IUMI ✴ 2008

VANCOUVER

Exposure Accumulation

Thomas Clift, CPCU, AIU, ARe

Guy Carpenter

September 16, 2008

Opportunities to Understand and Protect Your Portfolio

- Yachts and Cargo Risk Accumulations
  - Personal Yachts
    - Risk identification and evaluation
      - Management tools
      - Hazard simulation modeling
  - Cargo Accumulation
    - Risk identification and evaluation
    - Making the latest technology productive

Overview

Yacht Risks and Cargo Risk Accumulations

Advancing Marine Modeling

- Today, we have the technology to improve (not replace) traditional marine risk management concepts
  - but, it is not being widely used

- The models and techniques used for other property catastrophe lines can be applied to Marine
  - and reinsurers are requiring more quantitative input

Understanding Exposure Accumulation

- Marine risks are often associated with geographical concentration

- Geographically co-located insureds increase concentration

- The accumulation of risk in one place escalates potential losses

For marine writers, personal yacht and cargo accumulations are risks that can be mitigated through simulation modeling. The technology exists, and in many cases data is available. The missing component is your decision to use them.
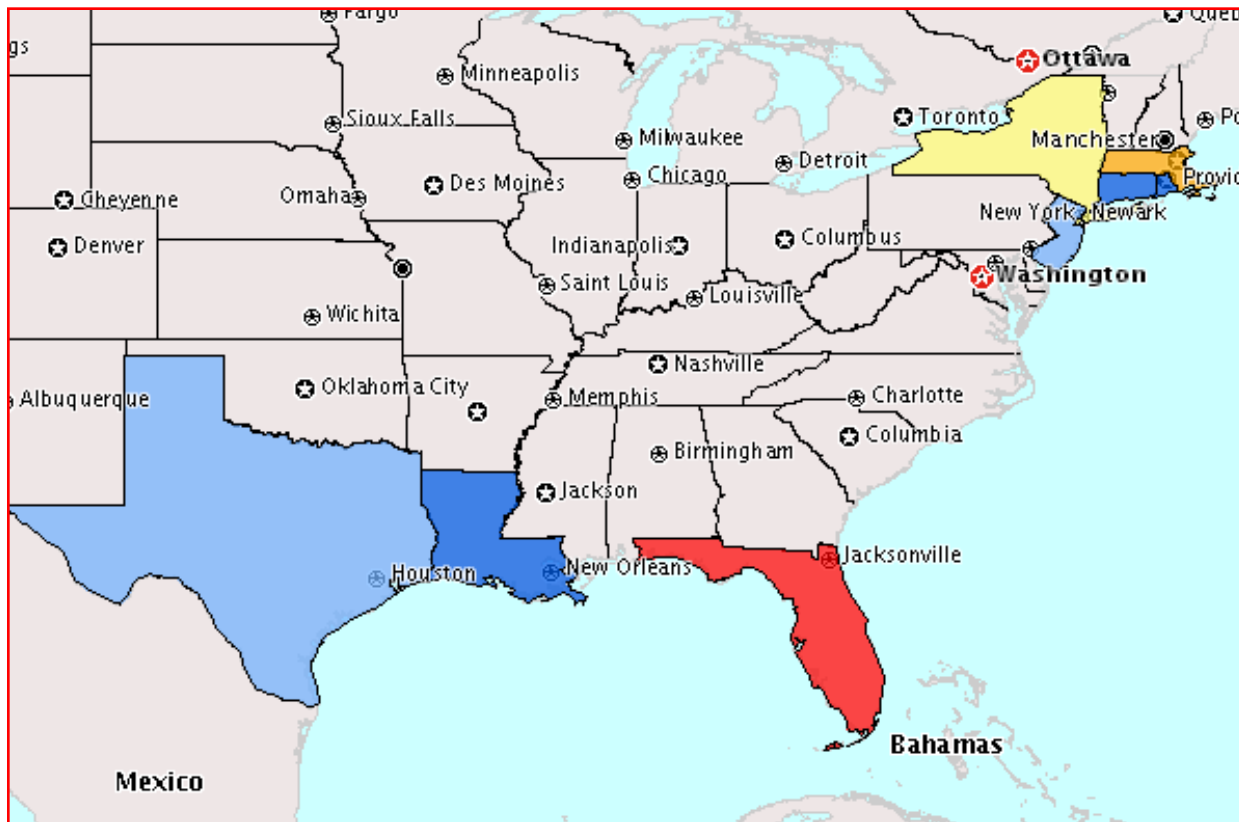
Personal Yachts

Identify Hurricane Yacht Exposures

Identify and report "detailed" yacht exposure information by state

State	Number of Risks	Total TIV	% of TIV	Average Value	Site Deductible	Deductible As a % of TIV
Connecticut	232	42,191,916	4.1%	181,793	1,265,757	3%
Florida	1,058	229,395,226	22.1%	216,789	23,969,411	10%
Louisiana	200	30,435,662	2.9%	152,352	1,591,145	5%
Massachusetts	870	149,097,411	14.4%	171,351	4,472,922	3%
Maryland	526	56,689,989	5.5%	107,693	1,700,700	3%
New Jersey	680	78,823,745	7.6%	115,922	2,364,712	3%
New York	783	130,387,250	12.6%	166,452	3,911,617	3%
Rhode Island	129	34,305,687	3.3%	265,392	1,029,171	3%
Texas	1,035	118,408,659	11.4%	114,414	6,190,284	5%
Total	**6,843**	**1,036,092,015**	**100.0%**	**151,403**	**35,591,821**	**3%**

Thematically shaded exposure highlights concentrations

# Track Exposures Down to Postal Code

Identify and report "detailed" yacht exposure information by state, county, and postal code

Postal Code	Total TIV	Number of Risks	Average Value	Site Deductible
77518	28,700,946	297	96,741	2,135,233
77550	3,699,380	35	106,301	275,219
77554	1,693,382	26	64,879	125,981
77573	1,309,518	16	83,620	97,423
77563	1,250,338	14	89,821	93,020
77650	703,365	7	101,056	52,328
77551	220,778	4	50,752	16,425
77590	171,246	7	24,604	12,740
77546	104,850	5	20,086	7,800
77510	99,804	4	22,943	7,425
Total	**41,328,705**	**415**	**99,587**	**3,074,686**

Granular data makes risk management decisions more effective. Track by mooring address for the most targeted results.

