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Managing Risk in a Connected World

**Managing Port Accumulation
In a Connected World**

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Agenda

- What is Connected Risk
- Port Accumulation – Defining the Requirement
- Scope of Data, Components of Solution and Key Data Items
- Basic Algorithm
- Houston Port – Calculating Trade Flow
- Calculating Underwriting Exposure
- Benefits of Approach
- Next Steps to Connected Risk

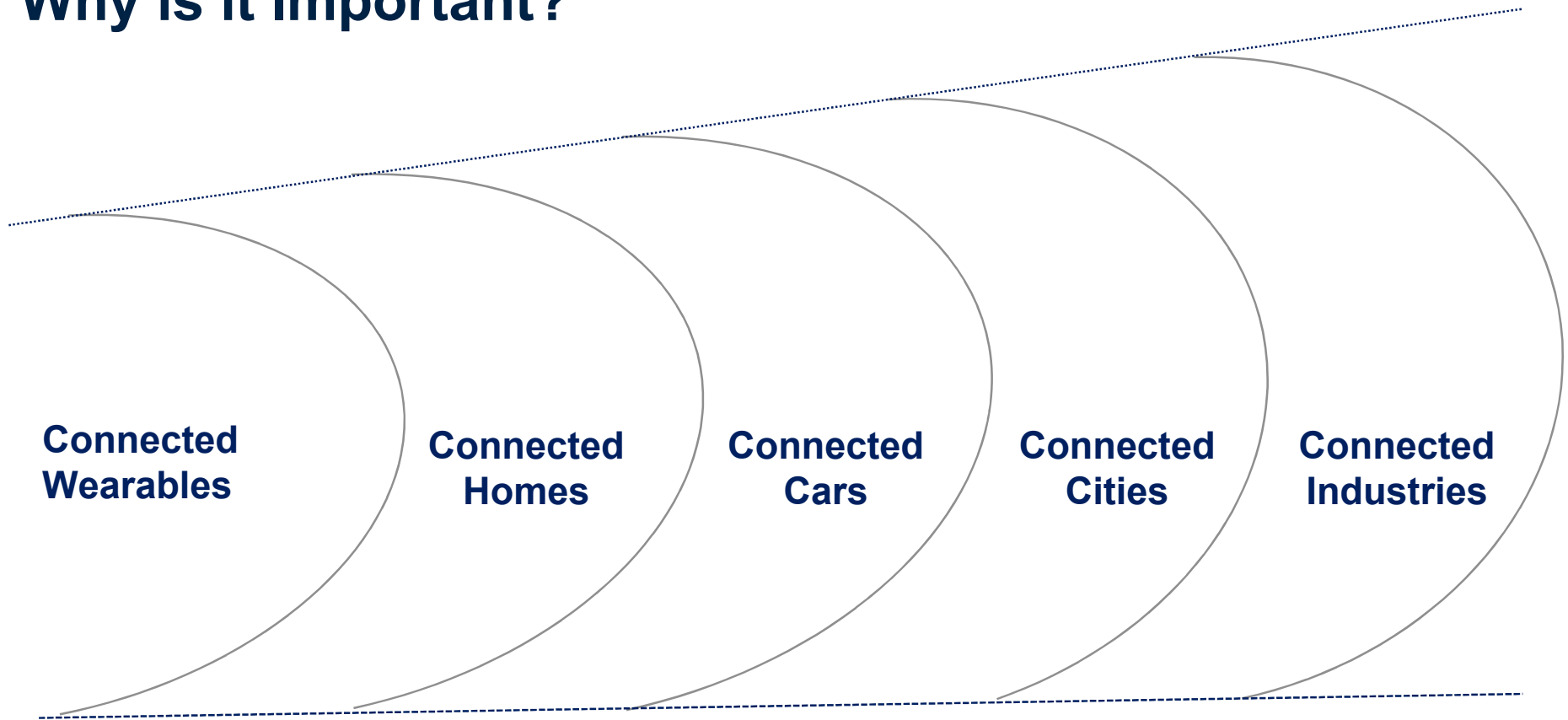


What is Connected Risk?

