Managing Natural Catastrophes in a Post-9/11 World

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Presentation Outline

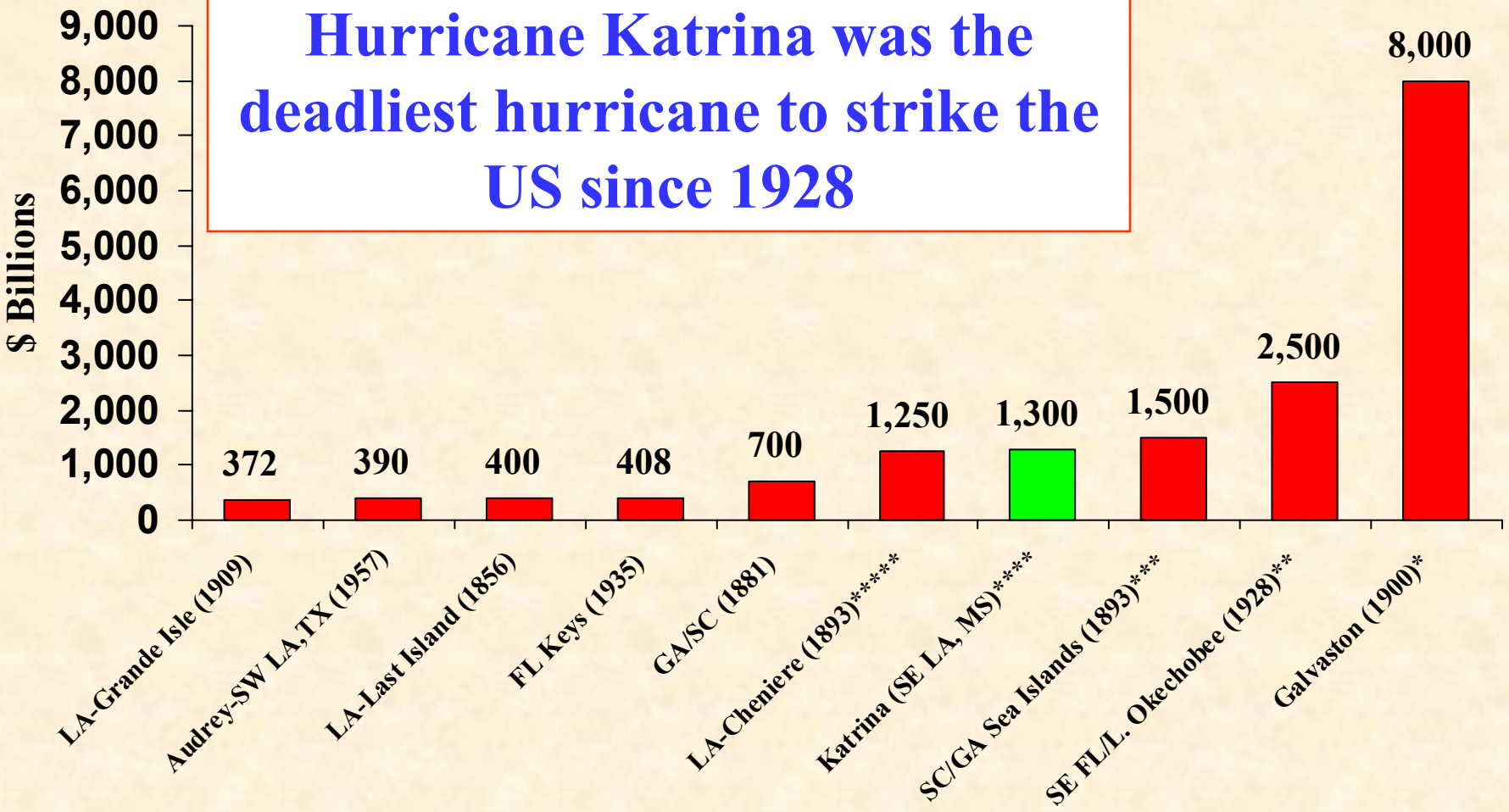
- Hurricanes Katrina, Rita, and Wilma
  - Their place in history
- Catastrophe Loss Management: The Hurricane Season of 2005
- Focus on the Energy/Marine Sector
- Managing Natural Catastrophes – The Larger Context
  - Emergency preparedness and response in the wake of 9/11
  - Questions and emerging lessons from Hurricane Katrina
- The U.S. Department of Homeland Security
  - Historic moment for America or bureaucracy writ large?
- Emergency Preparedness and Response
  - All-hazards vs. terrorist myopia?
  - FEMA – Challenges in the years ahead
- Implications for P/C Insurers and Reinsurers
- Concluding Remarks

Hurricanes Katrina, Rita, and Wilma:

Their Place in History

Top 10 Deadliest Hurricanes to Strike the US: 1851-2005

Hurricane Katrina was the deadliest hurricane to strike the US since 1928

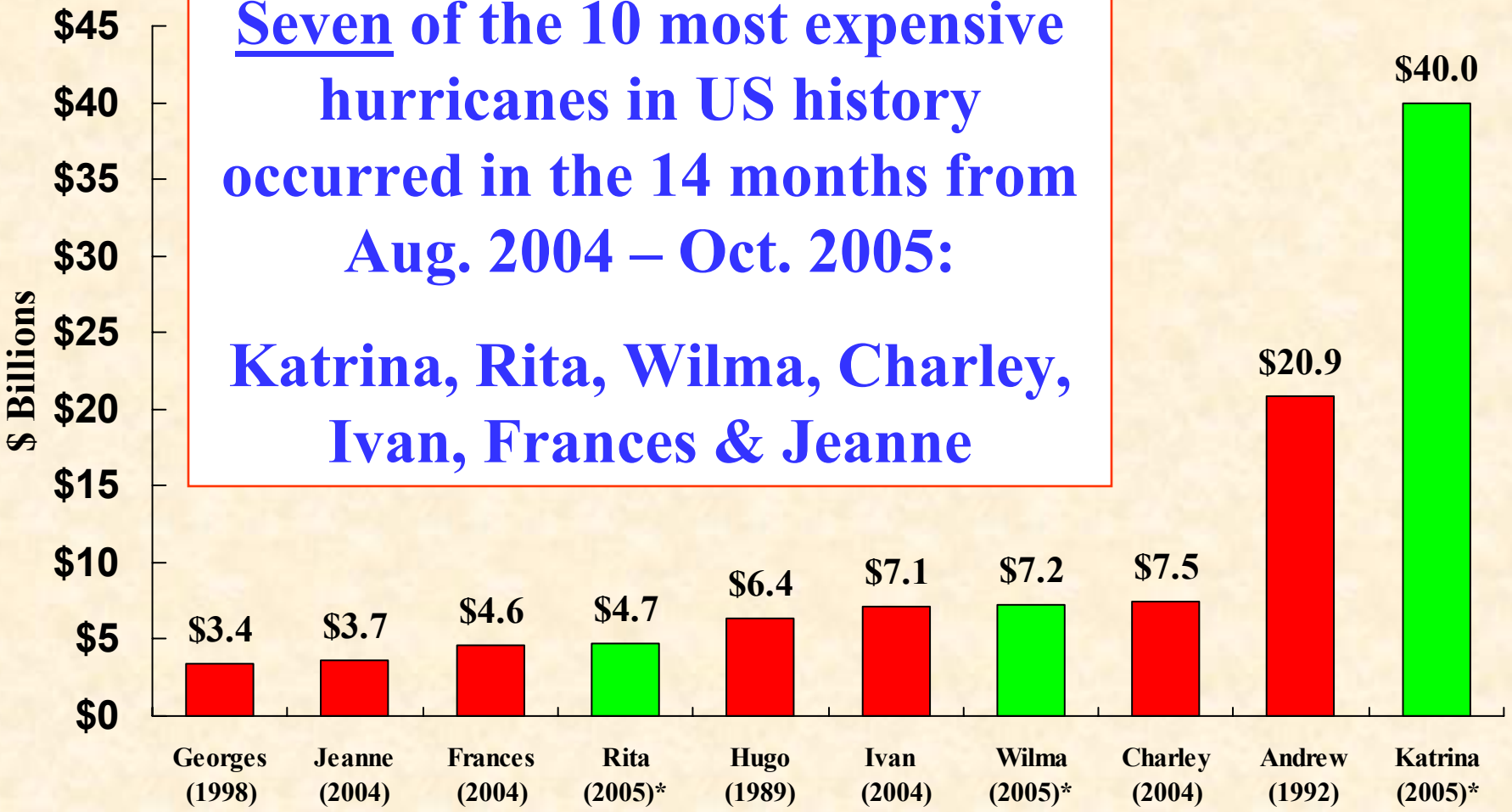


*Could be as high as 12,000 **Could be as high as 3,000 ***Midpoint of 1,000 – 2,000 range
****Preliminary as of Oct. 14, 2005 *****Midpoint of 1,100-1,400 range.
Sources: NOAA; Insurance Information Institute.

Top 10 Most Costly Hurricanes in US History, (Insured Losses, $2004)

Seven of the 10 most expensive hurricanes in US history occurred in the 14 months from Aug. 2004 – Oct. 2005:

Katrina, Rita, Wilma, Charley, Ivan, Frances & Jeanne



*III estimates as of October 14, 2005 in 2005 dollars for Rita; November 1, 2005 for Wilma.
Sources: ISO/PCS; Insurance Information Institute.

Top 10 Insured Property Losses in US ($2004)

Eight of the 10 most expensive disasters in US history occurred within the past 4 years

*III estimate, stated in 2005 dollars, as of 11/01/05.
Note: 9/11 loss figure is for property claims only. Total insured losses ($2004) are approximately $34B.
Sources: ISO/PCS; Insurance Information Institute.

*Top 11 Insured Property Losses Worldwide, 1970-2005 ($2004)**

Five of the 11 most expensive disasters in world history affected the US within the past 4 years.

*All figures are for total losses across all locations, not just US. Katrina and Wilma losses are preliminary III estimates stated in 2005 dollars.