See Specific Accumulations to Gauge Portfolio Concentration

Illustrate and understand portfolio concentrations as well as site detail
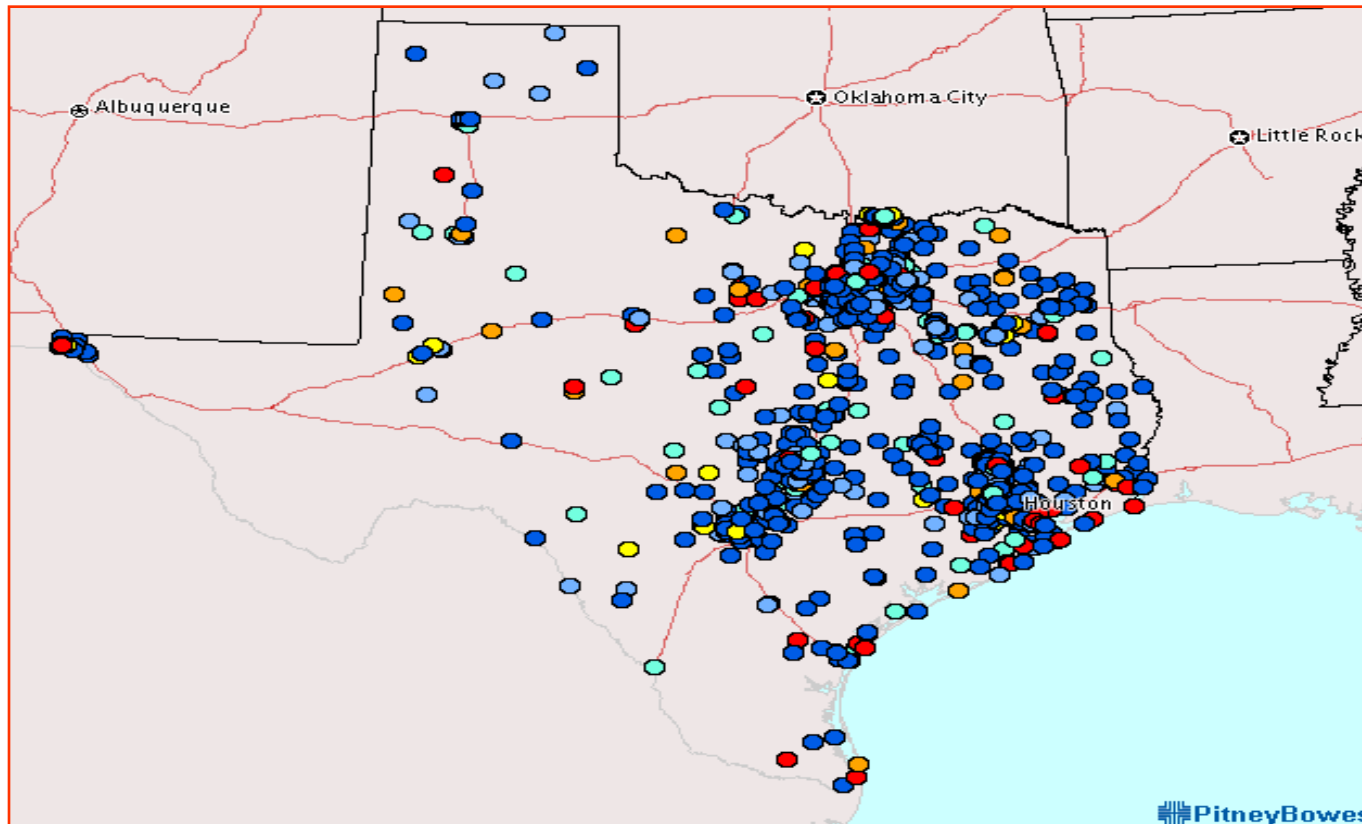
Identify and report "detailed" yacht exposure information by distance from coast

Distance to Coast Range	Number of Risks	% of Number of Risks	Total TIV	% of Total TIV	Site Deductible
Zero	9	0.14%	948,894	0.1%	60,349
> 0 to 100	2,864	41.85%	536,561,932	51.8%	15,814,343
> 100 to 250	182	2.67%	40,739,931	3.9%	1,353,562
> 250 to 500	264	3.86%	52,376,158	5.1%	1,978,352
> 500 to 1,000	307	4.49%	64,323,682	6.2%	1,486,613
> 1,000 to 2,500	288	4.21%	51,684,398	5.0%	1,966,124
Greater than 2,500	2,928	42.78%	289,457,022	27.9%	12,932,478
Total	**6,843**	**100.00%**	**1,036,092,015**	**100.0%**	**35,591,821**

