing non-static cargo exposures for insurance risk assessment – an 'ideal' approach?

The (significant) challenges

- Unlike property risk, exposure and accumulation management is primarily non-static – both time and space
- There are significant *potential* accumulations, particularly in world container ports, terminals and free ports
- Complex, interdependent worldwide multi-modal transport chains
- Wide range of assets exposed, increasing traffic
- Greatly varying storage levels and dwell time, including seasonality across varying asset types
- Lack of transparency in standard container contents
- Diverse vulnerabilities and uncorrelated losses make loss estimation uncertain
- Risk accumulations are difficult to locate with accuracy within ports
- Complex, multi-insured risks
- **Result: Under or over estimation of exposure?**

Figure 7: **Organisations involved in the container end-to-end journey**



Source: Department for Transport, 2008

Extracted from *"The container freight end-to-end journey"* published by the UK Dept. of Transport (Dec 2008)

Part 2 - Mapping accumulation and interdependent risks

Some data exists to *potentially* help assessment at a high level

- World Ports Index provides basic location data for key accumulation sites
- World Bank container volumes can identify relative accumulation potential and trends (*http://data.worldbank.org/indicator/IS.SHP.GOOD.TU*)
- Detailed aerial photo interpretation / mapping can add greater granularity and potential accumulation risks
- Shipping loop statistics by line can assist in determining overall port-port movements
- Transit times can be estimated based on general statistics, transhipments
- Slow-steaming due to oil price fluctuations may impact

