How to Protect Your Global Supply Chain

Webinar Start Time: 1:00pm EDT

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Speakers

Robert Hartwig
President
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Chris Johnson
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Presentation Outline

• Categorizing Supply Chain Disruption Threats
• Recent World Events as Examples of the Need to Protect Against Supply Chain Disruption
  – Earthquakes, Resurgent Terrorism Threats, Tornadoes, Hurricanes...
• Risk and the New World Economic Order
  – Globalization
  – Extended Supply Chains
  – Outsourcing
  – Shifting Trade Patterns
  – Economic and Political Instability
• The Unfortunate Nexus: Opportunity, Risk & Instability
  – Future growth is necessarily fraught with greater risk
• Solutions for Managing Supply Chain Disruption

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Categorizing Supply Chain Disruption Threats

The Longer the Chain, the Greater the Likelihood of a Weak Link
Reasons Why Supply Chains Are Under More Stress than Ever

- Increased Use of Global Supply Networks
- Increased Use of Outsourcing
- Use of Just-in-Time Inventory Techniques
- Rising Number of Natural Catastrophes Globally
- Increased Geo-Political Instability
- Economic Weakness of Business Partners
Causes of Supply Chain Disruptions

- Natural Disasters
- Industrial Accidents
- Labor Issues (strikes, shortages)
- Production Process Problems
- Political Upheaval, War, Civil Strife
- Trade Disputes
- Health & Safety Concerns
- Credit/Cash Flow Problems
- Supplier Finances/Solvency

There are solutions for most causes of supply chain disruptions that can reduce their severity.

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Recent Events Illustrate the Need to Protect Against Supply Chain Disruption

Is the World Becoming a Riskier Place?
Uncertainty, Risk and Fear Abound

- Japan, New Zealand, Haiti, Chile Earthquakes
- Record Flooding Along the Mississippi River
- Record Tornado Activity in the US
- Volcanic Ash In Europe
- Political Upheaval in the Middle East
- Resurgent Terrorism Risk (e.g., Bin Laden Killing)
- Manmade Disasters (e.g., Deepwater Horizon)

If We Choose to View Everything as a “Black Swan” then We Consign Ourselves to be Victims

Are “Black Swans” everywhere or does it just seem that way?

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Terrorism, Insurance and Business Interruption

The Killing of Bin Laden Serves as Reminder of the Importance in Protecting the Supply Chain

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Distribution of Insured September 11 Losses by Line ($ Billions, 2009 Dollars)

9/11 losses totaled $40.0 billion in 2010 dollars ($32.5 billion in 2001 dollars)

9/11 remains the largest insured loss in global history until Hurricane Katrina in 2005. Fully 1/3 of the 9/11 insured losses were related to Business Interruption.

Sources: Insurance Information Institute research.

(1) Loss total does not include NYC March 2010 settlement of up to $657.5 million to compensate about 10,000 Ground Zero workers.

(2) Sum of segment totals may not equal overall total due to rounding. Adjusted to 2010 dollars using the Bureau of Labor Statistics (BLS) Inflation Calculator.
# Insured Loss Estimates:
## Truck Bomb Terrorist Attack ($ Bill)

<table>
<thead>
<tr>
<th>Type of Coverage</th>
<th>New York</th>
<th>Washington</th>
<th>San Francisco</th>
<th>Des Moines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Life</td>
<td>$0.3</td>
<td>$0.2</td>
<td>$0.3</td>
<td>$0.1</td>
</tr>
<tr>
<td>General Liability</td>
<td>1.2</td>
<td>0.4</td>
<td>0.7</td>
<td>0.2</td>
</tr>
<tr>
<td>Workers Comp</td>
<td>3.5</td>
<td>2.8</td>
<td>3.9</td>
<td>1.5</td>
</tr>
<tr>
<td>Residential Prop.</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Commercial Prop.</td>
<td>6.8</td>
<td>2.1</td>
<td>3.9</td>
<td>1.2</td>
</tr>
<tr>
<td>Auto</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$11.8</strong></td>
<td><strong>$5.5</strong></td>
<td><strong>$8.8</strong></td>
<td><strong>$3.0</strong></td>
</tr>
</tbody>
</table>

Supply Chain Disruptions Arising from Events Much Smaller than 9/11 Can Still Be Very Disruptive

Source: American Academy of Actuaries, Response to President’s Working Group, Appendix II, April 26, 2006.