Mapping technology enhances the results, supporting informed action

GUY CARPENTER

Watch What You Cover

Identify mooring address by satellite imagery

Identify and report "detailed" yacht exposure information by wind band for pending / post event
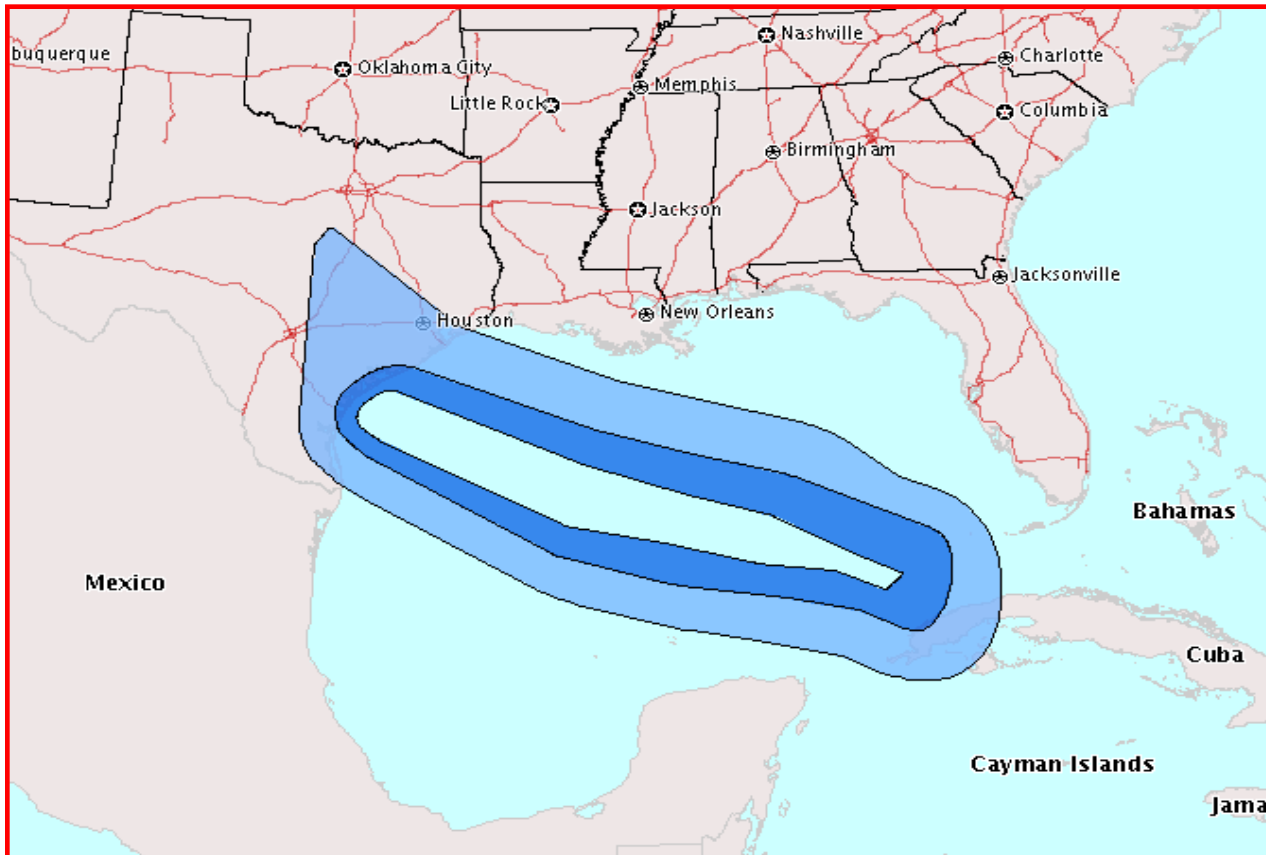
Pair maps with satellite imagery following an actual event

Powered by Guy Carpenter   iaxs

GUY CARPENTER

Early Warning Indications – Hurricane Ike
Key Geographical Concerns

State	County	Postal Code	Total TIV	Number of Risks	Site Limit	Site Premium	Site Deductible
Texas	Aransas	78358	4,460,384	14	4,262,145	16,800	260,425
		78382	311,877	6	298,016	10,800	15,810
	Calhoun	77982	2,533,637	4	2,421,031	4,400	119,712
		77983	9,450	1	9,030	1,500	645
	Jackson	77971	41,850	1	39,990	2,200	800
	Matagorda	77457	38,475	1	36,765	1,800	368
		77465	35,068	1	33,509	1,500	335
	Nueces	78373	8,077,725	15	7,718,715	24,000	392,979
		78414	573,750	1	548,250	1,600	32,895
		78480	1,022,085	7	976,659	9,800	46,027
Total			18,718,900	51	17,886,949	74,400	957,226

Potential impacted exposure by postal code

Early Warning Indications – Hurricane Ike Individual Yacht Detail

Postal Code	Policy Number	Total TIV	Number of Risks	Site Limit	Site Premium	Site Deductible
78373	1208834	20,278	1	19,350	62	645
	1247465	1,409,985	1	1,345,470	4,291	67,273
	1248086	716,483	1	683,700	2,181	34,185
	1172199	72,324	1	69,015	220	690
	123990	1,216,670	1	1,161,000	3,703	58,050
	1236734	135,186	1	129,000	411	6,450
	1232144	304,167	1	290,250	926	14,512
	1245623	844,909	1	806,250	2,571	40,312
	1246511	304,167	1	290,250	926	14,512
	1249387	2,027,783	1	1,935,000	6,171	96,750
	1241567	446,112	1	425,700	1,358	21,285
	1229800	101,389	1	96,750	309	7,740
	1234566	162,223	1	154,800	494	7,740
	1411345	31,093	1	29,670	95	2,322
	1229934	93,278	1	89,010	284	8,901
		7,886,047	15	7,525,215	24,000	392,979

Site information to support pre and post – catastrophe efforts

Model for Results

Using yacht exposure data and maps, you can:

- Model loss scenarios
- Understand portfolio threats
- Develop an informed risk management plan

Simulation modeling is technology that quantifies risk by examining numerical, measurable characteristics such as insured values, that are exposed to catastrophic and man-made perils such as hurricanes, earthquakes and terrorism

GUY CARPENTER

Analyze Risk with RMS RiskLink Yacht Modeling

About RMS RiskLink Yacht Modeling

- Initially released in Summer 2006
- Employs robust stochastic, hazard, and financial modules
- Losses heavily weighted by storm surge in contrast to wind speed
- Designed for non-commercial vessels
- Generates standard RMS output

Keep in mind that:

- Yacht vulnerability module and geocoding capabilities are still first generation
- RMS advises not to run with "loss amplification" – (problem)

Reinsurers increasingly requesting RMS RiskLink output - EDMs (exposure) and RDMs (results).
General observation - results are within 15% to 25% of client expectations at common return periods.