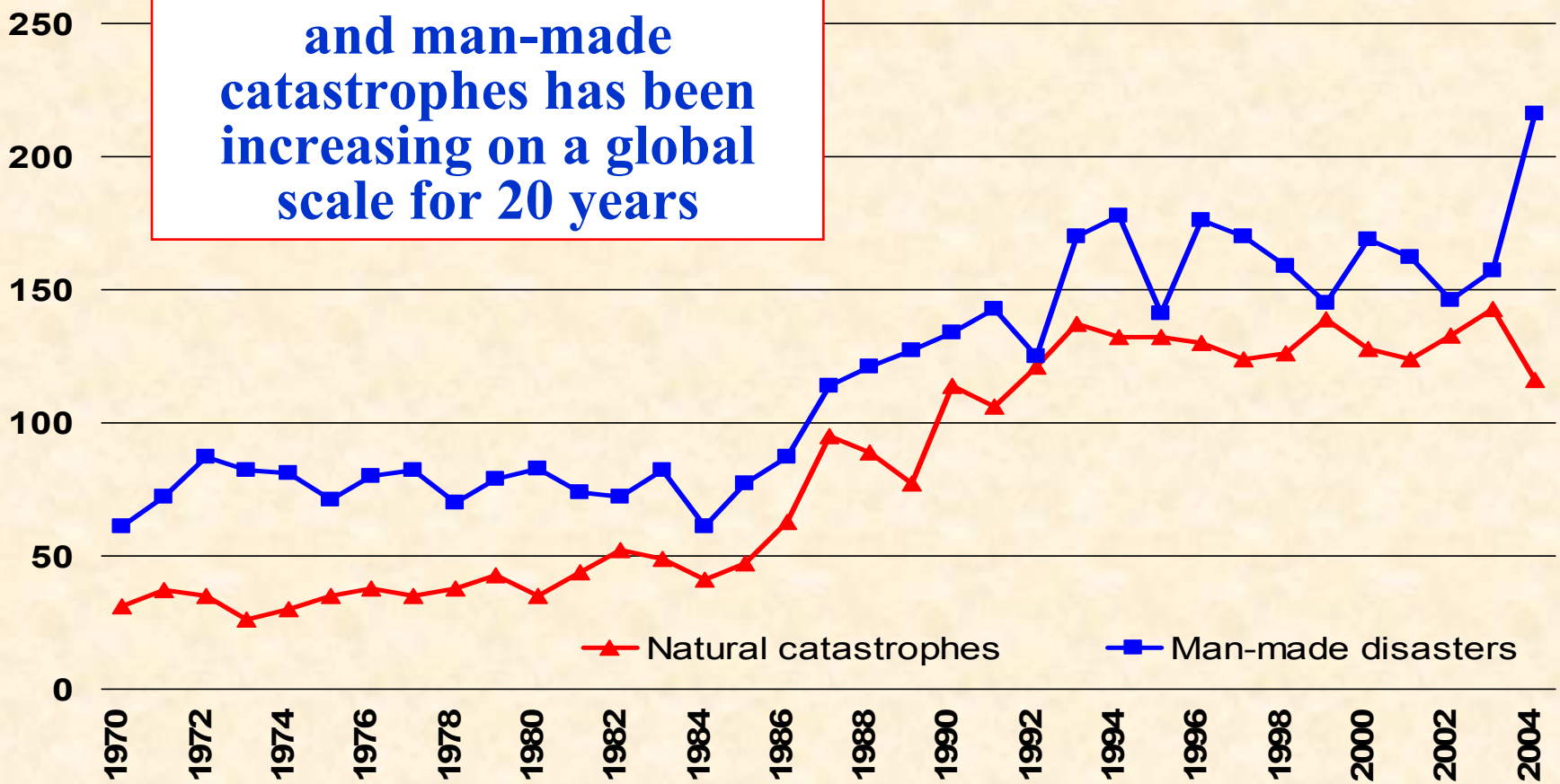
Sources: ISO/PCS; Swiss Re, "Natural Catastrophes and Man-Made Disasters in 2003," *Sigma*, no.1, 2004

CATASTROPHE LOSS MANAGEMENT

Focus on the Hurricane Season of 2005

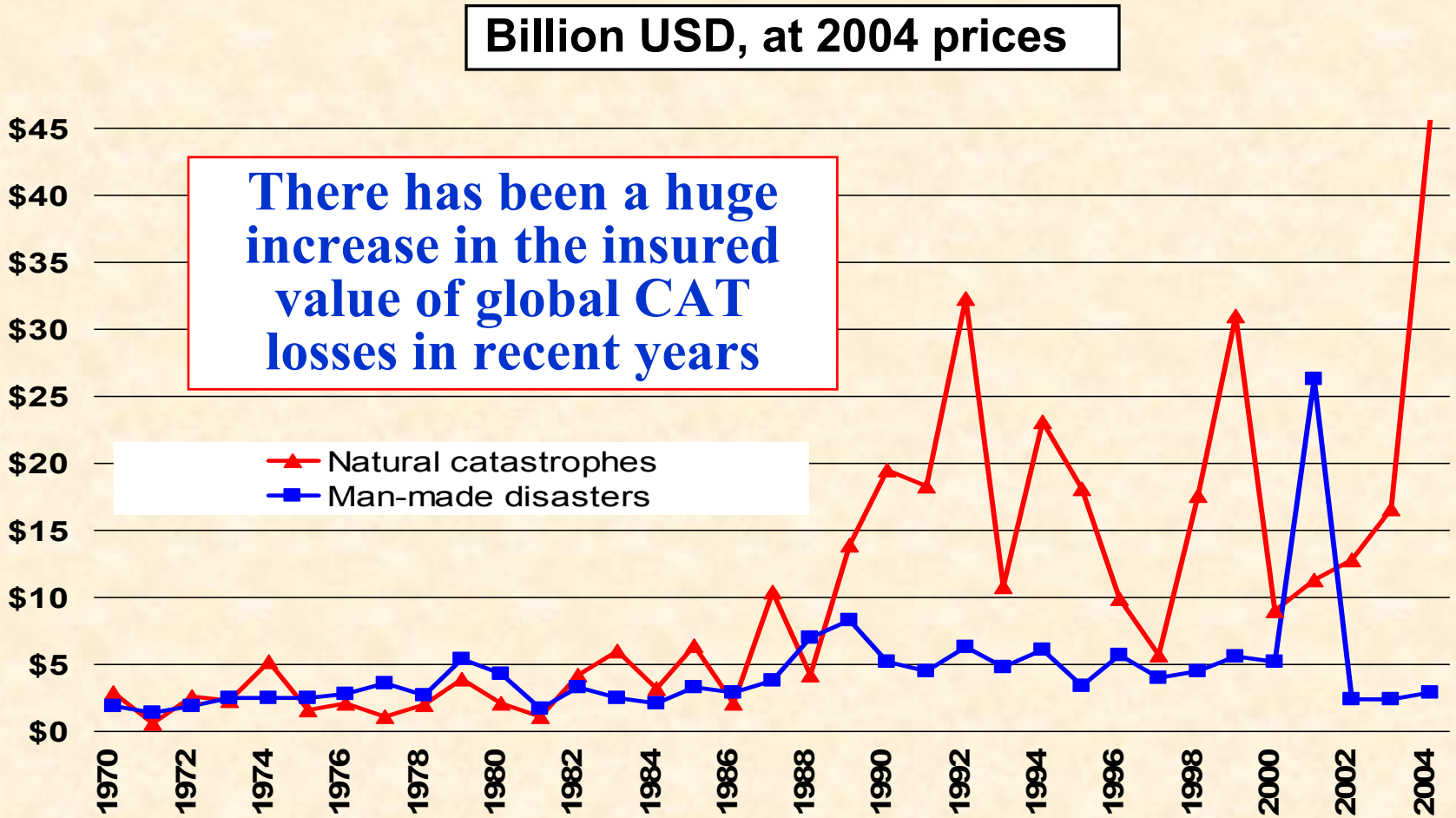
Global Number of Catastrophic Events, 1970–2004

The number of natural and man-made catastrophes has been increasing on a global scale for 20 years



Man-made disasters: without road disasters. Source: Swiss Re, *sigma* No. 1/2005, page 4.

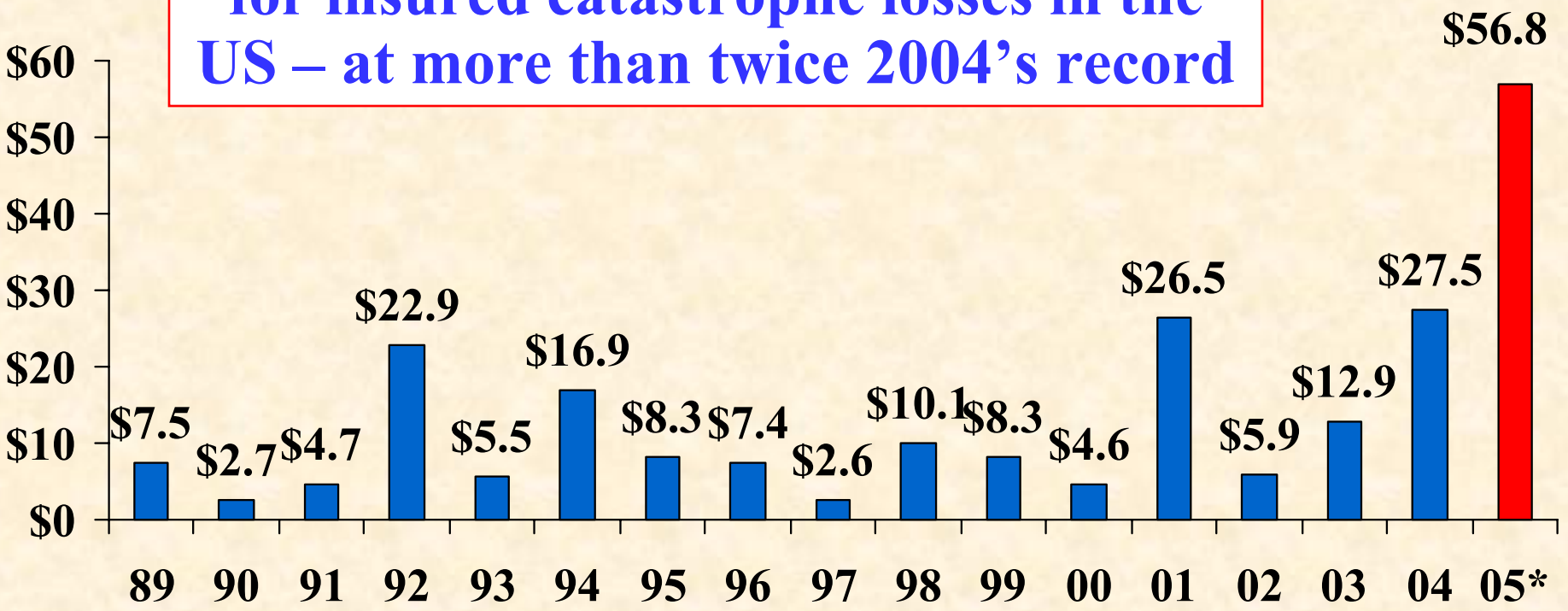
Global Insured CAT Losses, 1970–2004 (Property and Business Interruption)



Source: Swiss Re, *sigma* No. 1/2005, page 6

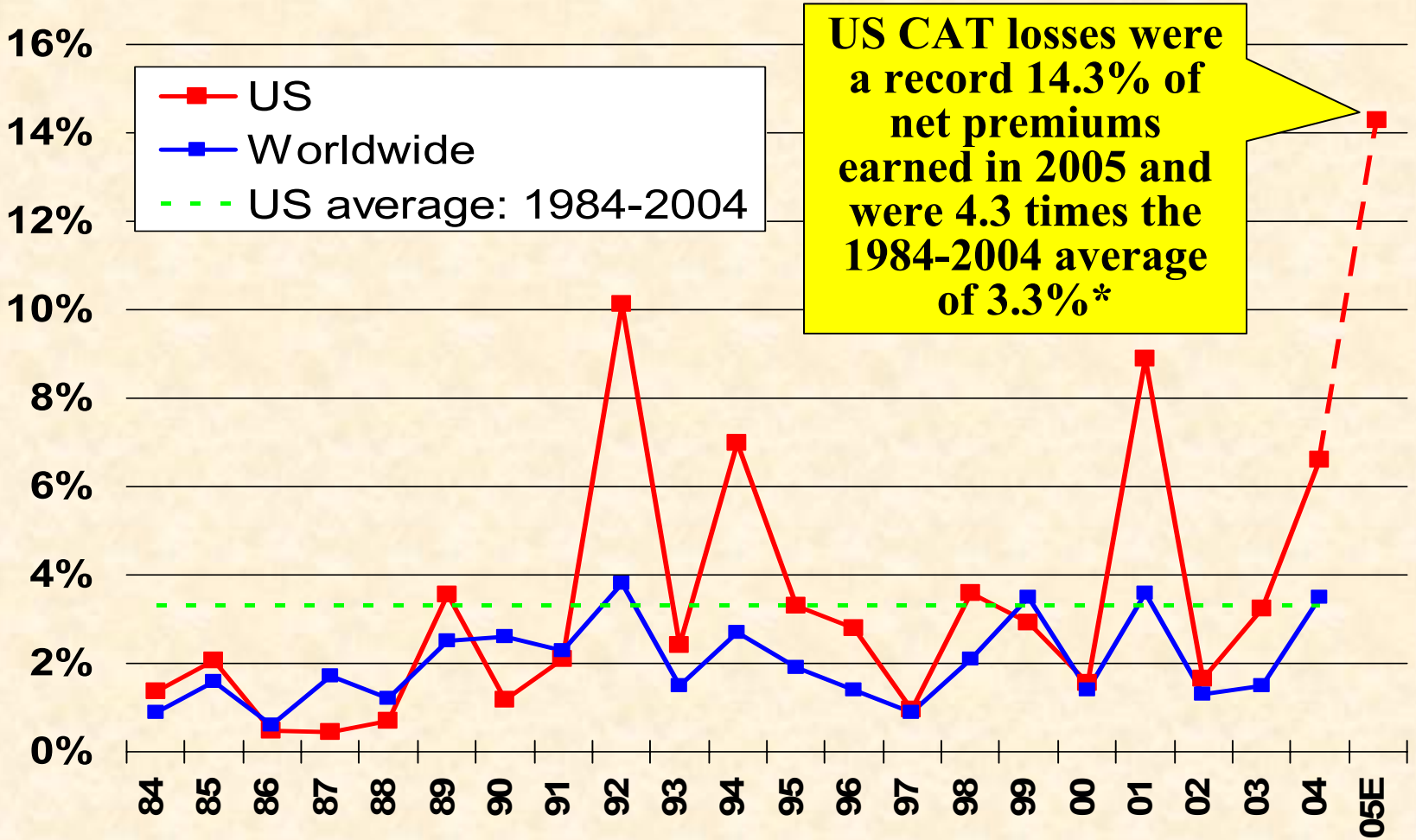
U.S. Insured Catastrophe Losses ($ Billions)