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Potential Insured Losses from Terrorist Attack on Major Corporate HQ in Houston

- **Liability, $1.0**
- **Life, $0.5**
- **Property, $3.9**
- **Workers Comp, $4.6**

Supply chain disruptions could originate with an attack on a headquarters or key facility.

*Break down is based on $10 billion loss estimate. Range of estimates is $10 - $12 billion. Source: RMS.*
Summary of Japan Earthquake & Impacts on US P/C Markets

The March 11 Quake & Other Major CATs Are Big Events that Caused Massive Supply Chain Disruptions

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Location of March 11, 2011 Earthquake Near Sendai, Honshu, Japan

March 11 Earthquake Facts as of 4/21/2011

- Magnitude 9.0 earthquake struck Japan at 2:46PM local time (2:46AM Eastern) off northeast coast of Honshu, 80 miles east of Sendai
- Quake is among the 5 strongest in recorded history and the strongest in the 140 years for which records have been kept in Japan
- 12,000+ fatalities
- Economic loss: $100 - $300 bn
- Insured losses up to $45 bn
- Fukushima Nuclear Plant threat level raised to Category 7 on April 11 (highest, same as Chernobyl)
- Significant tsunami damage was recorded in Japan; relatively minor damage on the U.S. West Coast

LOCATION
130 km (80 miles) E of Sendai, Honshu, Japan
178 km (110 miles) E of Yamagata, Honshu, Japan
178 km (110 miles) ENE of Fukushima, Honshu, Japan
373 km (231 miles) NE of Tokyo, Japan

Source: US Geological Service; Insurance Information Institute.

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Insured Japan Earthquake Loss Estimates*

(Insured Losses, $ Billions)

**Supply chain/Business Interruption Losses are the largest unknown in current insured loss estimates. Total economic losses are likely to total in the $200-$300 billion range.**

<table>
<thead>
<tr>
<th></th>
<th>Eqecat</th>
<th>RMS</th>
<th>AIR Worldwide</th>
<th>Towers Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>$ - $5</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>$10 - $15</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>$20</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*As of April 21, 2011. Towers Watson estimate includes $3.0 (low) to $4.9 billion (high) in life insurance losses. RMS estimate includes insured life/health losses of $3 to $8 billion.

Sources: AIR Worldwide, Eqecat, RMS, Towers Perrin; Insurance Information Institute.

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Recent Major Catastrophe Losses

The March 2011 earthquake in Japan will become among the most expensive in world and possibly set a record for supply chain disruption/business interruption losses.

Insured Losses from Recent Major Catastrophe Events Exceed $55 Billion, an Estimated $53 Billion of that from Earthquakes

Sources: Insurance Council of Australia, Munich Re, AIR Worldwide; Insurance Information Institute.
Example Supply Chain Disruptions Arising from the Japan Quake/Tsunami

- Automobiles
  - Plants around the world idled or operating at reduced capacity

- Auto Parts

- Electronic Devices

- Electronic Components
  - Parts, chips, processors, etc.

- Specialty Chemicals

- Agricultural Commodities

- Shipping Capacity

The Australian floods caused major disruptions in coal exports, affecting Asian power plants’ ability to generate electricity
Summary of April 2011 Tornado Outbreak

Recent Severe Tornadoes Have Caused Supply Chain Problems

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Number of Tornadoes and Related Deaths, 1990 – 2011*

*2011 is preliminary data through May 6.

Tornadoes have already claimed nearly 400 lives

There were already 1,042 tornadoes in the US by May 6

*2011 is preliminary data through May 6.
877 tornadoes had killed more than 400 people through late April, including at least 340 on April 26, the second deadliest tornado outbreak in US history.


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Severe Wind Reports,
January 1—April 29, 2011

There have been 7,136 severe wind reports through April 29; 5,280 of those (74%) were in April; there have also been 1,992 “Large Hail” reports.

Source: NOAA Storm Prediction Center; http://www.spc.noaa.gov/climo/online/monthly/2011_annual_summary.html#

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Outlook Is for a Severe 2011 Atlantic Hurricane Season

Hurricane Katrina Caused Enormous and Long-Lasting Supply Chain Disruptions;

Will History Repeat Itself in 2011?