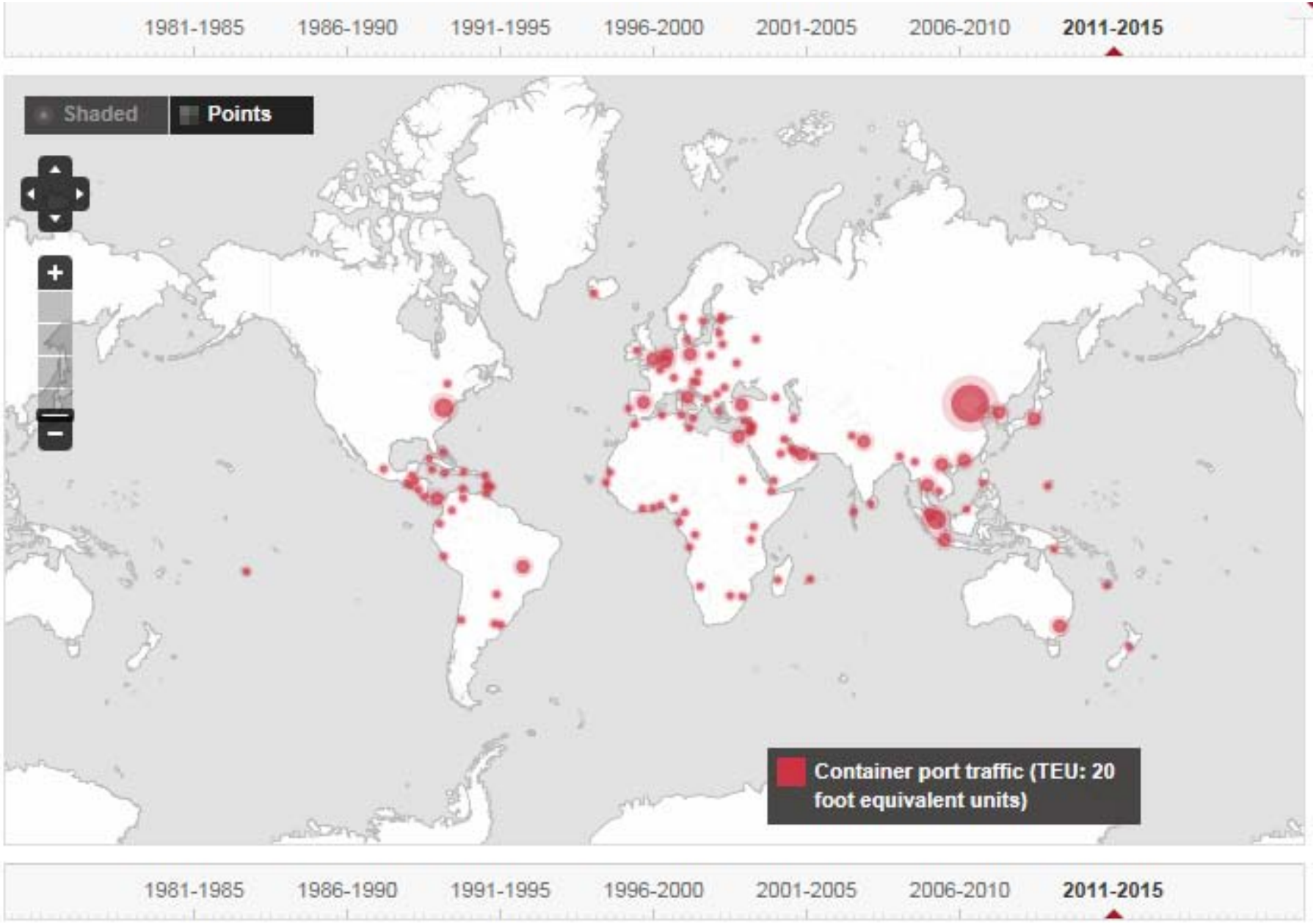