2005 will be by far the worst year ever for insured catastrophe losses in the US – at more than twice 2004's record



*As of 6/30/05 plus $920 in insured for Hurricane Dennis in July, $40 billion (est.) for Hurricane Katrina in August, $800 million (AIR est.) for Hurricane Ophelia in Sept., $4.7B for Hurr. Rita & $7.2B for Wilma.
Note: 2001 figure includes $20.3B for 9/11 losses reported through 12/31/01. Includes only business and personal property claims, business interruption and auto claims.
Source: Property Claims Service/ISO; Insurance Information Institute

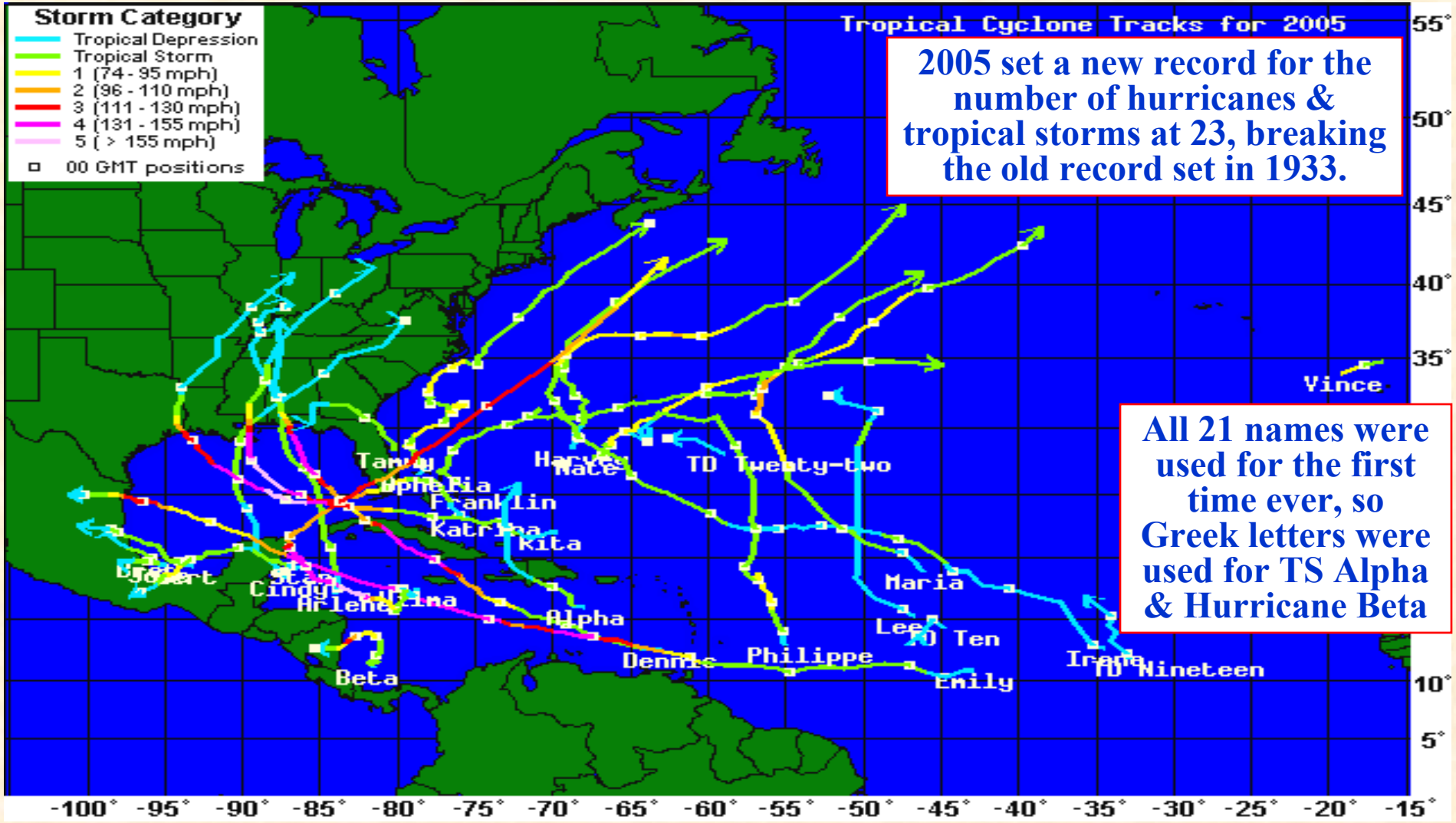
Insured Property Catastrophe Losses as % of Net Premiums Earned, 1983–2005E



*Insurance Information Institute estimate of 14.3% for 2005 based estimated 2005 DPE of $418.8B and estimated insured CAT losses of $60B.

Sources: ISO, A.M. Best, Swiss Re Economic Research & Consulting; Insurance Information Institute.

2005 Has Been a Busy, Destructive, Deadly & Expensive Hurricane Season



Source: WeatherUnderground.com, October 31, 2005.

Number of Major (Category 3, 4, 5) Hurricanes Striking the US by Decade

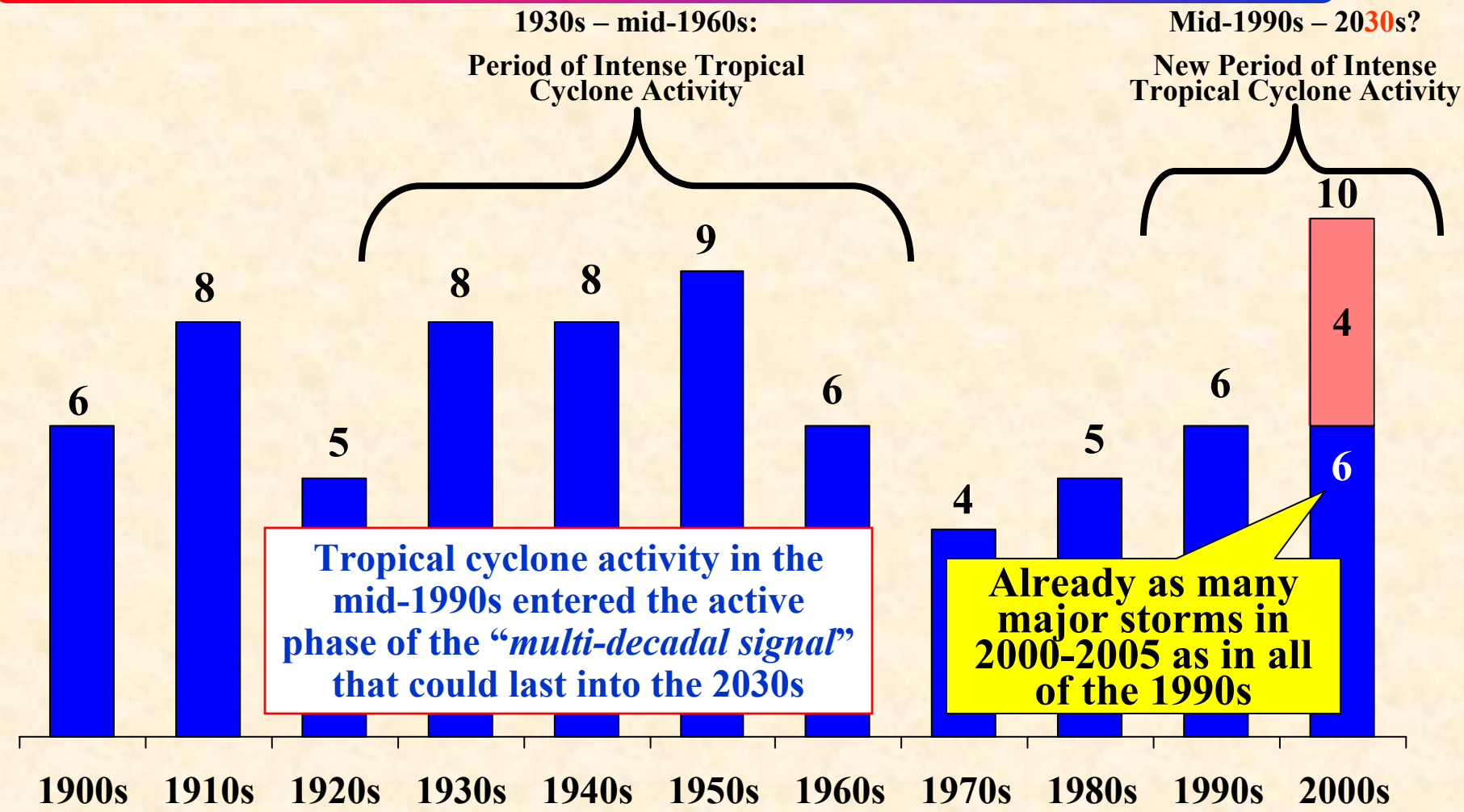
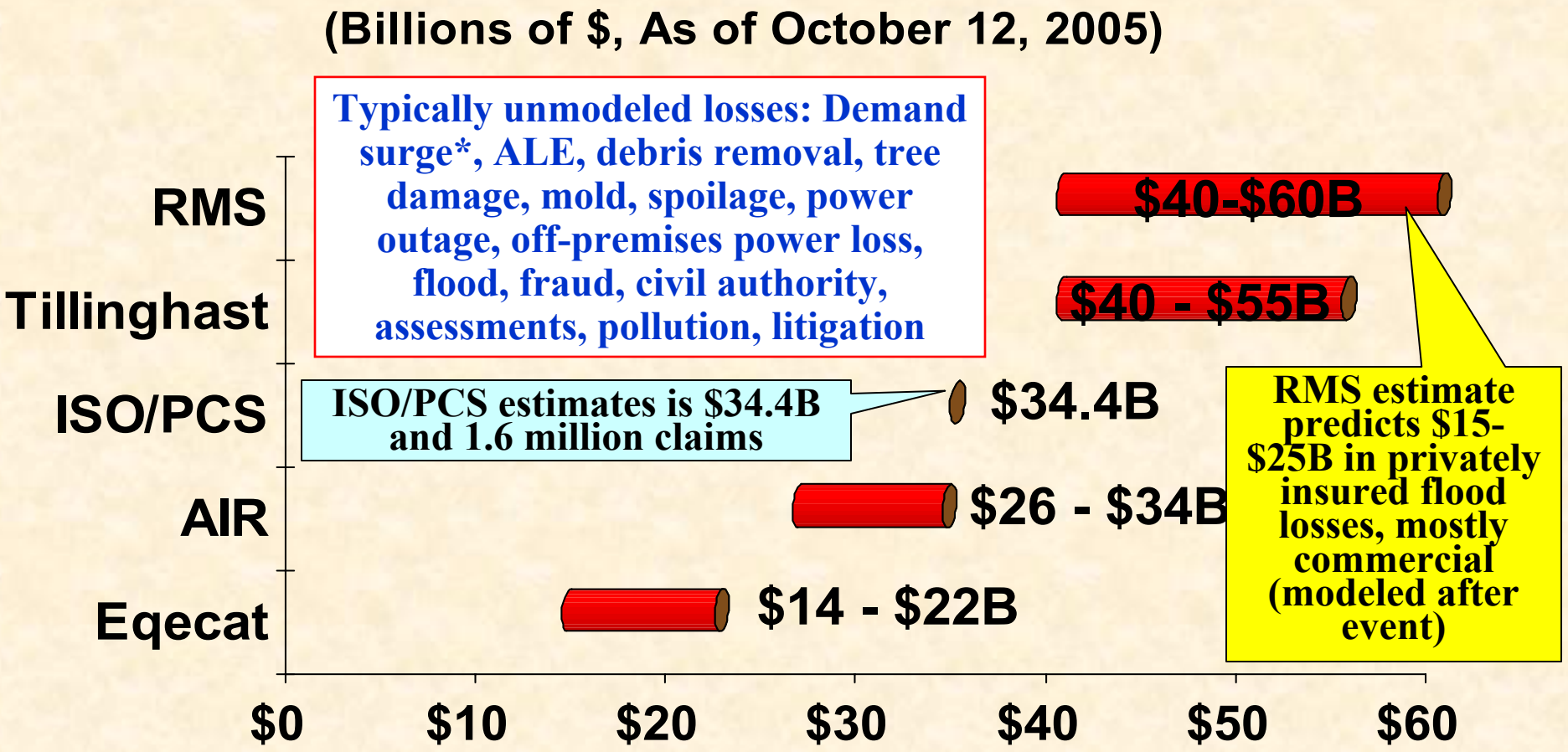