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Outlook for 2011 Hurricane Season:
75% More Active Than Average

<table>
<thead>
<tr>
<th></th>
<th>Average*</th>
<th>2005 (Katrina Year)</th>
<th>2011F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Named Storms</td>
<td>9.6</td>
<td>28</td>
<td>16</td>
</tr>
<tr>
<td>Named Storm Days</td>
<td>49.1</td>
<td>115.5</td>
<td>80</td>
</tr>
<tr>
<td>Hurricanes</td>
<td>5.9</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>Hurricane Days</td>
<td>24.5</td>
<td>47.5</td>
<td>35</td>
</tr>
<tr>
<td>Intense Hurricanes</td>
<td>2.3</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Intense Hurricane Days</td>
<td>5.0</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Accumulated Cyclone Energy</td>
<td>96.1</td>
<td>NA</td>
<td>160</td>
</tr>
<tr>
<td>Net Tropical Cyclone Activity</td>
<td>100%</td>
<td>275%</td>
<td>175%</td>
</tr>
</tbody>
</table>

*Average over the period 1950-2000.
Source: Dr. Philip Klotzbach and Dr. William Gray, Colorado State University, April 6, 2011.
Probability of Major Hurricane Landfall (CAT 3, 4, 5) in 2011

<table>
<thead>
<tr>
<th></th>
<th>Average*</th>
<th>2011F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entire US Coast</td>
<td>52%</td>
<td>72%</td>
</tr>
<tr>
<td>US East Coast Including Florida Peninsula</td>
<td>31%</td>
<td>48%</td>
</tr>
<tr>
<td>Gulf Coast from FL Panhandle to Brownsville, TX</td>
<td>30%</td>
<td>47%</td>
</tr>
</tbody>
</table>

ALSO...Above-Average Major Hurricane Landfall Risk in Caribbean for 2011 (61% vs. 42%)

*Average over the period 1950-2000.
Source: Dr. Philip Klotzbach and Dr. William Gray, Colorado State University, April 6, 2011.
Global Catastrophe Losses Have Interrupted Trade Flows

Infrastructure, Transportation Networks, Facility Damage and Destruction

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Increased supply chain insurance protection will be required on a global scale if current trends continue (as is expected).

Source: Geo Risks Research, NatCatSERVICE.
Natural Catastrophes, 2010
950 loss events

- Supply chains can be broken in countless ways, anywhere in the world

○ Natural catastrophes
○ Selection of significant loss events (see table)

Source: Geo Risks Research, NatCatSERVIC.E

Geophysical events
(earthquake, tsunami, volcanic activity)

Meteorological events
(storm)

Hydrological events
(flood, mass movement)

Climatological events
(extreme temperature, drought, wildfire)

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## Significant Natural Catastrophes: 1980 – February 2011

### 10 Costliest Events Ordered by Overall Losses

<table>
<thead>
<tr>
<th>Period</th>
<th>Event</th>
<th>Affected Area</th>
<th>Overall losses US$ m, original values</th>
<th>Insured losses US$ m, original values</th>
<th>Fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-30.8.2005</td>
<td>Hurricane Katrina</td>
<td>USA: LA, New Orleans, Slidell; MS, Biloxi, Pascagoula, Waveland, Gulfport</td>
<td>125,000</td>
<td>62,200</td>
<td>1,300</td>
</tr>
<tr>
<td>17.1.1995</td>
<td>Earthquake</td>
<td>Japan: Hyogo, Kobe, Osaka, Kyoto</td>
<td>100,000</td>
<td>3,000</td>
<td>6,400</td>
</tr>
<tr>
<td>12.5.2008</td>
<td>Earthquake</td>
<td>China: Sichuan, Mianyang, Beichuan, Wenchuan, Shifang, Chengdu, Guangyuan, Ngawa, Ya'an</td>
<td>85,000</td>
<td>300</td>
<td>84,000</td>
</tr>
<tr>
<td>17.1.1994</td>
<td>Earthquake</td>
<td>USA: Northridge, Los Angeles, San Fernando Valley, Ventura, Orange</td>
<td>44,000</td>
<td>15,300</td>
<td>84,000</td>
</tr>
<tr>
<td>6-14.9.2008</td>
<td>Hurricane Ike</td>
<td>USA. Cuba. Haiti. Dominican Republic. Turks and Caicos Islands. Bahamas</td>
<td>38,300</td>
<td>18,500</td>
<td>170</td>
</tr>
<tr>
<td>May-Sept. 1998</td>
<td>Floods</td>
<td>China: Jiangtsekiang, Songhua Jiang</td>
<td>30,700</td>
<td>1,000</td>
<td>4,200</td>
</tr>
<tr>
<td>27.2.2010</td>
<td>Earthquake, tsunami</td>
<td>Chile: Bio Bio, Concepción, Talcahuano, Coronel Dicacho, Chillán; Del Maule, Talca, Curicó</td>
<td>30,000</td>
<td>8,000</td>
<td>520</td>
</tr>
<tr>
<td>23.10.2004</td>
<td>Earthquake</td>
<td>Japan: Honshu, Niigata, Ojiya, Tokyo, Nagaokakyo, Yamakoshi</td>
<td>28,000</td>
<td>760</td>
<td>50</td>
</tr>
<tr>
<td>23-27.8.1992</td>
<td>Hurricane Andrew</td>
<td>USA: FL, Homestead; LA. Bahamas</td>
<td>26,500</td>
<td>17,000</td>
<td>60</td>
</tr>
<tr>
<td>27.6-13.8.1996</td>
<td>Floods</td>
<td>China: Guizhou, esp. Guiyang; Zhejiang; Anhui; Jiangxi; Hubei; Guangxi</td>
<td>24,000</td>
<td>445</td>
<td>3,050</td>
</tr>
</tbody>
</table>