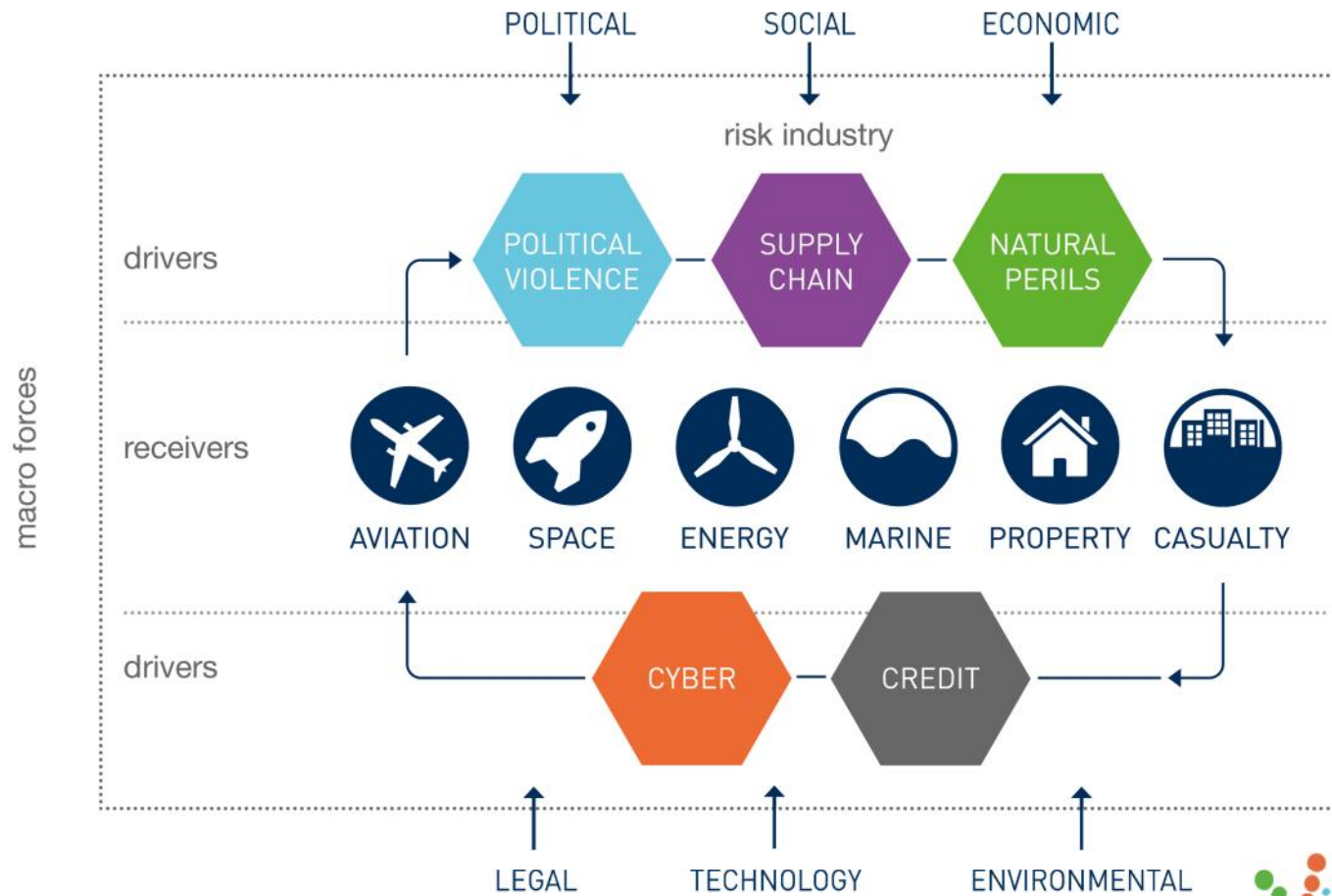
“Connected risk is the systemic exposure of commercial organisations, their partners, suppliers and clients to cumulative and cascading financial, operational and reputational vulnerabilities.”