Simulation Modeling
RMS Yacht Model Data Requirements

Required Data	**Data Not Currently Applied**
Mooring location	Age of vessel
Replacement value	Construction materials
Type of vessel	Mooring characteristics
(sail or power)	Operating territory
Length of vessel	
Suggested Additional Data	**Open Issues**
Peril deductible	Demand surge
Limits if applicable	Updating vulnerability curves
	Geocoding

Risk Analysis – RMS RiskLink Results
Occurrence Exceedance Probability (OEP)

Annual Prob. Of Non-Exceedance	Return Period Years	Ground–up (S)	Gross (S)	Net (S)
10.00%	10	13,210,489	12,702,974	11,815,238
5.00%	20	23,968,851	23,128,933	20,795,207
2.00%	50	45,218,187	43,634,084	39,304,713
1.00%	100	68,261,251	65,181,684	60,936,130
0.40%	250	79,970,539	76,963,565	74,800,374
0.20%	500	105,913,125	102,387,338	99,819,041
0.10%	1,000	132,811,925	127,999,373	124,798,801

There is a 99.0% chance that Company "X" will not exceed $65.2 million in gross loss any given year from the peril of "Y", due to a single event and over a 100-year horizon.

RMS RiskLink Results Average Annual Loss

Product Group	Total Insured Values	% of Total Insured Values	Expected Annual Gross Loss	% of Total EAGL	Premium	EAGL to Premium
Warehouse Cargo	674,570,230	26.4%	2,298,745	10.5%	13,792,470	16.7%
Marine Package	953,366,742	37.3%	5,844,538	26.6%	46,756,304	12.5%
Yacht	927,154,850	36.3%	13,810,467	62.9%	69,052,335	20.0%
Total	**2,555,091,822**	**100.0%**	**21,953,750**	**100.0%**	**129,601,109**	**16.9%**

- **Average Annual Loss is the theoretical loss a "Company" can expect on average over time for the "subject" portfolio and modeled peril**

- **Average Annual Loss can be reported at site location to assist with underwriting decision making process**

Manage Geographical Areas by the Numbers

Yacht	Geography / Peril	Total Insured Values	% of Total	Annual Property Premium	% of Total	Average Annual Loss	% of Total
Yacht	Gulf Coast	335,000,000	13.2%	15,000,000	23.4%	2,400,000	25.0%
	Florida	1,200,000,000	47.4%	24,000,000	37.5%	5,088,000	53.0%
	Mid-Atlantic	225,000,000	8.9%	9,000,000	14.1%	864,000	9.0%
	Northeast	700,050,000	27.7%	14,000,000	21.9%	672,000	7.0%
	Hawaii	70,000,000	2.8%	2,000,000	3.1%	576,000	6.0%
Total		**2,530,050,000**	**100.0%**	**64,000,000**	**100.0%**	**9,600,000**	**100.0%**

Make specific decisions for geographical areas

Technology for Underwriters

Policy Number	Annual Property Premium	Average Annual or Expected Loss	% of Premium
Yacht 2965	16,510	2,254	13.65%
Yacht 3967	3,810	2,176	57.11%
Yacht 5111	6,096	2,016	33.08%
Yacht 2905	11,430	1,638	14.33%
Yacht 7786	12,446	1,552	12.47%
Yacht 2890	2,286	1,358	59.39%
Yacht 2789	19,050	1,296	6.80%
Yacht 3088	22,860	1,242	5.43%
Yacht 8634	6,524	786	12.05%

Three policies raise a potential red flag for underwriters assuming a corporate yacht catastrophe load of 15%

GUY CARPENTER

Cede Risk Based on a Thorough Analysis

Limit	Attachment	% Placed	Deposit Premium	ROL
$2,000,000	$3,000,000	100.0%	$700,000	35%
$5,000,000	$5,000,000	100.0%	$1,300,000	26%
$10,000,000	$10,000,000	100.0%	$1,700,000	17%
Program Premium			$3,700,000	22%

Average Annual Loss	% of Premium
$ 500,000	71.4%
$ 950,000	86.4%
$ 1,200,000	70.6%
2,650,000	71.6%

Average Annual Loss	Difference (DP - AAL)	Standard Deviation	SD Calculation
$ 500,000	$ 200,000	$ 571,429	35.0%
$ 950,000	$ 350,000	$ 972,222	36.0%
$ 1,200,000	$ 500,000	$ 1,250,000	40.0%

Transfer risk at optimal pricing; secure the right amount of cover at the best cost

Extract Total Value from Simulation Models

- The trend for pricing many lines of marine reinsurance is increasingly dependent upon technical tools

- Reinsurance costs can be a significant percentage of your insurance spend, directly impacting your bottom line

- Technology can help you achieve your goals – including an effective balance between risk and transfer costs

Capital management is the fundamental objective. Informed decisions based on reliable information makes your capital more productive

Yacht Accumulation: Key Insights

- Release of RMS RiskLink yacht model is a significant improvement over prior methodologies, but requires some critical enhancements

- These enhancements will only occur if RMS users as a group push the issue

- Reinsurers will continue to press forward using technical benchmark pricing techniques

- There are direct benefits to understanding and using leading-edge applications that incorporate modeling technology

Cargo Accumulation

Key Concerns

- Determine exposure concentrations from individual insured risks located in ports, airports, or in - transit on cargo ships

- Estimate losses associated with exposure accumulations

- Identify geographic areas/perils/commodities that are driving risk managed layer as a result of exposure accumulations

- Ascertain the effects of seasonality on losses

Cargo exposure accumulation can be a significant risk that is little understood and rarely quantified

Portfolio Information
Shipment date
Source and destination of shipment
Commodity description (HS/SIC Code)
Shipment value
Premium information