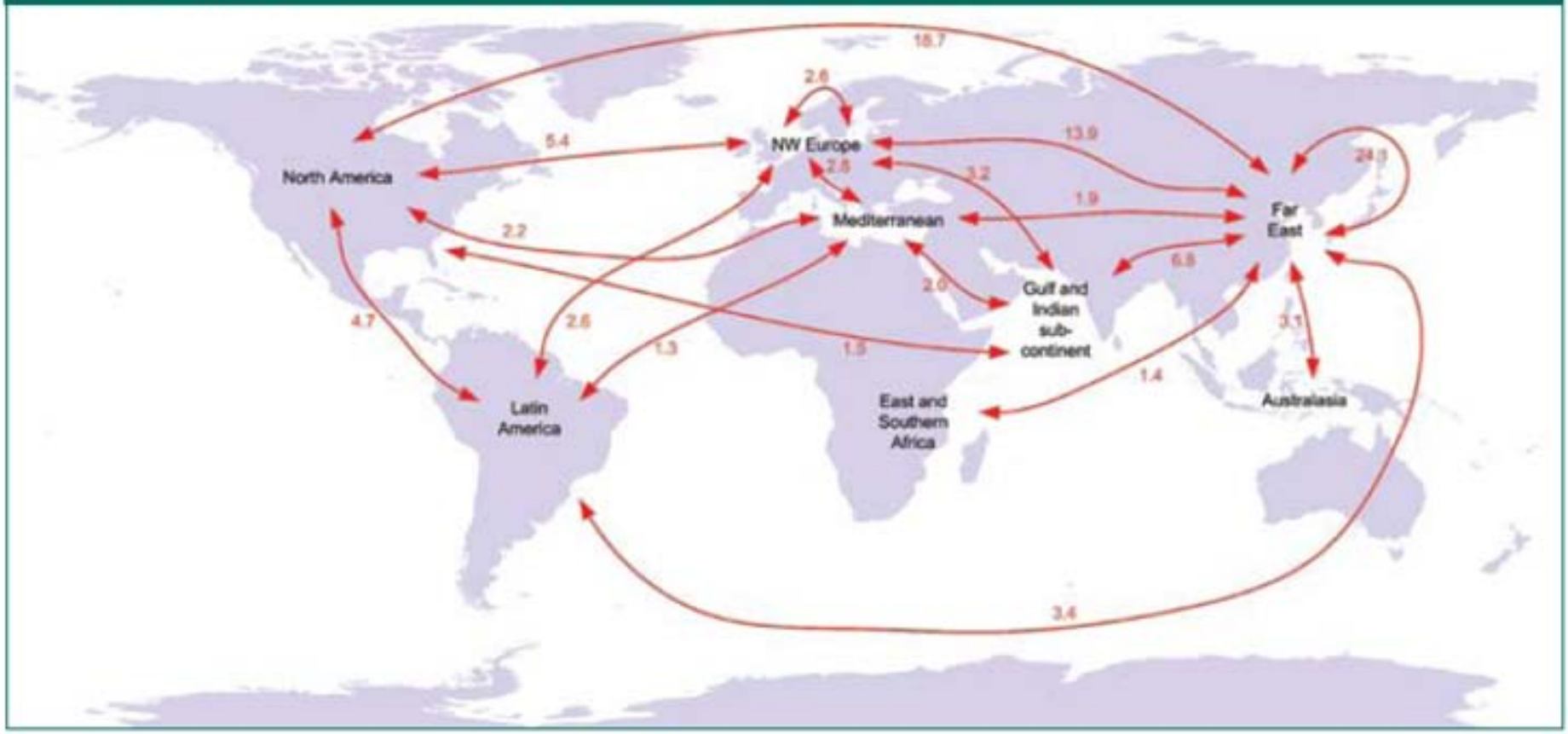