*Figure for 2000s is extrapolated based on data for 2000-2005 (6 major storms: Charley, Ivan, Jeanne (2004) & Katrina, Rita, Wilma (2005).

Source: Tillinghast from National Hurricane Center: http://www.nhc.noaa.gov/pastint.shtm.

Hurricane Katrina Insured Loss Estimates Still Vary Widely

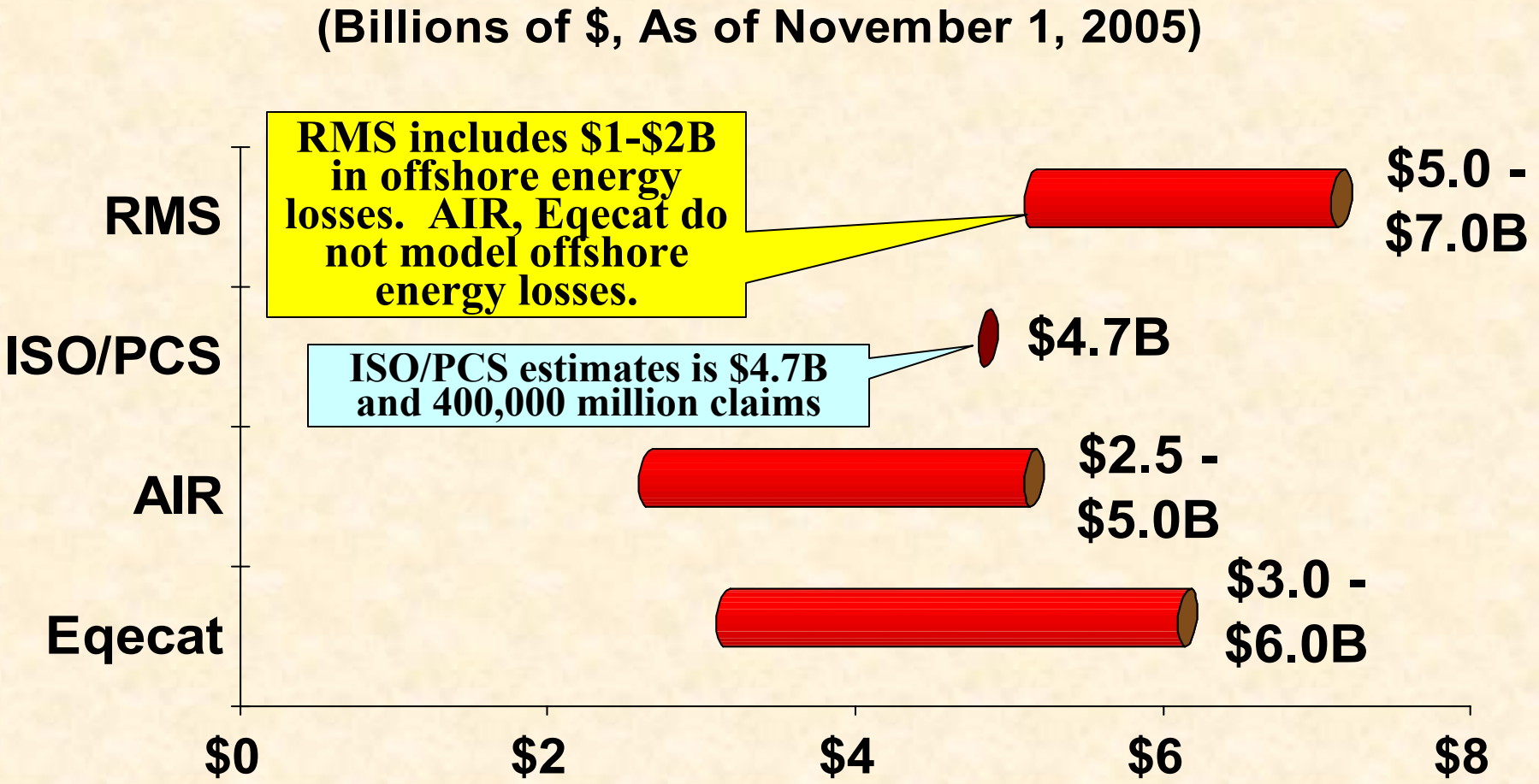


*Major US landfall occurred Aug. 29.

**Rising material costs, e.g., plywood rose 38% and framing lumber by 14% through Sept. 16, 2005.

Sources: RMS, AIR, Eqecat, Tillinghast; Compiled by the Insurance Information Institute.

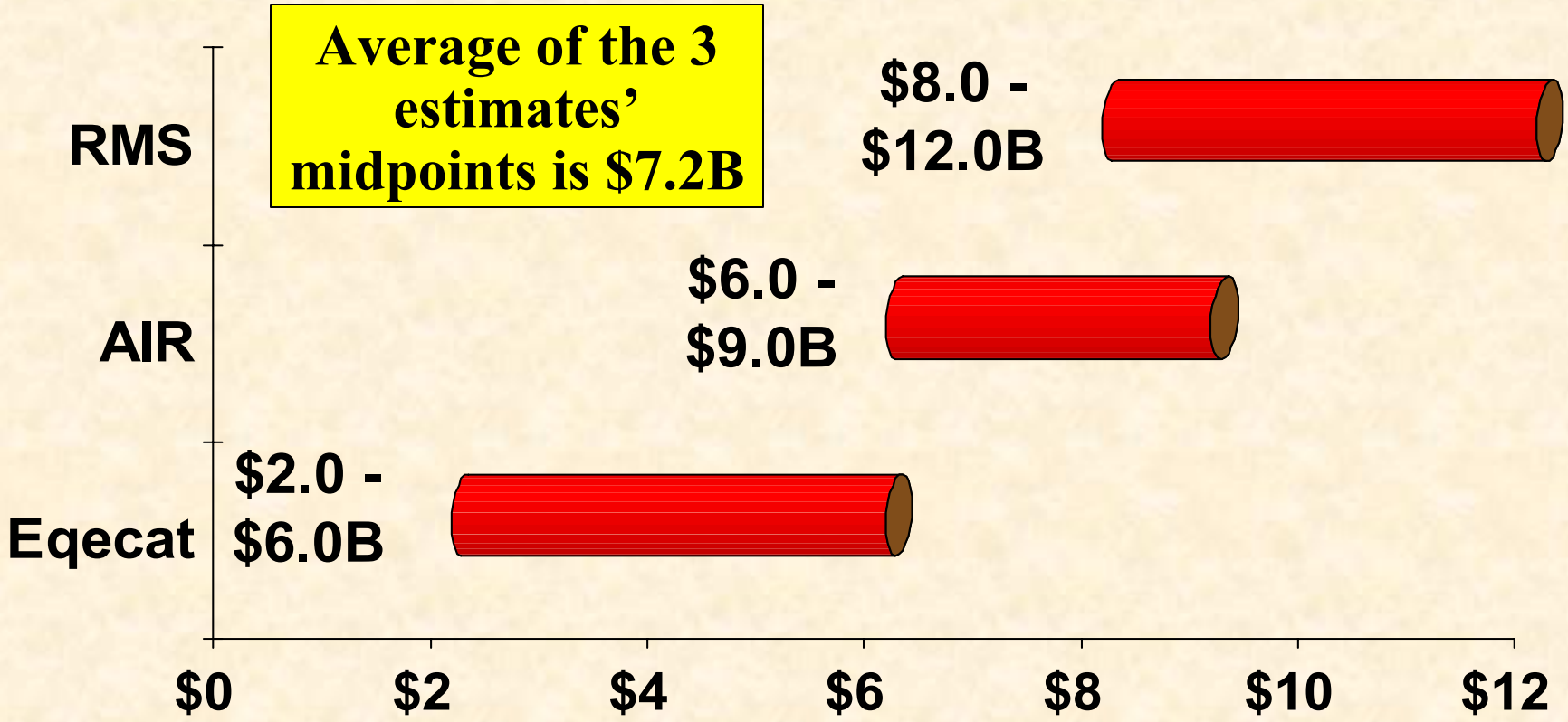
Hurricane Rita Losses: Much Smaller & Less Variable



Sources: RMS, AIR, Eqecat, ISO/PCS; Compiled by the Insurance Information Institute.

Hurricane Wilma Insured Losses: Late Season Large Loss*

(Billions of $, As of November 1, 2005)



*US insured property and business interruption losses only. Wilma's US landfall occurred Oct. 24.
Sources: RMS, AIR, Eqecat; Compiled by the Insurance Information Institute.

Breakdown of RMS $40-$60 Billion Katrina Loss Estimate

Type of Loss	Low	High
Windstorm & Surge	$20	$25
Flood, private (not incl. NFIP)*	$15	$25
Off Shore Energy, Marine	$2	$5
Misc., Possible Pollution	$2	$3
1st Landfall (FL)	$1	$2
TOTAL	**$40**	**$60**

***Primarily commercial flood and associated business interruption losses.**
Sources: RMS; Adapted from *Responding to Katrina*, Lane Financial LLC, Sept. 16, 2005.