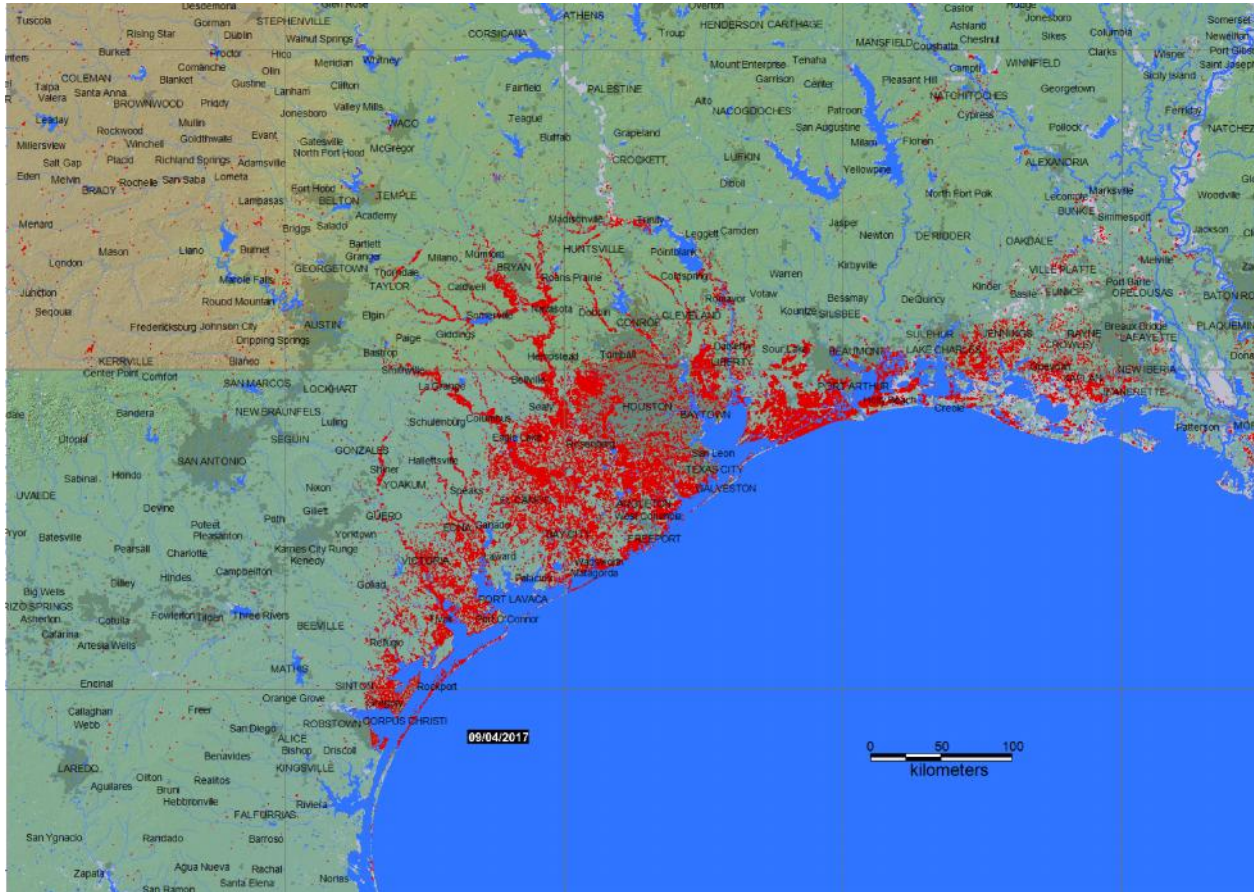
Why is it Important?



How Can We Visualise Connected Risk?