1981-1985
1986-1990
1991-1995
1996-2000
2001-2005
2006-2010
2011-2015
Shaded
Points
Container port traffic (TEU: 20 foot equivalent units)
1981-1985
1986-1990
1991-1995
1996-2000
2001-2005
2006-2010
2011-2015

Figure 12: **Shipping route container flows greater than 1 million TEU (million TEU)**



Source: MDS–Transmodal, 2006

Extracted from *"The container freight end-to-end journey"* published by the UK Dept. of Transport (Dec 2008)

Part 2 - Modelling cargo accumulations at port

- Port volumes will vary considerably
- Commodity risks will further complicate accumulation estimation
- Top down approach
- Port turnover statistics
- Average cargo TEU values
- Seasonal variability
- Worst case (100%) TIVs versus average?

Container Traffic through US Ports

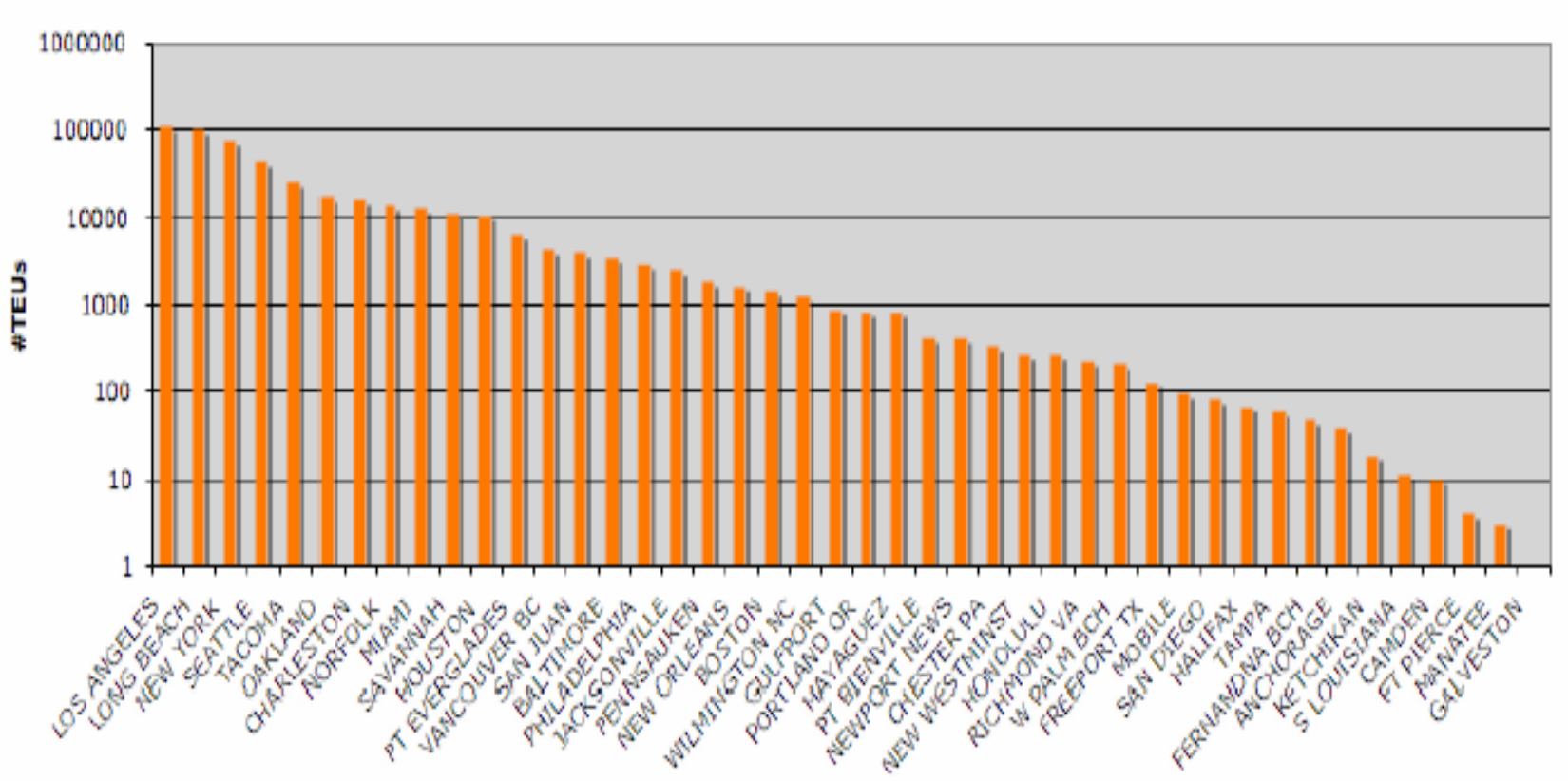
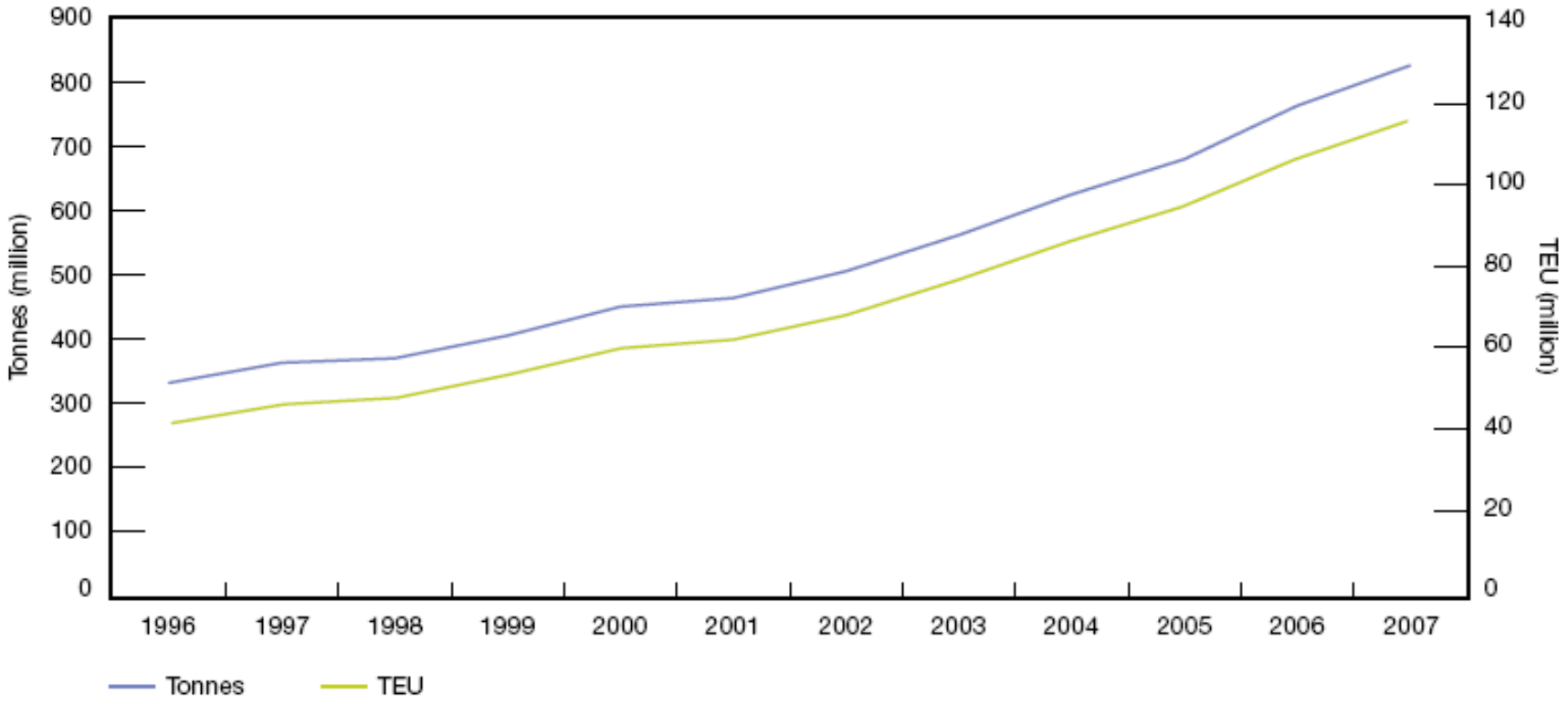


Figure 2. Total number of TEUs imported through 44 US ports.