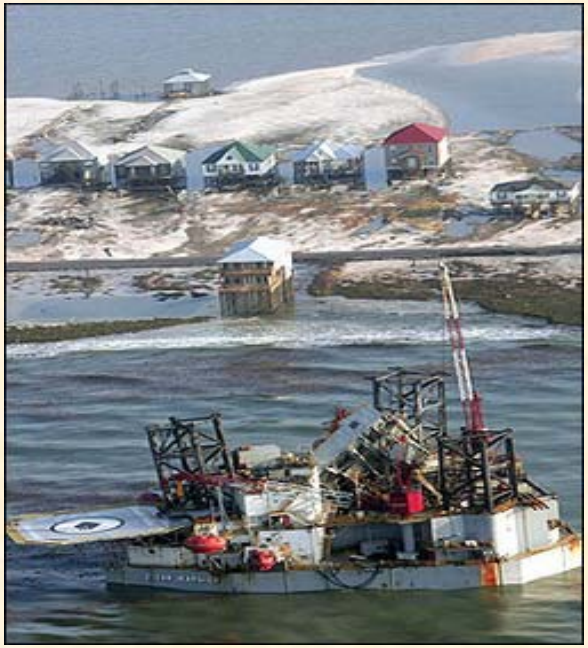
Breakdown of Tillinghast $40-$55 Billion Katrina Loss Estimate

Type of Loss	Low	High
Personal Property Lines		
Residential Property	$14.0	$17.0
Personal Auto	$1.0	$2.0
Personal Watercraft	$0.2	$0.3
Total	**$15.2**	**$19.3**
Commercial Property Lines		
Commercial Property (excl. Off-Shore)	$13.5	$16.0
Business Interruption (excl. marine & energy)	$6.0	$9.0
Commercial Auto	$0.2	$0.3
Sub-Total Personal & Commercial	**$19.7**	**$25.3**
Marine & Energy	$4.0	$6.0
Liability	$1.0	$3.0
Other	$0.0	$1.0
Total All Lines	**$39.9**	**$54.6**

Summary of Facts About Insured Losses Regarding Katrina

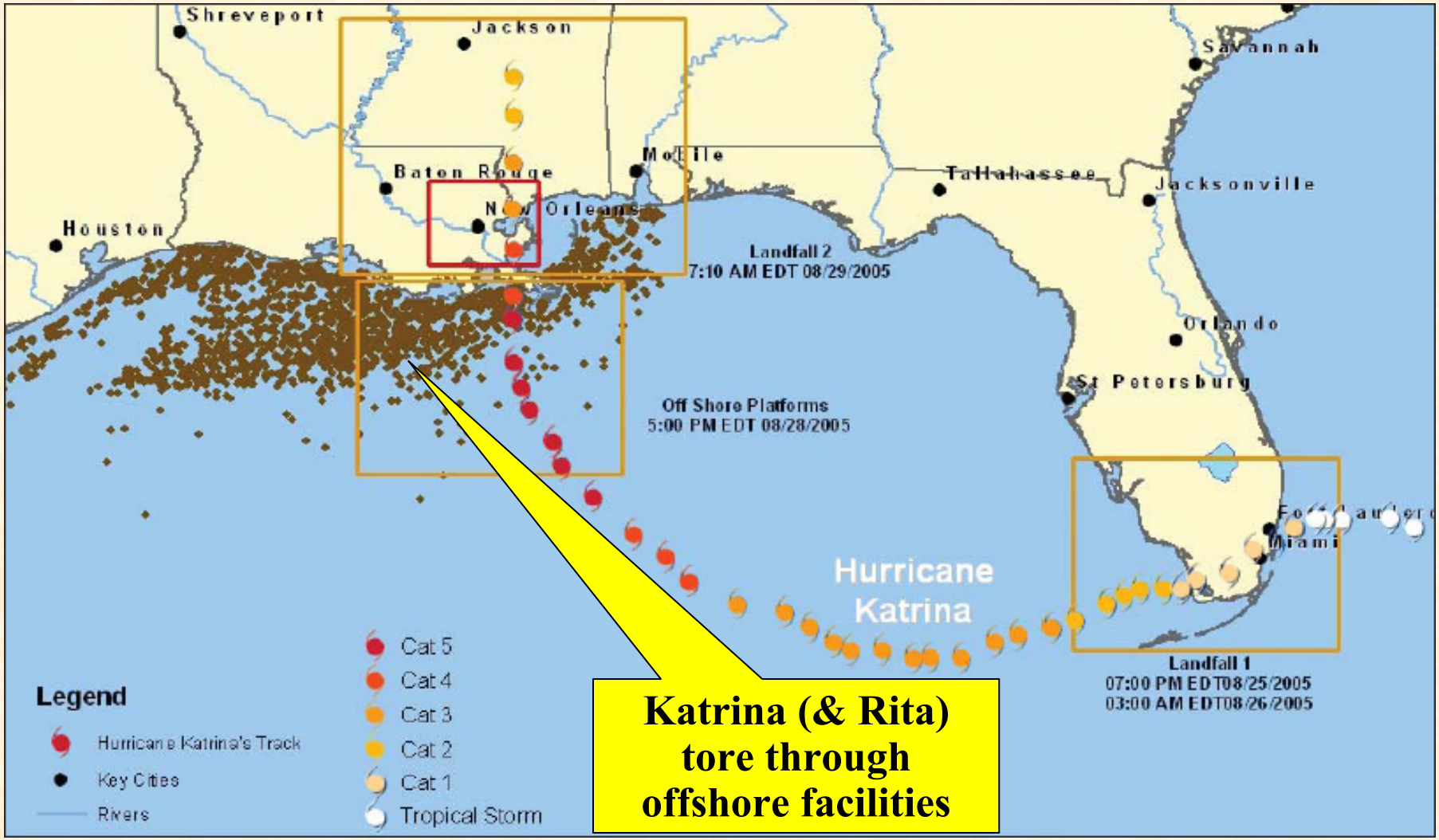
- **As of October 14, 2005:**
  - **58 companies had announced pre-tax loss estimates**
  - **Announced loss total: $22.1B to $24.4B**
  - **This works out to 55% - 61%% of a mid-range insured loss estimate of $40 billion**
  - **$40B loss is 9.7% of US PHS of $412.5B as of 6/30/05**
- **Announced Company Loss Estimates:**
  - **High: $2.55 billion; Low: $1.2 million**
  - **Upper loss est. % of 2Q:05 Equity: 0.2% to 46.1%**
- **At least 20 companies put on watch for possible downgrades by various ratings agencies**
- **Many Lines Affected:**
  - **Extreme events→loss correlations increase**

Focus on the Energy/Marine Sector



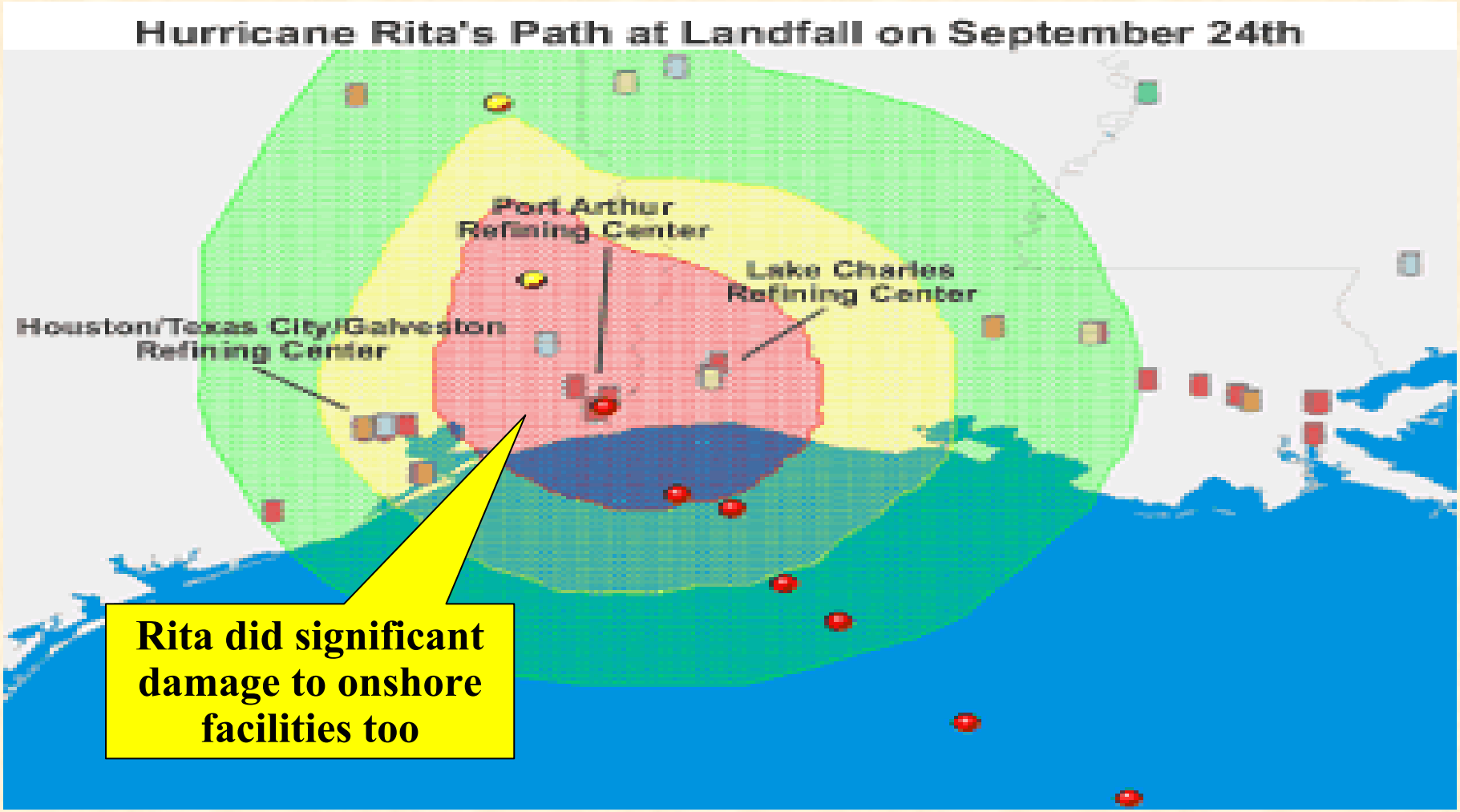
A wrecked oil platform washes ashore in Alabama in the wake of Hurricane Katrina

Katrina's Path of Destruction Through the Offshore Energy Industry



Source: "*Hurricane Katrina: Profile of a Super Cat*," RMS, October 2005.