Cargo Accumulation Model

Assumptions

Territory Specific Database

International Trade Data

Results & Graphical Exhibits

Standard RMS Reports

Reports

GUY CARPENTER
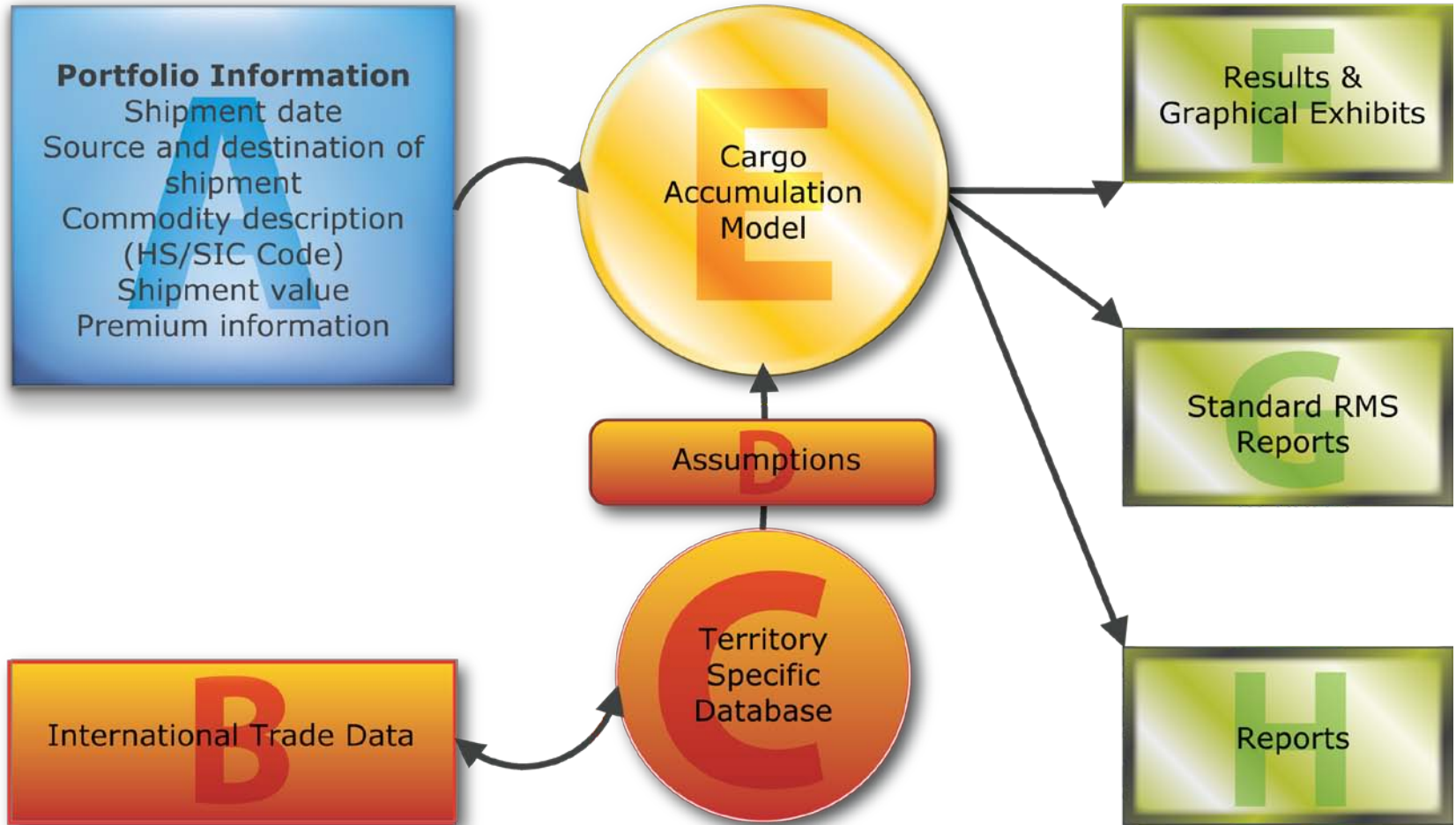
Data Requirements - Availability Varies

- Shipment date

- Source and destination of shipment

- Commodity description

- Shipment value (wholesale or retail)

- Premium

Portfolio Information
A
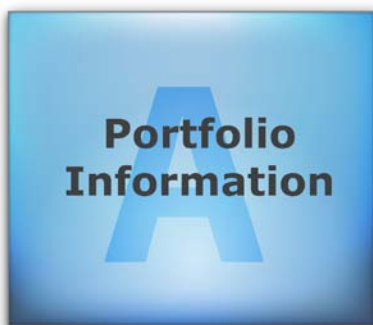
Assumptions can be made to fill data voids

GC's proprietary International Trade Database (ITD) is a comprehensive file of historical trade patterns

- Identifies the magnitude and seasonality of international trade volumes at major global seaports and airports
- Segments trade volume by commodity description at each port
- Helps estimate total value of cargo on board specific vessels on particular trading routes
- Updated monthly

GUY CARPENTER

FIGURE 1: MONTHLY JAPANESE TRADE VOLUMES

— Imports
— Exports

Source: Guy Carpenter International Trade Database

Monthly trade volumes for major seaports, airports and shipping routes

Left pie chart:
- 16% Narita Airport
- 11% Nagoya
- 9% Tokyo
- 40% Other Ports
- 5% Kansai Airport
- 5% Osaka
- 6% Kobe
- 8% Yokohama