TEU = 20 foot equivalent units = standard-size container

Extracted from *"Analysis of Recent Manifests for Good Imported through US Ports"* (31/10/06)
https://e-reports-ext.llnl.gov/pdf/339093.pdf

Figure 8: **Worldwide containerised loaded maritime TEU, 1996–2007**



Source: MDS–Transmodal, 2007

Extracted from *"The container freight end-to-end journey"* published by the UK Dept. of Transport (Dec 2008)

Part 2 - Estimating exposure TIVs

- Aim: to capture ‘TIV’ accurately as possible – in situ and in transit – 100% TIV per location versus average
- Consider all risks policies, bespoke open cargo provisions, perils clauses
- Consider estimation of relative commodity values over time
- There is no perfect approach – gain consensus!
- Factor TIV uncertainty into catastrophe assessments and accumulations

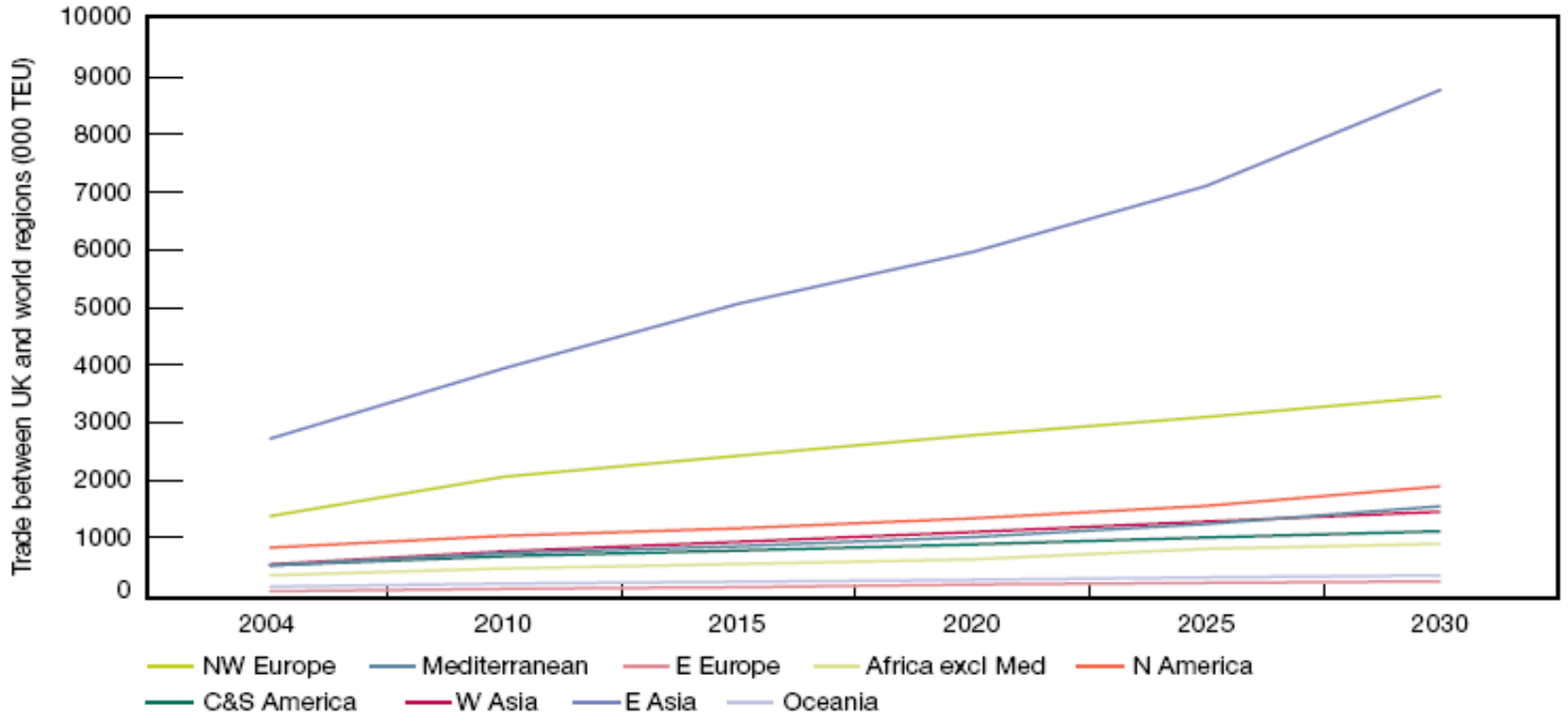
Example of satellite images available

Foshan, China

Source: ESRI http://storymaps.esri.com/stories/2013/ports/
Container Port dedicated website

Satellite image can be zoomed-in /-out of any target port worldwide

Figure 10: **Forecast containerised traffic, 2004–2030, by World Region ('000s TEU)**



Source: MDS–Transmodal, 2004

Part 2 - Future exposure management initiatives

- Current model driven initiative
- Granular cargo vulnerability curves – replacing property based general contents
- Greater choice of loss estimation
- Improved cargo stacking and warehousing / concentration models (time and space) in main ports
- Trans-shipment estimations and relative dwell times
- *Caution*: increased granularity does not mean increased accuracy
- Continued requirement for careful assessment and representation at policy level
- *Main focus*: ensure consensus approach reflects best industry knowledge and is flexible

Part 3 - Insurance

- Coverage will be provided in respect of Cargo, Property, Business Interruption and Liabs
- Complexity of losses arising from CAT events, valuations and adjustments (inc lag time calculations)
- Major Natural catastrophes on coastal regions such as flood, earthquakes, tsunamis and windstorms
- “Man made” catastrophes such fires and explosions
- Cargo can remain in one place for a period of time (up to 60 days under the Institute Cargo Clauses)
- Limitation on policies such as maximum storage or transit exposure will allow for worse case scenarios estimations

Part 3 - Insurance

- “Brands Clause” – cargo may not damaged but may be difficult to sell by association with an event
- Solvency II requires accumulation control and capital base commensurate with the risk
- Insurance carriers need to establish the level of exposure over all the classes of business
- Customs values against insurance values

Part 4 – Port of Tianjin

The Port of Tianjin …

… is the 4th Largest port in the world by throughput (approx. 40% of cars imported to China pass through the port or more than half a million units in 2014)

… lies at the head of the Hai River about 42kms inland from the Bohai Gulf off the Yellow Sea

… is located on China's east coast.

… is about 160kms southeast of Beijing

… is also connected to the Yangtze River by the Grand Canal

… is part of the Tianjin municipality which has an estimated population of 10.2m people (6th largest city in the People's Republic of China)