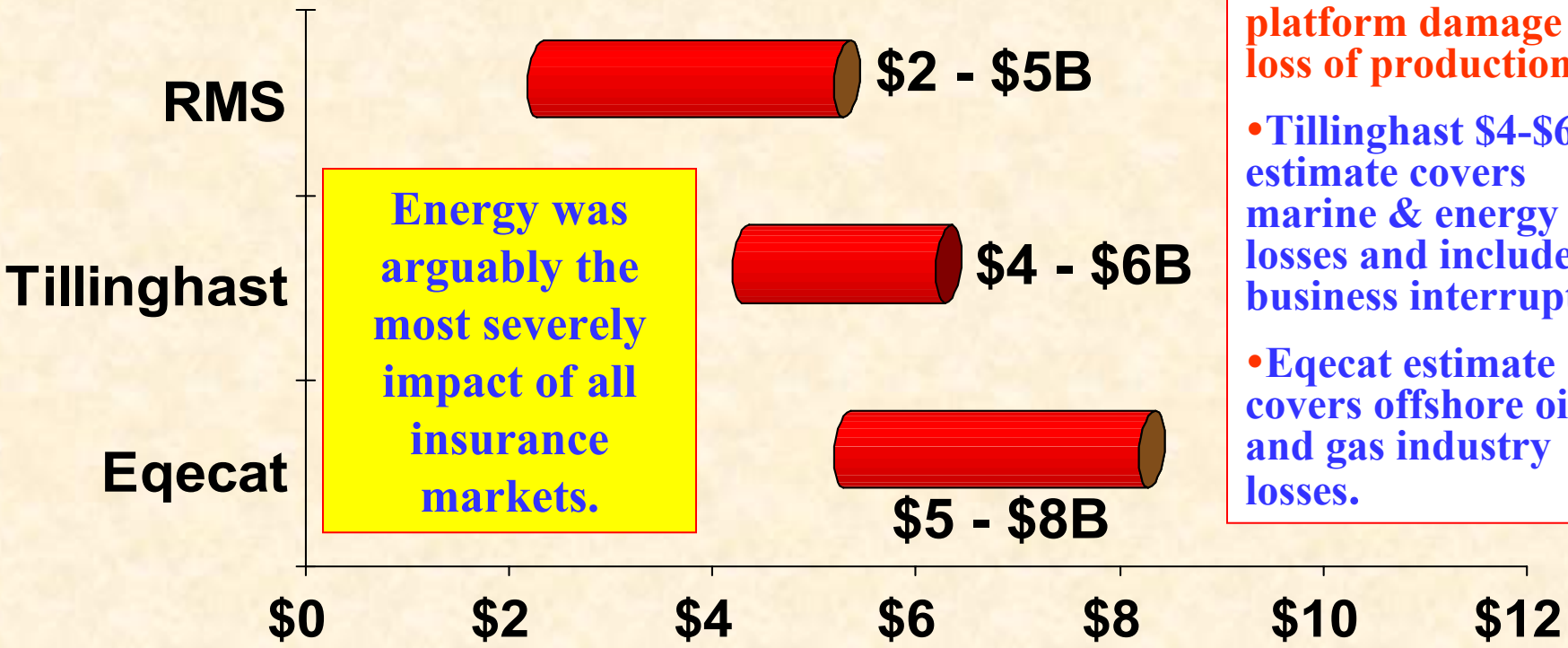
Hurricane Rita's Path Was at Least as Devastating for Energy/Marine Concerns



Source: Energy Information Administration; iMapData Inc.

Hurricane Katrina Energy/Marine Insured Loss Estimates

(Billions of $, As of October 10, 2005)



Energy was arguably the most severely impact of all insurance markets.

- **RMS estimate covers offshore platform damage and loss of production.**
- **Tillinghast $4-$6B estimate covers marine & energy losses and includes business interruption.**
- **Eqecat estimate covers offshore oil and gas industry losses.**

*Sources: RMS, Eqecat, Tillinghast; Compiled by the Insurance Information Institute.

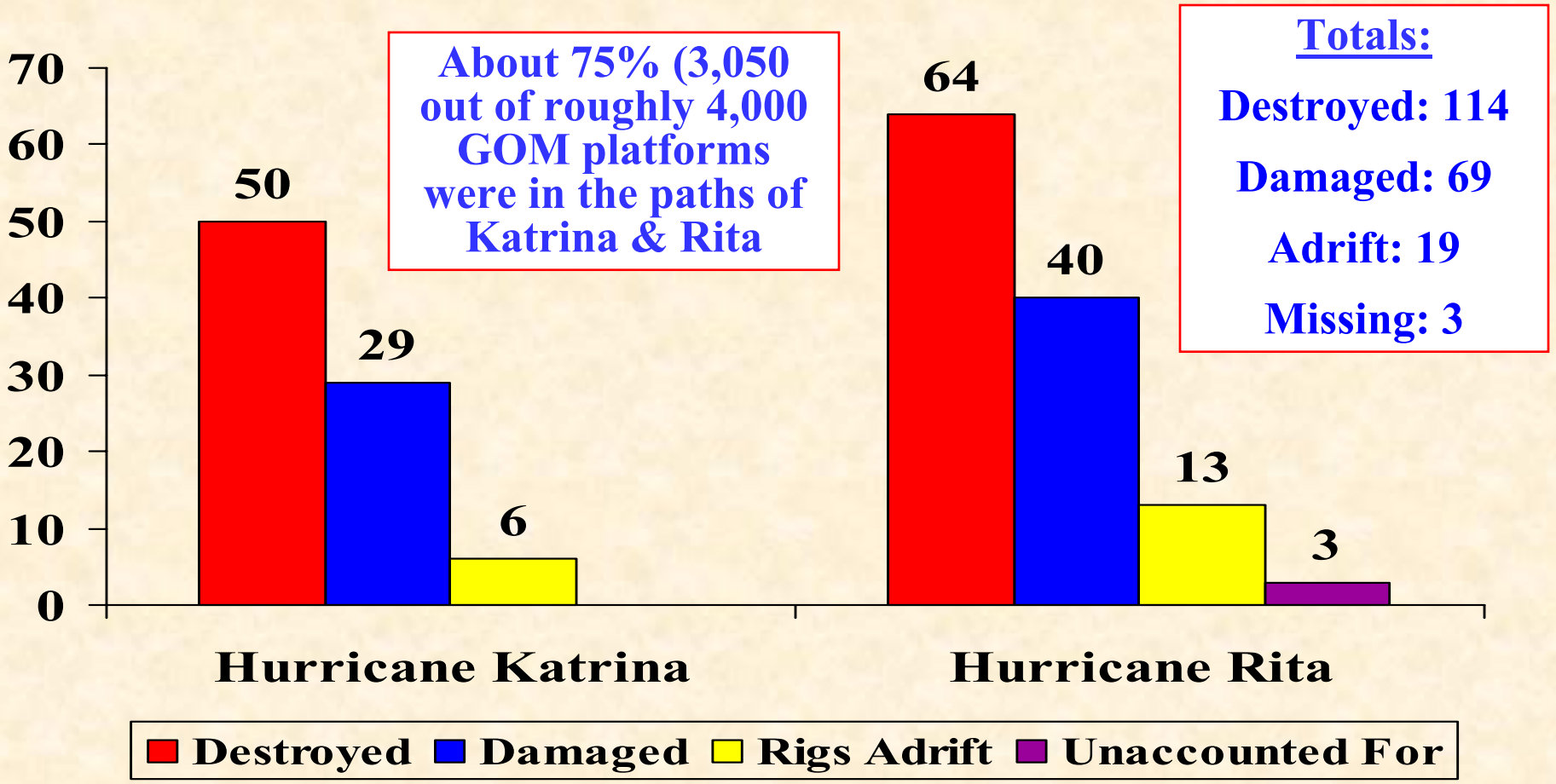
Gulf of Mexico Energy/Marine Status Following Katrina & Rita (October 4, 2005)

- **Of the 4,000 platforms administered by the Minerals Management Service (MMS), 3,050 platforms were in the path of Hurricanes Katrina and Rita.**
- **As of October 4, MMS announced Hurricane Katrina had destroyed 50 oil rigs and platforms and damaged 29 more. A further 6 rigs were adrift.**
- **Hurricane Rita destroyed 64 oil rigs and platforms and damaged 40 more. 13 rigs are adrift and a further 3 rigs unaccounted for.**
- **Of those destroyed, 108 were older "end of life" facilities not built to MMS' upgraded design standards. They account for only 1.7% of the Gulf's oil production and 0.9% of the Gulf's gas production.**
- **Major new facilities withstood the storms better, with only one major facility destroyed and four receiving significant damage.**

Source: Minerals Management Service (MMS).

Hurricanes Katrina/Rita: Damage to Oil Platforms and Rigs in Gulf of Mexico

No. of Platforms/Rigs Destroyed, Damaged or Adrift, as of October 4, 2005.



Source: Minerals Management Service (MMS), US Department of the Interior.

Largest Vulnerabilities Exposed by This Year's Hurricane Season

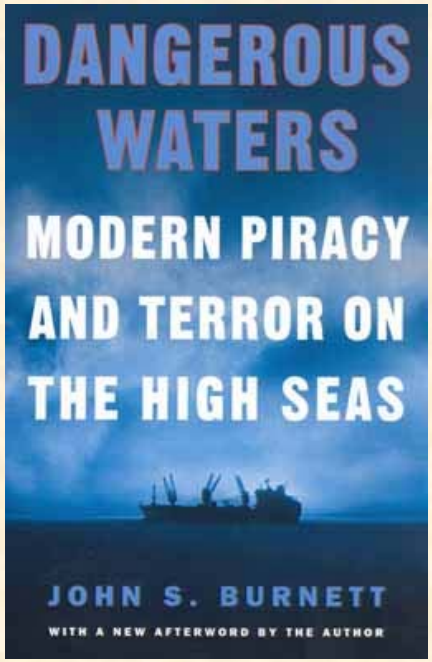
- Offshore energy sector – significant exposure on the TX and LA. Gulf Coast
- Of the 4,000 platforms operating in the Gulf of Mexico, ~3000 were in the path of at least one of the two hurricanes
- Up to 108 oil & gas platforms were destroyed by Hurricanes Katrina and Rita, plus 53 platforms were significantly damaged
- BI losses difficult to estimate
  - Represented 2/3 of covered losses in Hurricane Ivan in 2004 for offshore energy
  - 91% of oil and 83% of gas production was initially shut down in the wake of Katrina
  - 3 weeks after Katrina, 55% oil and 34% gas still unavailable; half of halted oil production driven by onshore damage to refineries

Oil Giants: Financial Fallout From The Storms?

- **As of October 25, 2005, a number of energy giants had announced damage estimates. Insurance will cover much of the loss:**
  - **BP** warned the damage will cost the company $700 million. Of this, about $550 million is lost profit due to production-related damage, incl. lost output and repairs. Further $150 million due to disrupted refining operations.
  - **Chevron** announced Katrina fallout could cost the company $350 million or more.
  - **ConocoPhillips** initial estimate of its share of mutual insurance premium charges, affecting Q3 05, due to Hurricane Katrina is $30 million, after-tax. Total impact still being evaluated.
  - **Shell** puts its total costs after tax for hurricane related items at around $350 million over the period 2005 to 2006. Insurance will cover a significant portion.

Source: www.rigzone.com, 10/25/05. Wall Street Journal, 10/26/05.

Managing Natural Catastrophes in a Post-9/11 World



Are Ports/Shipping Still Vulnerable to Terrorist Attack?