Right pie chart:
- 15% Industrial Machinery
- 15% Transport
- 16% Electronics
- 24% Other Products
- 5% Instruments and Related Products
- 6% Chemicals
- 7% Primary Metals
- 12% Petrochemicals
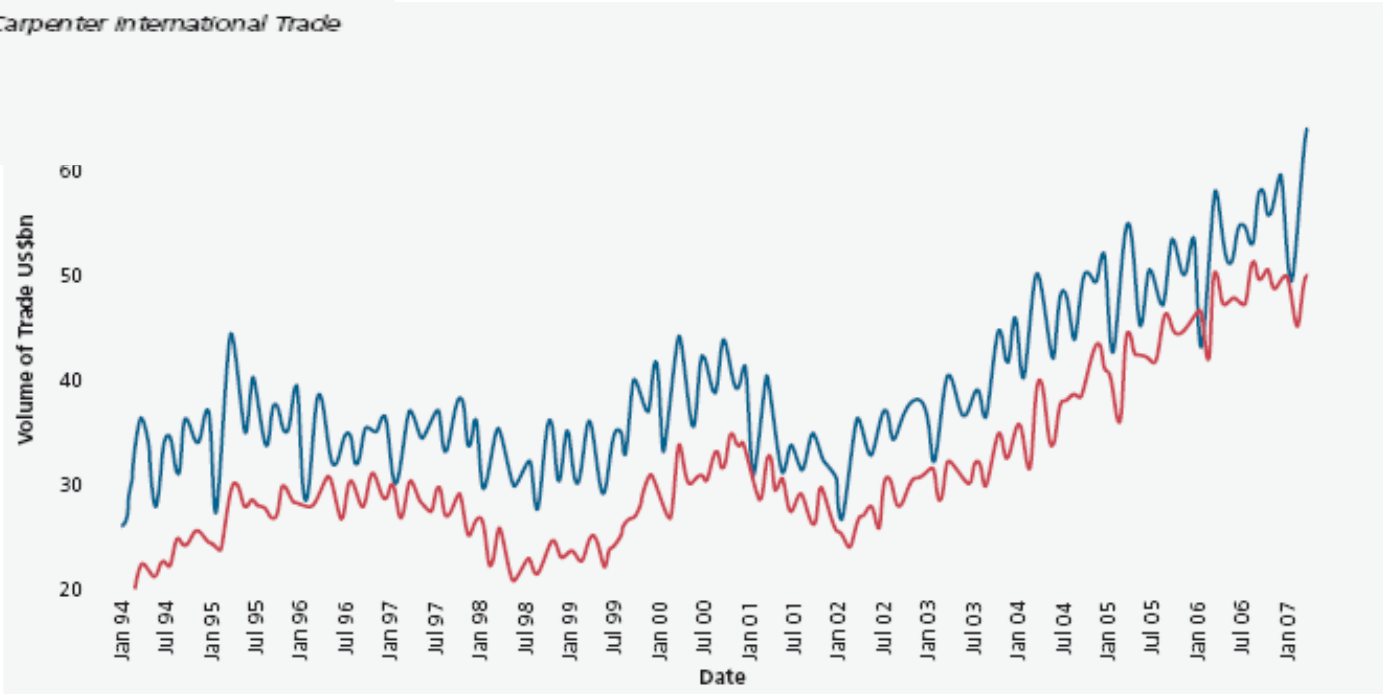
Territory Specific Database
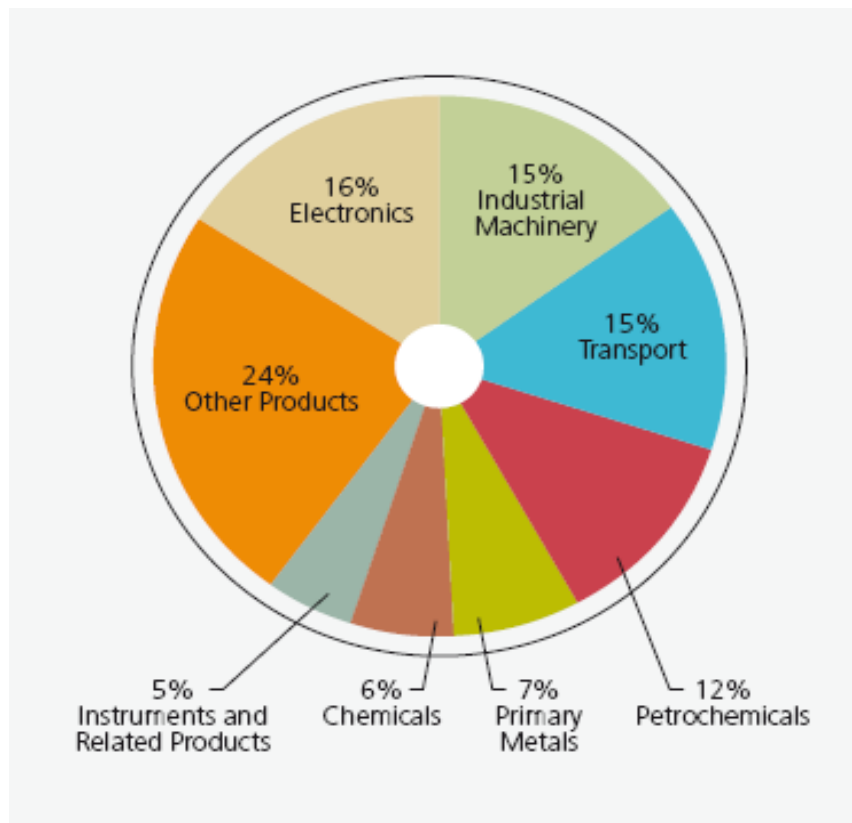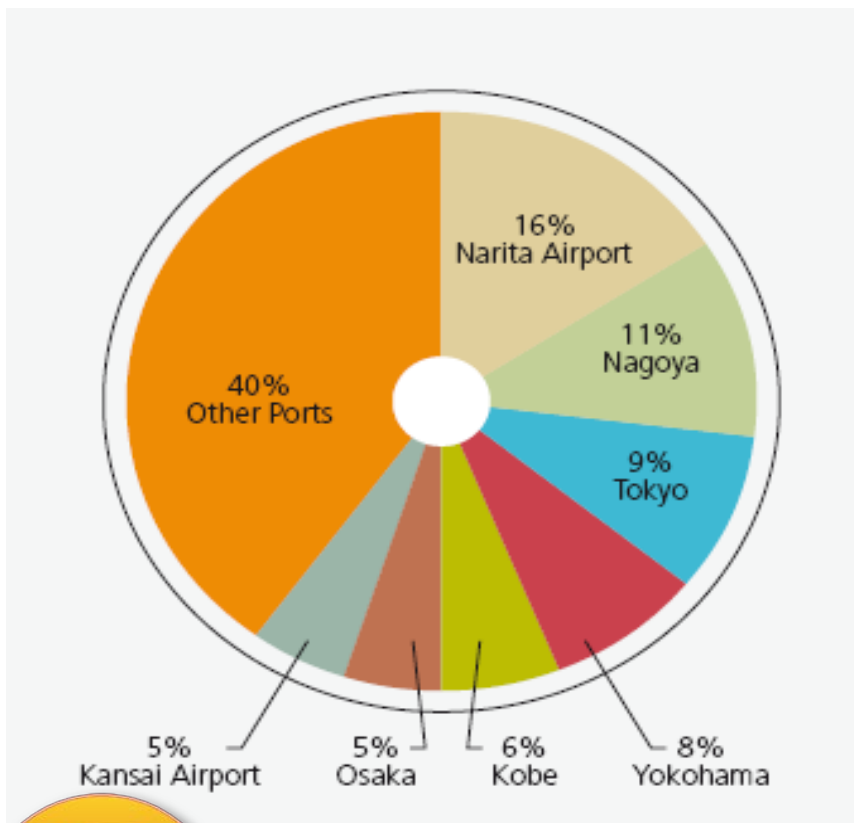
ITD includes trade volume and commodity breakdown by port