Hurricane Harvey – Connected Risk In Numbers



First Hurricane of category 3 or above to hit USA since 2005



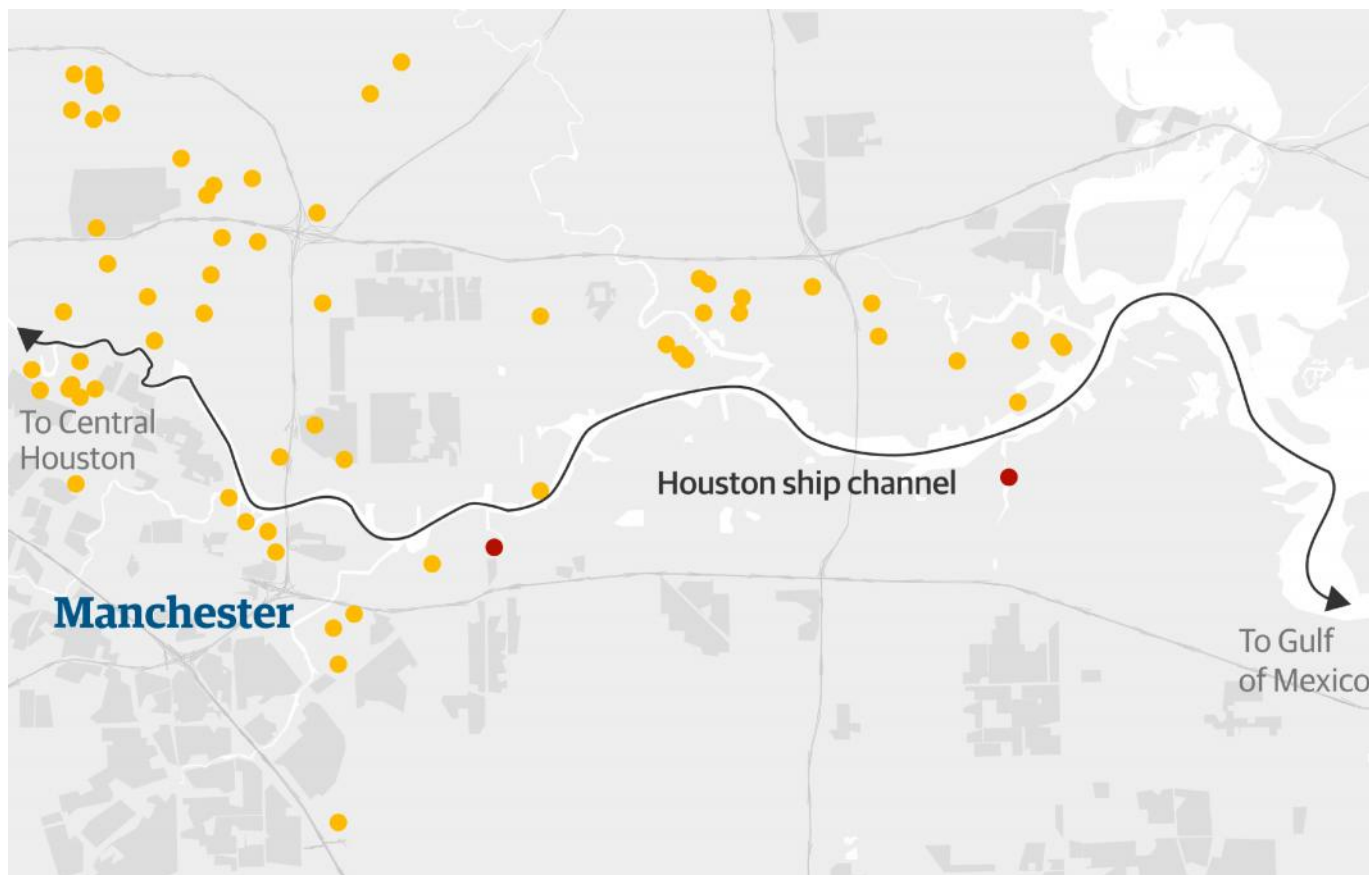
Hurricane Harvey – Connected Risk In Numbers

As at 1st September

- **20 Trillion Gallons** of rain fall in Houston- enough water to supply NYC for 50 years
- **51.88 inches** of rain fell in Cedar Bayou in 5 days, a new US record
- **\$125 Billion** in aid requested by the state of Texas
- **3rd** “500-year” storm to strike Houston since 1979
- **80%** of Texans don’t have flood insurance
- **10** coastal refineries shut, removing 3m bpd of output or 17% of US refining output
- **17%** increase in gas prices
- **500,000 Barrels** of crude oil released from federal reserves



Hurricane Harvey – Connected Risk In Numbers



Toxic Sites

Port Accumulation – Defining the Requirement?

Statement of Vision

“As an underwriter I would like to understand my exposures in each of the sub-classes – hull & machinery, P&I, cargo and energy so that I have an integrated view of my portfolio exposure whether I am an insurer, reinsurer or both.

Although the initial focus may be all risks, I would also like to understand my exposure from other connected risks such as the weather, supply chain, cyber and political violence.”



Port Accumulation – Defining the Requirement?

“As an underwriter I would like to understand my static and transit exposure at any one port”

Static exposure

a) Understand the value of goods offloaded or waiting to be loaded at any one port.