- **Many people seem to fear port exposure**
- **New York, Norfolk, Charleston, Ft. Lauderdale, Los Angeles, Seattle all cited as making progress**
- **Canadian Exposure: 3 million containers travel in/out of Canada each year valued at C$70 billion**
- **27% of the 1.5 million containers imported into Canada wind up in the US**

Source: *Wall Street Journal* April 21, 2003; Insurance Information Institute, from US Coast Guard

The Realities of Port Security in the Post-9/11 Era

Progress at the Federal Level

- Soon after 9/11, the U.S. Coast Guard began several risk-based activities and initiatives aimed at improving and managing port security
- The U.S. Coast Guard has developed numerous security plans — called *Area Maritime Security Plans* — to identify and address risks and vulnerabilities in and around the nation's key ports
- Other initiatives include the development of computer-based tools for assessing risks at specific port locations
- Another key initiative is the Port Security Grant Program. This program has awarded more than $500 million in security grants to port authorities and industry stakeholders

Terrorist Risk Factors From Shipping

CARGO

- Smuggle people/weapons
- Use cargo to transport weapons (conventional, nuclear, bio or chemical

VESSELS

- Use vessel as weapon
- Use to launch attack
- Sink to disrupt infrastructure

EXTERNAL IMPACTS

- Loss of life/prop. damage
- Disruption to Trade Flows
- Higher transport costs due to added security

PEOPLE

- Attacking ship to provoke human casualties
- Use cover of seafarer ID to insert terrorist opratives

MONEY

- Use shipping revenue to fund terrorist activities
- Use ships to launder money for terrorist organizations

Source: *Security in Maritime Transport: Risk Factors and Economic Impact*, Organization for Economic Cooperation and Development (July 2003); Insurance Information Institute

Progress Towards the Development of a Comprehensive Strategy for Container Security

- DHS efforts to tighten maritime container security have been criticized for
  - Poor supervision
  - Lack of comprehensive strategy for keeping dangerous cargo from reaching U.S. ports
- Container Security Initiative has been widely criticized for failing to inspect all high-risk cargo
- A bill introduced in the Senate on Tuesday may quell some of this criticism. The bill seeks to
  - Codify existing programs to and inspect and track shipping containers
  - Set minimum standards for all U.S.-bound containers
- Pause for concern: the standards will be enforced by a new Office of Maritime Cargo Security created within DHS

Problems with the Customs-Trade Partnership Against Terrorism

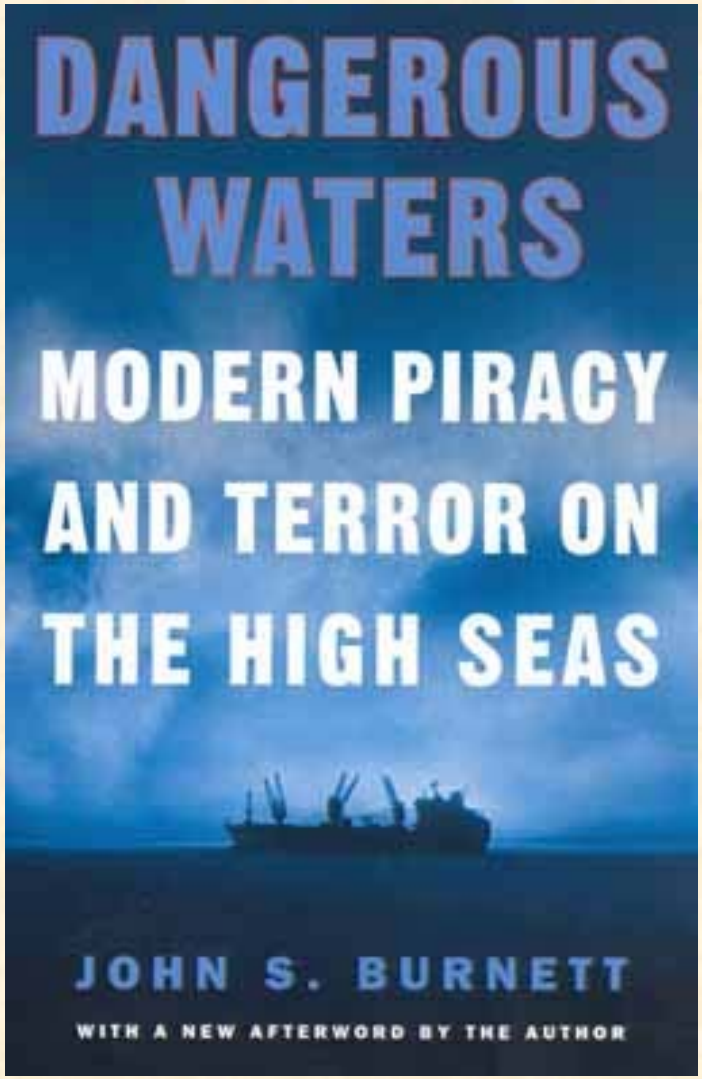
- Under C-TPAT, shipping companies agree to tighten cargo security in exchange for fewer government inspections
- In May, GAO found that DHS failed to confirm whether the nearly 5,000 companies in C-TPAT have actually improved security
- Proposed legislation would increase DHS' ability to confirm that shippers are following through
  - Will allow 3rd party companies to validate that shippers have actually tightened their security
- Central Challenge:

Creating enough real incentives for public/private partnerships like this to operate in mutually beneficial and sustainable ways

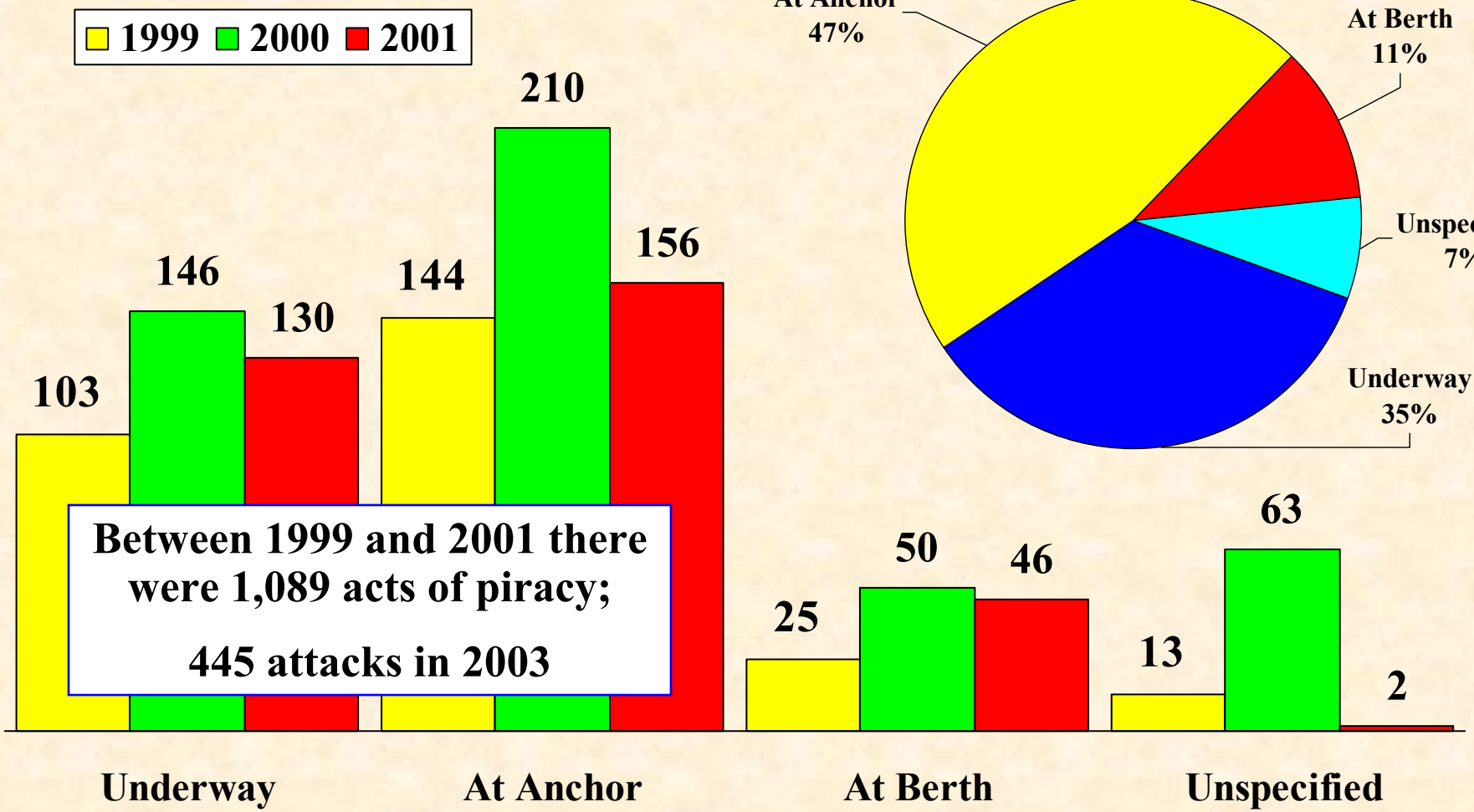
A Hint of Things to Come: The DHS Secure Freight Initiative

- A product of DHS Secretary Chertoff's 2SR
- As outlined recently by DHS Deputy Secretary Jackson, SFI will create a single, industry-run data fusion center, capable of culling cargo information from private sector shippers for use by DHS in its risk management efforts
- Within the shipping industry, details are still sketchy
- DHS promises that private sector stakeholders will be involved in any final decisions concerning the new program's implementation
- Key unresolved issues:
  - Funding
  - Privacy concerns

Piracy is Another Persistent and Expensive Problem



Acts of Piracy by Transit Point, 1999-2001



Source: *Patterns of Global Terrorism,* US Department of State; Insurance Information Institute

The Broader Context

Homeland Security

The Genesis of DHS

- In the wake of 9/11, President Bush issued the *National Strategy for Homeland Security* in July 2002
- Legislation creating the U.S. Department of Homeland Security (DHS) was signed in November 2002
- The creation of DHS represents a fusion of numerous federal agencies, with the objective of *coordinating* and *centralizing* the leadership of the nation's homeland security activities under a single, cabinet-level department
  - Began operations in March 2003
  - 22 separate agencies
  - Approximately 180,000 employees

DHS: Historic Moment for the United States or Bureaucracy Writ Large?

- The creation of DHS represents a historic moment of almost unprecedented action by the federal government to transform how the nation protects itself from acts of terrorism
- Rarely in the nation's history has such a large and complex reorganization of government been attempted, with such a singular and urgent purpose
- DHS represents a unique opportunity to transform a disparate group of agencies with multiple missions, values, and cultures into an effective cabinet-level department
- A central aspect of DHS's mission involves coordinating efforts to protect critical infrastructure, prepare for possible attacks and other emergencies, and respond to catastrophic incidents and events
- Accountability and performance thus far?
  - Hurricane Katrina as a specific case in point – first real test of the system?
  - DHS Inspector General
  - U.S. GAO
  - Academics and Think Tanks

Homeland Security: The Essential Tension

- Any coordinated and sustained effort to effectively manage homeland security must contend with two competing tasks:
  - The *prevention* of terrorist acts
  - *Mitigation* of *consequences* arising from acts of terrorism and other extreme events
- In a difficult decision context like this, resource allocation under uncertainty is one of the central challenges the federal government faces in its efforts to manage homeland security
- For the private sector, the tension comes from a (myopic) focus on ROI

The National Strategy for Homeland Security

- The *National Strategy for Homeland Security* describes six critical missions areas:
  - Intelligence and Warning
  - Border and Transportation Security
  - Domestic Counterterrorism
  - Protecting Critical Infrastructure and Key Assets
  - Defending Against Catastrophic Threats
  - Emergency Preparedness and Response
- The President has also issued several additional documents – called *Homeland Security Presidential Directives* (HSPDs) – that provide more detailed guidance on various homeland-security-related mission areas and initiatives

Emergency Preparedness and Response: Key Elements of the National Strategy

Within the Emergency Preparedness and Response mission area, the National Strategy identifies 12 separate initiatives:

1. Integrate separate federal response plans into a single all-discipline incident management plan
2. Create a national incident management system
3. Improve tactical counter terrorist capabilities
4. Enable seamless communication among all responders
5. Prepare health care providers for catastrophic terrorism
6. Augment America's pharmaceutical and vaccine stockpiles

Emergency Preparedness and Response: Key Elements of the National Strategy (cont.)