GUY CARPENTER

Cargo Accumulation Assumptions – Default Lag Times

- Subject to client review and confirmation
- Example of a number of inputs that can be adjusted by client

Country	Seaport Lag Time
South Korea	3
China	4
Japan	4
United States	3
India	5
Vietnam	8
Saudi Arabia	7
Hong Kong	3
United Arab Emirate	4
Kuwait	4

GUY CARPENTER

Cargo Accumulation Vulnerability – Stochastic Modules

- RMS peer reviewed Guy Carpenter's cargo accumulation loss matrix that incorporates geography (port location), perils (windstorm, earthquake, fire following) and cargo types (product line classes)

- Standard "probabilistic" output such as occurrence exceedance probability (OEP) and average annual loss quantifies risk potential

Cargo Accumulation Considerations

- **Seasonality**
  - How the value of trade varies over time
  - How port-side accumulations will vary as a result

- **Product Importance**
  - Which products drive the patterns within the portfolio
  - How these products affect the relative vulnerability

- **Port Importance**
  - How important is one location compared to all others
  - How does this affect the accumulated value on port side

GUY CARPENTER

- Electronic products represent about half of this particular portfolio

Product Importance (Annual Exposure) (U.S. Dollars)		
Electronic products	9,369,197,245	48.9%
Machinery	4,524,589,652	23.6%
Electrical machinery	2,254,856,235	11.8%
Furniture and bedding	947,545,125	4.9%
Misc. chenical products	884,584,521	4.6%
Iron and steel	451,256,213	2.4%
Pharmaceutical products	325,145,211	1.7%
Fish and seafood	221,548,214	1.2%
Manmade staple fibers	175,412,563	0.9%
Total	19,154,134,979	100.0%

GUY CARPENTER

Cargo Accumulation – Results
Port Importance

- South Korean ports represent about 40% of the portfolio
- Other Asian ports also quite important

Port importance (Annual Average)	
Ulsan, South Korea	14.3%
Incheon, South Korea	11.8%
Daesan, South Korea	9.8%
Busan, South Korea	5.8%
Hong Kong, Hong Kong	5.3%
Kobe, Japan	5.1%
Osaka, Japan	4.9%
Yokohama, Japan	4.6%

GUY CARPENTER

Cargo Accumulation - Results
Occurrence Exceedance Probability

Los Angeles EQ - January
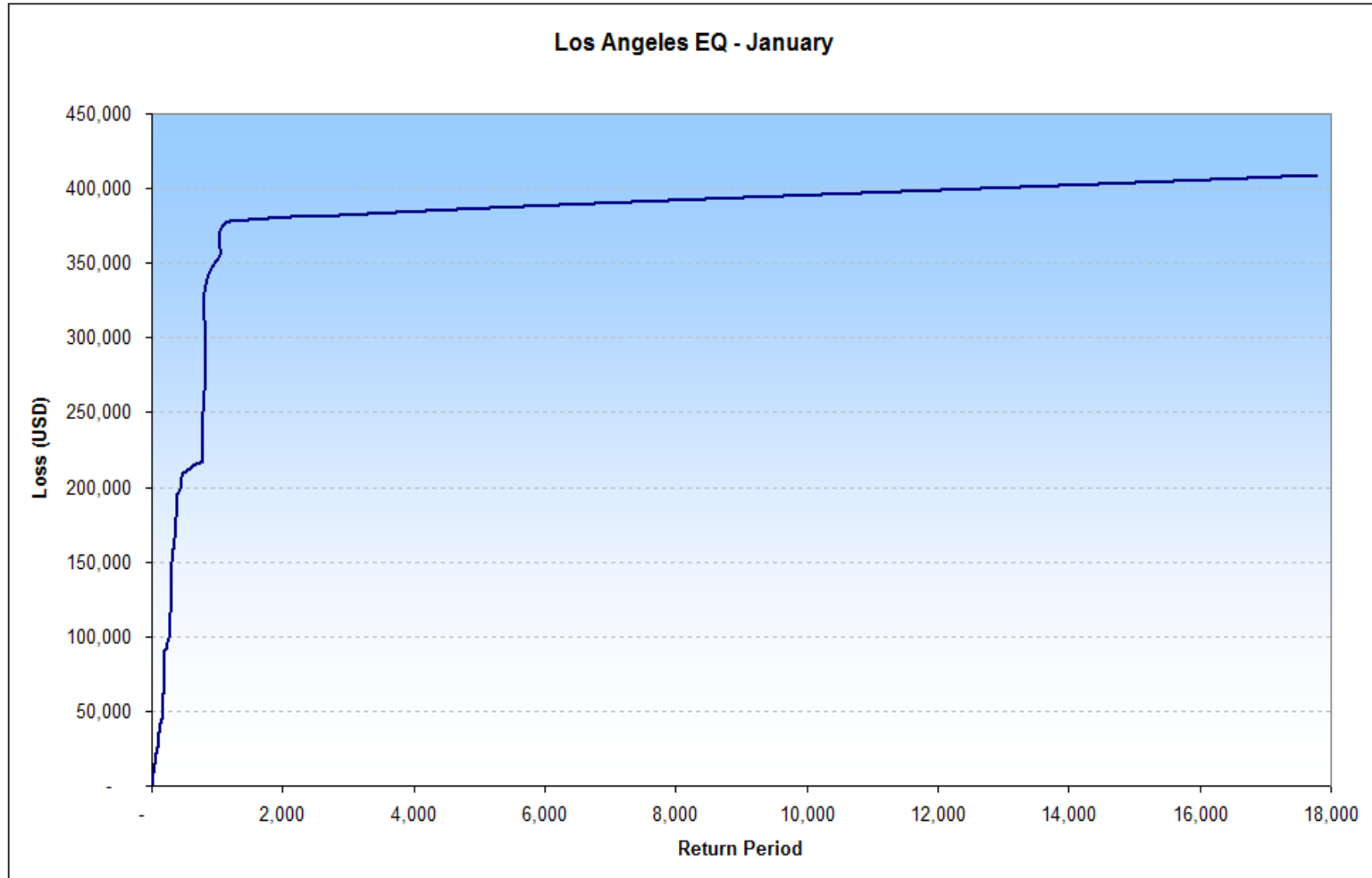
Analytics Working to Your Best Advantage