Transit exposure

a) the movement of goods country to country by value and volume/weight, so that I can assess the goods PML at any one port.

b) the movement of cargo vessels between ports so that I can assess the likely vessel PML at any one port.”

port PML = goods PML + vessel PML + static PML



Scope of Data

Russell's approach to port accumulation focussed on the following scope:

a) Focus on G20, trade routes and areas of interest

b) Countries that meet above criteria are

G20: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Russia, South Africa, Turkey, UK, USA and EU

Trade Routes: Egypt, Panama

Interest: Bangladesh, Colombia, Hong Kong, Iran, Malaysia, New Zealand, Norway, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Venezuela

c) Ships: All cargo carrying ships in excess of 100 GT

d) Ship Movements: All movements of cargo carrying ships between above list of countries

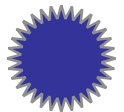
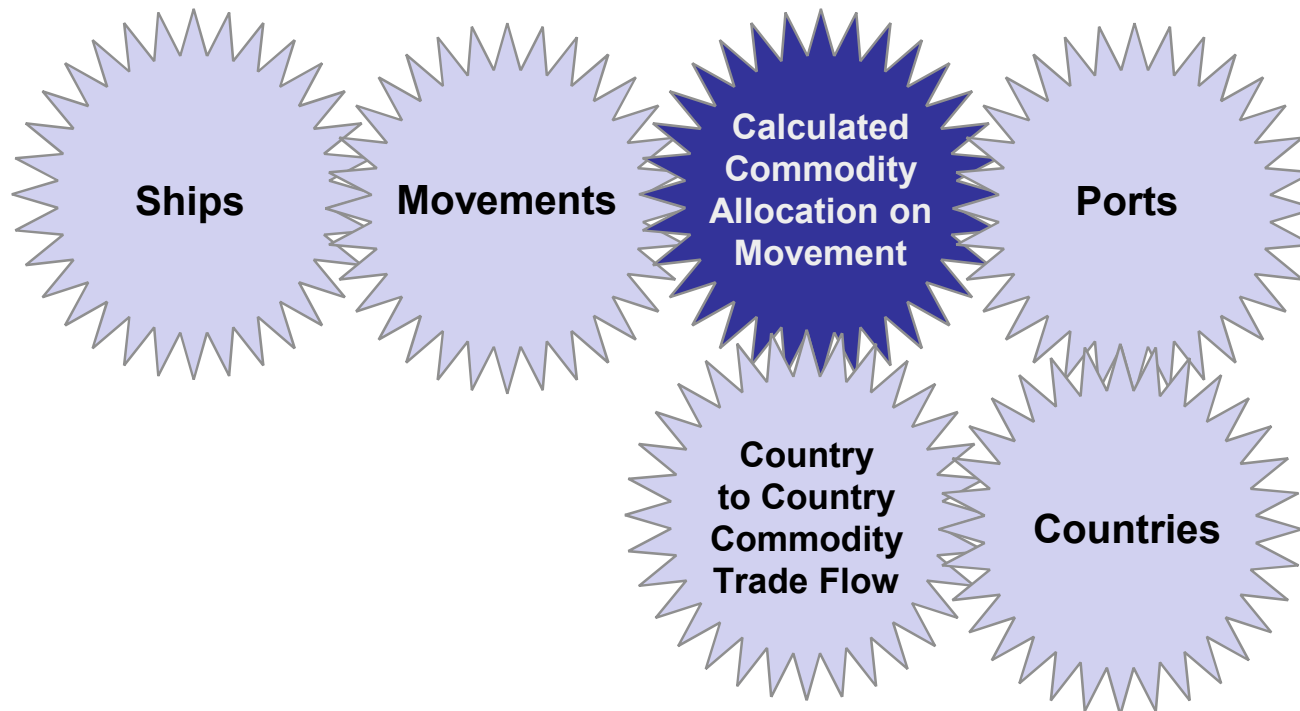
e) Trade Flow: All trade flow by commodity, value and quantity in / out of above list of countries

f) Ports: All ports, terminals and berths in above list of countries

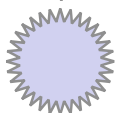
g) Timestamp: Data is year to date and updated quarterly in arrears



Components of Solution



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Key Data Items

Ships

- a) IMO Ship Number, Ship Name, Ship Type, Year of Build, Flag, Operator, Status
- b) Draught – Maximum displacement from lowest point to waterline
- c) Tonnage – Gross tonnage, dead weight tonnage, net tonnage
- d) Capacity
 - (i) Grain, Bale, Gas and Liquid Capacity in cubic metres
 - (ii) Insulated Capacity in TEU, number of 20 foot containers
 - (iii) Passenger Capacity in numbers
 - (vi) TEU in number of 20 foot containers
 - (v) Number of cars in number of vehicles



Key Data Items

Movements

- a) IMO Ship Number and Ship Name
- b) Ship Type
- c) Arrival and Departure Date
- d) Arrival and Departure Draught
- e) Arrival Port - Port Id, Name, Longitude, latitude, Country, Hours in Port
- f) Destination Port – Port Id, Name
- g) Last Port – Name, Country, Arrival and Departure Dates