7. Prepare for chemical, biological, radiological, and nuclear decontamination

8. Plan for military support to civil authorities

9. Build the Citizen Corps

10. Implement the First Responder initiative of the FY03 budget

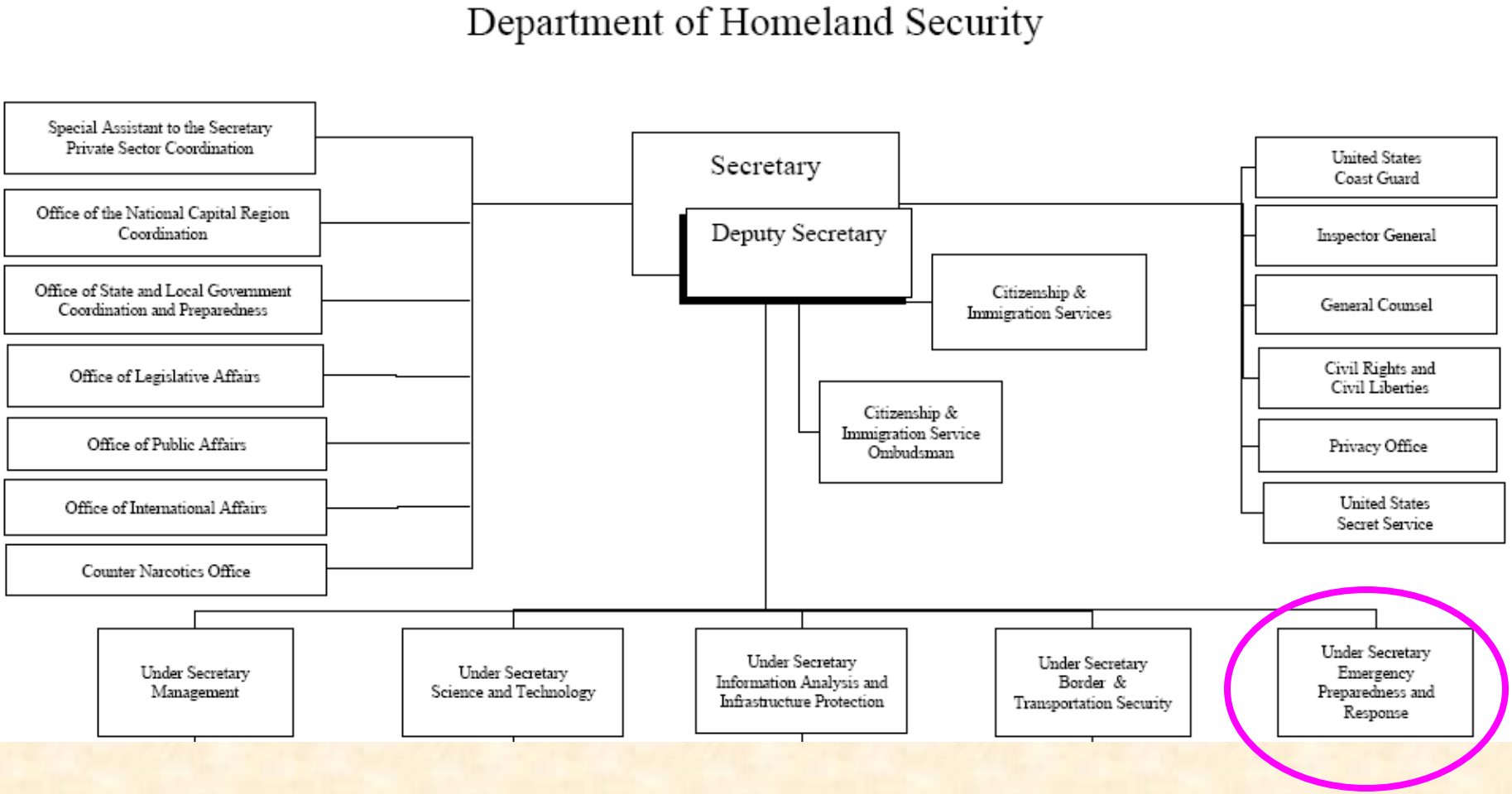
11. Build a national training and evaluation system

12. Enhance the victim support system

FEMA

Past, Present, and Future

DHS Organizational Structure: FEMA's Place in the Larger Context of Homeland Security



FEMA: Informed Opinion Prior to this Year's Devastating Hurricane Season

"…*consolidate* DHS response missions into FEMA and *strengthen that agency*. FEMA should be engaged squarely in *its traditional role* of planning for national (not just federal) response to emergencies… [emphasis added]."

DHS 2.0

Heritage Foundation

December 2004

FEMA in the Wake of Hurricane Katrina

- FEMA has, of course, become synonymous with the government's bungled response to the hurricane
- To what extent is this a fair characterization of this agency and the difficult situation it now finds itself in?
- Skepticism going forward…

FEMA: What Went Wrong and Why?

- Over the course of the next year, many theories and explanations will be forthcoming
- Much of what will likely be said will contain the following core elements:
  - The agency is no longer cabinet-level, but rather a small cog within the organizational and bureaucratic behemoth that is DHS
  - FEMA's mission to help states prepare for "all hazards" – from terrorism to natural disasters – has become lost within DHS's myopic focus on terrorism
  - FEMA should perhaps revert to being an independent, cabinet-level agency

Importance and Centrality of the All-Hazards Context

HSPD 8 – National Preparedness: The National Planning Scenarios

- Developed under the leadership of the Homeland Security Council
- Overarching goals are to
  - Create the *agility* and *flexibility* to meet a wide range of threats and hazards
  - Provide a structure for the development of national preparedness standards
- 15 planning scenarios provide parameters regarding the nature, scale, and complexity of incidents of national significance, which include both terrorism and natural disasters
- Each scenario provides a basis for defining *prevention*, *protection*, *response*, and *recovery* tasks that need to be performed, as well as required capabilities

National Planning Scenarios

The Homeland Security Council has developed 15 all-hazard planning scenarios for use in national, federal, state, and local homeland security preparedness activities:

1. Nuclear Detonation – 10-Kiloton Improvised Nuclear Device
2. Biological Attack – Aerosol Attack
3. **Biological Disease Outbreak – Pandemic Influenza**
4. Biological Attack – Plague
5. Chemical Attack – Blister Agent
6. Chemical Attack – Toxic Industrial Chemicals
7. Chemical Attack – Nerve Agent

National Planning Scenarios (cont.)

8. Chemical Attack – Chlorine Tank Explosion
9. **Natural Disaster – Major Earthquake**
10. **Natural Disaster – Major Hurricane**
11. Radiological Attack – Radiological Dispersal Devices
12. Explosives Attack – Bombing Using Improvised Explosive Device
13. Biological Attack – Food Contamination
14. Biological Attack – Foreign Animal Disease (Foot and Mouth Disease)
15. Cyber Attack

Scenario 10: Natural Disaster – A Major Hurricane

- In this scenario, a Category 5 hurricane hits a major metropolitan area
  - Sustained winds are at 160 mph, with a storm surge greater than 20 feet above normal
  - As the storm moves closer to land, massive evacuations are required
  - Some low-lying escape routes are inundated by water anywhere from 5 hours before the eye of the hurricane reaches land
- Consequences associated with Scenario 10:

Casualties	1,000 fatalities; 5,000 hospitalizations
Infrastructure Damage	Buildings destroyed; large debris
Evacuations/Displaced Persons	1 million evacuated; 100,000 homes seriously damaged
Contamination	From hazardous materials, in some areas
Economic Impact	Billions of dollars
Recovery Timeline	Months

Looking Towards the Future

Where Do We Go From Here?

Challenges in Emergency Preparedness

Adopting an All-Hazards Approach

- The *National Strategy* calls for the creation of

  > "a fully integrated national emergency response system that is adaptable enough to deal with any terrorist attach, no matter how unlikely or catastrophic, as well as *all manner of natural disasters*" [emphasis added]

- Challenges:
  - Identifying the types of emergencies for which they should be prepared and the requirements for responding effectively
  - Assessing current capabilities against those requirements
  - Developing and implementing effective, coordinated plans among multiple first responder disciplines and jurisdictions
  - Defining the roles and responsibilities of federal, state, and local governments and private entities

Challenges in Emergency Preparedness

Improving Intergovernmental Planning and Coordination

- The National Strategy emphasizes a shared national responsibility – involving all levels of government – in responding to a serious emergency

- In May 2004, GAO reported that a major challenge involves what they saw as lack of coordination within DHS in terms of the agency's ability to prepare for, respond to, and recover from terrorist and other emergency incidents:

  "…there has been a lack of regional planning and coordination for developing first responder preparedness, defining preparedness goals, identifying spending priorities, and expending funds" (GAO-04-433)

Challenges in Emergency Preparedness

Establishing Emergency Preparedness Standards

- The National Strategy makes mention of benchmarks, standards, and other performance measures for emergency preparedness

- However, in January 2005, GAO found that

> "…there is not yet a complete set of preparedness standards for assessing first responder capacities, identifying gaps in those capacities, and measuring progress in achieving performance goals" (GAO-05- 33)

FEMA: The Story Thus Far

- Sentator Trent Lott, R-Miss, et al. are calling for Congress to resotre FEMA to a separate, independent agency
- In Congressional testimony three weeks ago, DHS Secretary Michael Chertoff acknowledged that Hurricane Katrina "challenged the disaster relief system in a way that has not ever happened"
- He singled out *planning* as an area in need of improvement, saying it was responsible for 80% of the failures
- Secretary Chertoff pledged to retool FEMA:
  - Improved aid delivery system
  - Qualified senior leaders
  - Modernizing business practices and communication systems
- However, Chertoff rejected the idea that FEMA should be removed from under the DHS umbrella
- Partisan politics reigns supreme?

"Why Shouldn't you be arrested for negligent homicide?"
Rep. Cynthia A. McKinney, D-GA

Source: Congressional Quarterly, October 19, 2005

Implications for the P/C Insurance Industry

Mismanagement of Emergency Preparedness and Response Can Impact the Economic Losses Associated with Natural Disasters

- Clearly, there is a relationship between "recovery time" and the economic losses associated with a natural catastrophe such as Hurricane Katrina
  - Business interruption losses increase exponentially with response lag
  - Fires burn uncontrolled
  - Failed law enforcement, rioting and looting
  - Delayed flood drainage
  - Untimely mitigation of environmental release/contamination
  - etc.

- While precise estimates of this relationship will require future empirical study, a couple of points are worth considering in light of Katrina:
  - A key responsibility for P/C insurers is to play their important and substantial role in the risk mitigation process
  - It is important for federal, state, and local officials to understand and appreciate the role that insurance can play in both *minimizing loss* and *expediting recovery*
  - Both P/C insurers and property owners, alike, have a vested interested in seeing that the overall system works as best as possible

Prospective Challenges for P/C Insurers

Challenges for P/C Insurers: Uncertainty of Losses

- Natural disasters pose vexing challenges for insurers because they involve potentially high losses that are characterized by large degrees of uncertainty
- Moreover, natural disasters involve spatially correlated losses or the simultaneous occurrence of many losses from a single event
- Hurricane Katrina suggests a new "externality" for P/C insurers to consider:

Mismanagement of the government's response and recovery efforts in the affected region(s)

Rethinking Traditional Approaches to CAT Modeling and Risk Management in Light of Katrina

- Traditional approaches to risk assessment and CAT Modeling need to be revised to explicitly consider some of these new "externalities" (e.g., *political uncertainty*, etc.) into their overall analytical frameworks

- A clear need for increased geo-spatial sophistication and detail within CAT models, combined with the ability to perform "cascaded inference" (*broken levee* → · · · → *evacuation of affected area)*

- Seriously rethink the implications of changes in risk appetite/tolerance and ambiguity aversion for risk management strategies and corporate decision-making

- Decision-Makers must become *critical consumers* of this technology – not just passive receptors

Concluding Remarks

- The All-Hazards paradigm will become central to the policy dialogue in the years to come
- Policies and institutional regimes must be *flexible* and *responsive* to the *evolving threat environment*
- TRIA – and its (likely) renewal – is an important incremental step in the country's ability to confront and manage extreme events
- Public/Private partnerships are essential

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