- Analyzed data is information

- Information applied becomes knowledge

- Execution with knowledge yields wisdom

  Wisdom = Market Leadership

WISDOM

KNOWLEDGE
Applications and Predictions
Gradient Tool
Policy Rating

INFORMATION
Data converted into summaries / profiles
Patterns, trends develop
Specific client observations

DATA
Foundation to build upon
Guaged for quality in terms of accuracy and completeness
General observations
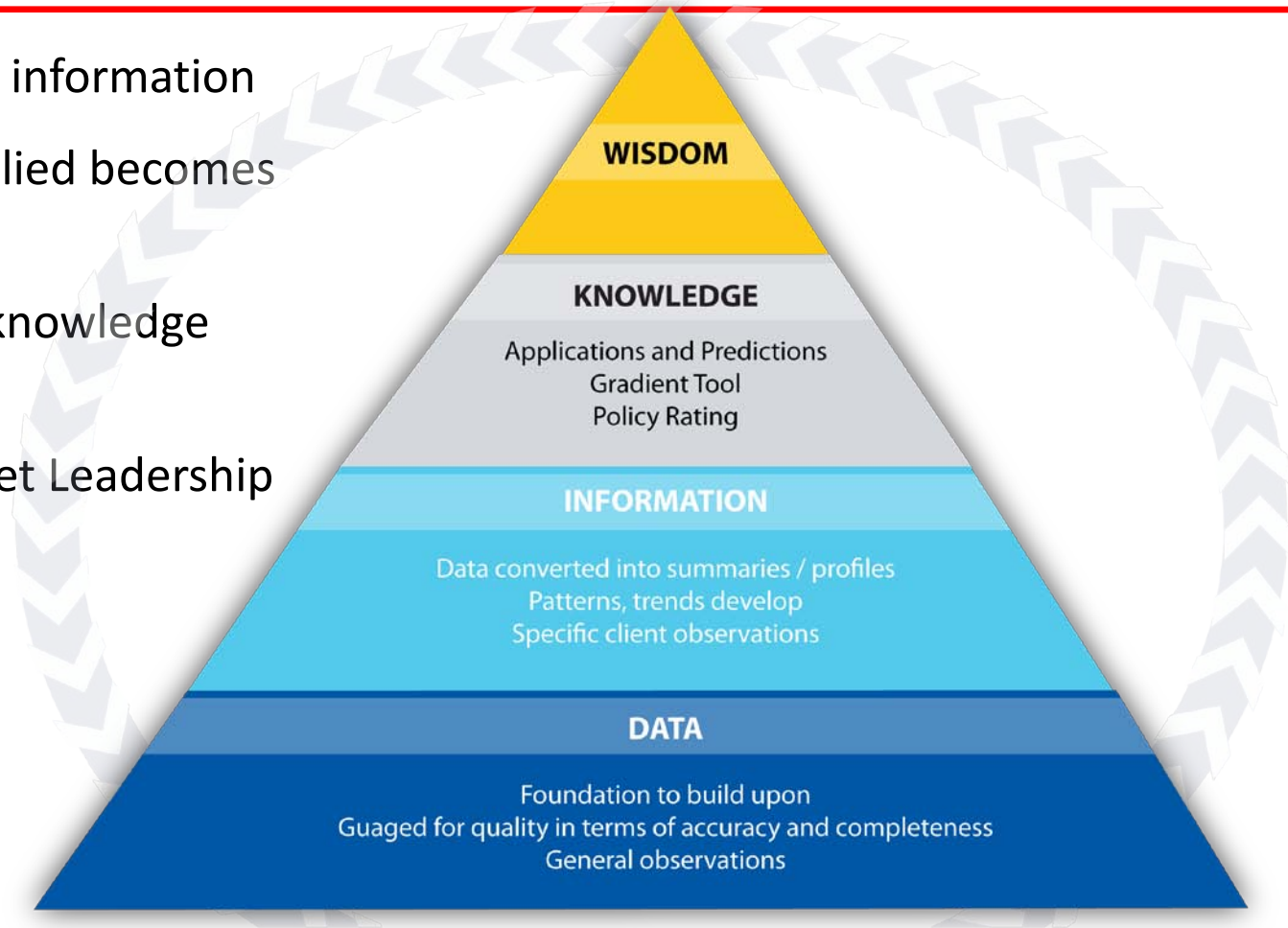
**Listen to the market, and make intelligent decisions
Gain a competitive edge.**

GUY CARPENTER

Disclaimer

GUY CARPENTER