About 50% of the industrial losses paid in Chile were for business interruption.

There is a large gap between overall economic and insured losses which could be narrowed if supply chain disruptions were more adequately insured.

© Munich Re, Geo Risks Research, NatCatSERVICE – As at 11 March 2011.

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### Natural Catastrophes, 2010 Overview & comparison with previous years

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2009</th>
<th>Average of the last 10 years</th>
<th>Average of the last 30 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of events</td>
<td>950</td>
<td>900</td>
<td>785</td>
<td>615</td>
</tr>
<tr>
<td>Overall losses</td>
<td>130,000</td>
<td>60,000</td>
<td>110,000</td>
<td>95,000</td>
</tr>
<tr>
<td>(US$m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insured losses</td>
<td>37,000</td>
<td>22,000</td>
<td>35,000</td>
<td>23,000</td>
</tr>
<tr>
<td>(US$m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatalities</td>
<td>295,000</td>
<td>11,000</td>
<td>77,000</td>
<td>66,000</td>
</tr>
</tbody>
</table>

Overall losses in 2010 were more than 3 times insured losses. Insuring against supply chain disruption can narrow that gap.

Source: Geo Risks Research, NatCatSERVICE.

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Risk and the New World Economic Order

Future Growth Will Be More Challenging/Risky

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World Economic Outlook: 2009-2012F

IMF says growth in emerging and developing economies will outpace advanced ones in 2011/12. The impact will be to accelerate the relative growth of insurance exposures outside the US, W. Europe and Japan.

March 11 Japan quake will slow 2011 growth

Outlook uncertain: The world economy continues to recover from the global economics, but activity is reviving at different speeds in different parts of the world, according to the IMF. A clear set of “winners” has emerged with direct implications for all industries and their insurers.

Sources: IMF, World Economic Outlook, Apr. 2011; Insurance Information Institute.

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World Trade Volume Outlook (Goods and Services): 2009-2012F

Surging import and export growth in Emerging Economies will stress supply chains and make them more vulnerable.

Rising global trade flows illustrate both the vulnerability and need to insure supply chain exposures. Import and export growth is stronger in emerging economies.

Sources: IMF, World Economic Outlook, Apr. 2011; Insurance Information Institute.
Commodity Price Changes in 2010-2011*

Surging commodity prices make supply chain disruptions even more costly

*data are through Jan. 20, 2011

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Emerging economies (led by China) are expected to grow by 6.5% in 2011 and 2012. Role of FDI in exposure growth key.

World output is forecast to grow by 4.4% in 2011 and 4.5% in 2011, following growth of 3.0% in 2010 and a 0.6% drop in 2009.

Advanced economies are expected to grow at a relative modest 2.5% in both 2011 and 2012.

An increasing share of global economic output originates in developing economies, illustrating increasing globalization and consequently the rising potential for supply chain disruption.