Key Data Items

Commodity Trade Flow

- a) Reporting Country
- b) Transport Method
- c) Year, Month
- d) Trade Direction (import / Export)
- e) Partner Country (from / to)
- f) HS Commodity Type level 4 code
- g) Financial Value in US Dollars
- h) TEU in number of 20 foot containers



Key Data Items

Ports

- a) Port Id, Name, Longitude, latitude, Country
- b) Number of Berths
- c) Number of Terminals
- d) Various Capacity information



Key Data Items

Manipulations

- a) Identify and cleanse “inaccurate” movement draughts and ship capacities
- b) Identify “pass through movements” as being those that are in port ≤ 5 hours
- c) Determine type of movement using draught and time in port (export, import, both)
- d) Map commodity types to ship types
- e) Convert all ship capacities to TEUs
- f) Use and adjust past year data to construct present year movements and trade flow

Basic Algorithm

- a) Determine per present year and month and per trade direction (export / import)
 - (i) Group movements to determine ship capacities in TEU per port per ship type
 - (ii) Group trade figures to determine commodity quantity in TEU per port per ship type
- a) Allocate trade figures to / from ships based on grouping (i) and (ii) for each ship per month
- b) Any commodities which are imported and/or left over in that month are effectively “static goods”
- c) Accumulate all ship allocations and “static goods” per port and trade direction in that month**
- d) Determine per year, month, port, trade direction, ship, commodity, quantity, value



Houston Port – Calculated Trade Flow (Annual)

Vessel Type	No.	Times in Port	Import TEU	Export TEU	Transit TEU	Pass Thru TEU	Static TEU
Bulk Carrier	816	531	277,412	372,049	649,461	595,076	23,118
Chemical Tanker	3,750	783	598,370	807,942	1,406,312	1,695,857	49,864
Container	1,789	566	650,385	738,446	1,388,831	2,647,355	54,199
LNG Tanker	11	6	861	1,509	2,370	2,387	72
LPG Tanker	826	230	99,093	310,218	409,311	525,131	8,258
Oil Tanker	1,062	409	612,768	485,880	1,098,648	1,590,725	51,064
Other Dry Cargo	1	1	1,383	1,383	2,766	0	0
Ro-Ro	170	60	120,271	115,986	236,257	384,097	10,023
Totals	8,425	2,586	2,240,273	2,717,427	4,957,700	7,443,061	196,597

Annual Calculated Trade \$111.3 billion



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Houston Port – Calculated Trade Flow (August)

Vessel Type	No.	Times in Port	Import TEU	Export TEU	Transit TEU	Pass Thru TEU
Bulk Carrier	62	84	20,931	33,459	54,391	60,398
Chemical Tanker	170	301	41,358	57,854	99,213	146,965
Container	132	147	48,137	53,703	101,840	243,379
LNG Tanker	1	1	0	162	162	400
LPG Tanker	44	64	2,325	17,709	20,034	37,183
Oil Tanker	78	94	46,535	30,949	77,484	156,737
Other Dry Cargo	0	0	0	0	0	0
Ro-Ro	14	14	1,386	1,390	2,776	42,147
Totals	501	705	160,673	195,227	355,899	687,210
Annual Calculated Trade	\$9.9 billion					

Calculating Underwriting Exposure

For each port of interest to the Underwriter, the following is proposed

- a. To determine **Vessel PML** – underwriter supplies insured value and line written for each vessel by imo number to determine vessel PML exposure.
- b. To determine the **Goods PML** – underwriter supplies market share in each of the countries of interest to determine goods PML exposure per port.
- c. To determine the **Static PML** – use average calculated stored goods values and above market share approach to derive the stored PML exposure per port.

port PML = goods PML + vessel PML + static PML



Benefits of Approach

- Better understanding of exposure and capital utilisation.
- Better understanding of underlying port accumulation risk prior to capital commitment.
- Improved risk selection and optimization of capital.
- More accurate, consistent and timely exposure analysis.



Next Steps Towards Connected Risk

- Incorporate market values of ships based on age
- Visualise exposure from natural peril, geopolitical and other events
- Support blast zone techniques for war / terrorism analysis
- Incorporate economic forecasts per country for automatic trade adjustment
- Incorporate supply chain data to connect exporting / importing assureds
- Assess cyber impact on ship movement and cargo trade flow



Thank you

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