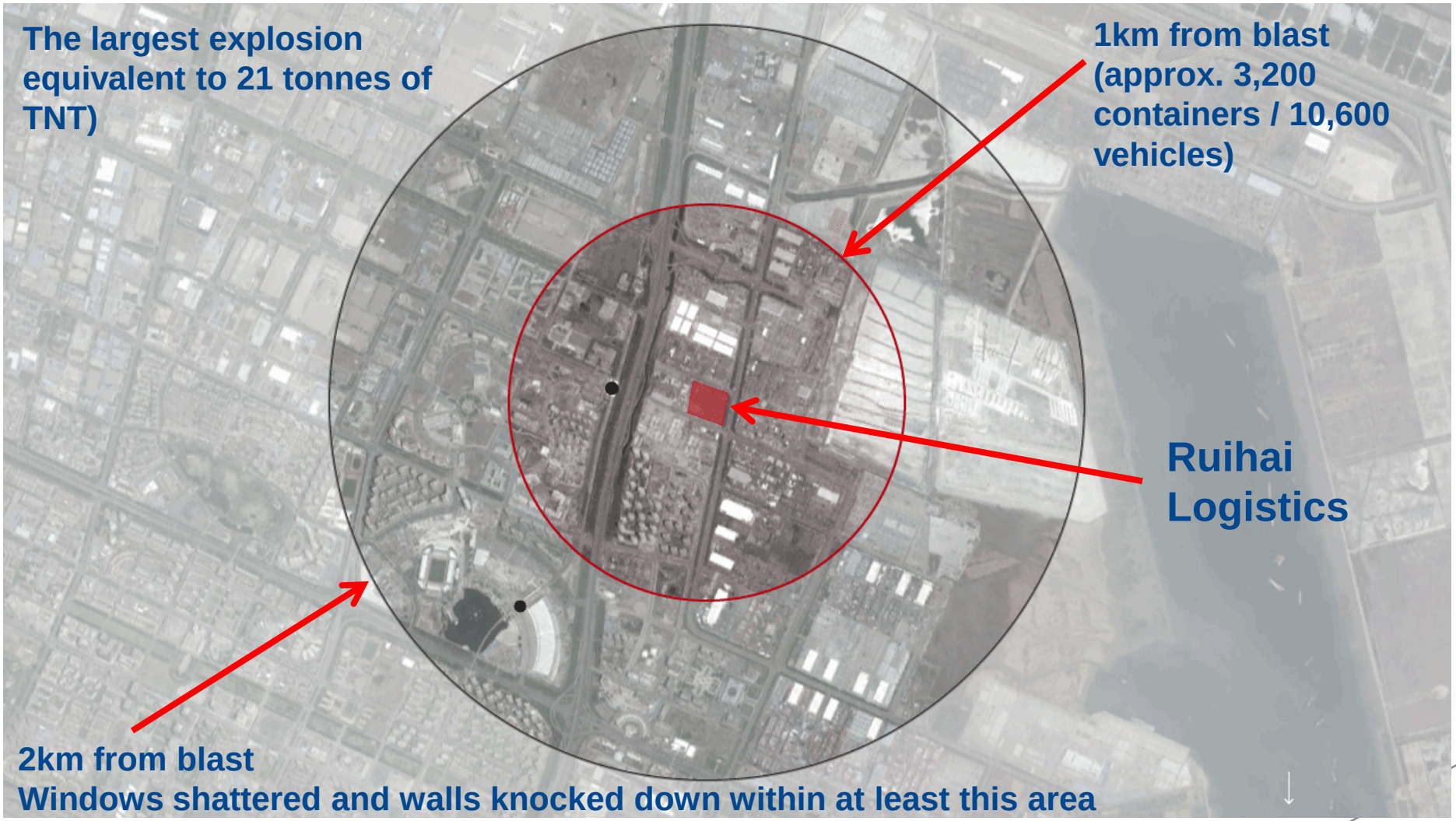
Part 4 – Tianjin Explosion (In Summary)

- Loss occurred on 12th August 2015
- Two massive explosion at warehouse owned by Ruihai International Logistics in Beijiang Port Area
- Caused widespread damage to infrastructure, a large industrial park, tens of thousands of containers / cars and stored goods
- 173 Deaths (of which 104 were “first responders” firefighters / policemen) & 797 non-fatal injuries
- One of the largest man made losses to date in Asia
- One of the most complex (re)insurance claims in history and is expected to have a long settlement period due to the reliability of information

Part 4 – Tianjin Explosion (summary)

- Will involve domestic and international insurers (approx.15 countries) – Low retention on direct domestic policies will mean majority of claim likely to be ceded to China Re and International reinsurers
- Will affect a wide variety of insurance coverages across Marine, Property, Liability and Aviation markets
- Also exposure to BI and CBI coverage (damage to transportation infrastructure)
- Liability exposures to warehouse owners and owners of chemicals stored
- Reports state that event will generate insurance losses of up to USD3.3bn

Part 3 – Tianjin Explosion



Satellite imagery by DigitalGlobe via Google Earth

Part 3 – Tianjin Explosion

Guy Carpenter CAT-VIEW – Tianjin explosion impact map

Vehicles - Over 22,000 damaged

Containers - Over 20,000 destroyed

Industrial – Nearly all buildings completely destroyed with 1km from epicentre

Residential - 17,000 units affected 2kms from blast

In Summary

The tragedy at Tianjin port has provided a stark reminder of the potential for catastrophic events to affect a number of classes of business.

It has highlighted the extreme difficulty of quantifying accumulated exposure at ports due to the mobile nature of much of the risks involved.

Assumptions can be made to provide some sensibility to scenarios but it remains an inaccurate science when considering the diversity of assets affected, the wide range of cargoes exposed, the seasonality of trade and values involved amongst many other things.

Modelling tools may help but will still depend on assumptions and general consensus.

Any Questions?

Thank you

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