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Insurance Evolved
The Unfortunate Nexus: Opportunity, Risk & Instability

Most of the Global Economy’s Future Gains Will be Fraught with Much Greater Risk and Uncertainty than in the Past—Insurance Is There to Help

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Political Risk in 2010: Greatest Business Opportunities Are Often in Risky Nations

The fastest growing markets are generally also among the politically riskiest.

Heightened risk has insurance implications.

Source: Maplecroft

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Solutions for Managing Supply Chain Disruptions

Basic but Thorough Risk Management Techniques Must Be Employed

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Risk Management Techniques for Managing Supply Chain Disruptions

• **Identification of Risk**
  – Conduct thorough supply chain mapping exercise
  – Look at processes as they come together to create final products
  – Look in reverse: starting with where profits are generated and work backwards to identify greatest financial threats

• **Avoidance**
  – Remove the threat of exposure to the supply chain

• **Mitigation**
  – Reduce the threat associated with exposures

• **Manage**
  – Includes transfer of risk through insurance
Speakers

**Robert Hartwig**
President
Insurance Information Institute

**Chris Johnson**
Senior Vice President
FM Global

**Moderator:**

**Paul Bomberger**
Editor-In-Chief
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So What’s New?

• Over 50% of Fortune 500 profit now comes from overseas
• Supply chains have become more complex, extending to tertiary levels and beyond
• Demographic change has placed more business in harm’s way
• We are in a truly intertwined global economy
• Catastrophe events are having deeper impact
“60-70% of a firm's cost is typically controlled by the extended supply chain.”

Emerging Market Opportunities

Real GDP Growth (%)

- China
- India
- Brazil
- North America
- Europe

2005-08 2009 2010 2011-2014

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Foreign Direct Investment Grows

Global FDI Flows 2005-2011

<table>
<thead>
<tr>
<th>Year</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>$1,700</td>
<td>$1,900</td>
<td>$2,100</td>
<td>$1,300</td>
<td>$1,500</td>
<td>$0</td>
<td>$700</td>
</tr>
</tbody>
</table>

BRIC #5 US

Source: UNITAD, World Investment Report 2009

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The Challenge: Risk

• Outsourcing operations ≠ Outsourcing risk
Future: Two Trading Blocks

Primary, Secondary

Tertiary, High Tech

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Evolution Never Errs To Simplicity

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China Exports: $1.2 TRILLION
"Nearly 90 percent of firms do not conduct a risk assessment when outsourcing production."

"Supply Chain Risk: It's Time to Measure It,"
A Timely Reminder

• “An ounce of prevention is worth a pound of cure.”

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FM Global’s Belief

- The majority of property loss is preventable, even in supply chains.
# The Consequences Can Be Dire

<table>
<thead>
<tr>
<th>Fire</th>
<th>Natural Catastrophes</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Strong Practices</th>
<th>Weak Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US$3,200,000</strong></td>
<td><strong>US$724,000</strong></td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Strong Practices</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>US$3,400,000</strong></td>
<td><strong>US$478,000</strong></td>
</tr>
</tbody>
</table>

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Let’s Get Real . . .

Instead of trying to anticipate low-probability, high-impact events, we should reduce our vulnerability to them.
Resiliency = Competitive Advantage

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Solutions

• Avoid or mitigate the supply chain exposures
• Manage the financial impact
• Seize the opportunity
Avoid or Mitigate the Interruption

• Thoroughly understand your supply chain at every tier – loss control and business impact analysis
• Map the manufacturing process
• Identify weaknesses
• Harden facilities, owned or otherwise
• Duplicate if necessary
• Overlay with financial mapping
• Define acceptable risk
• Create contingency and disaster plans

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Avoid or Mitigate the Interruption

• Requires top level commitment
• Must engage multiple disciplines

- Governance
- Risk tolerance
- Finance and balance sheet considerations
- Manufacturing
- Logistics
- Sales and Marketing
- Human Resources
- Risk Management
- And More!

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Risk Transfer Products

• **Part** of the solution
• Insurance product is evolving
• Traditionally, physical damage, business interruption, CTE
• Business Interruption, two flavors
  – Gross earnings
  – Gross profits
• **CTE** – Typically direct and/or named, first tier
• Solutions continue to be created

  - Broad master global insurance policy (DIC & DIL)
  - First party property coverage
  - Time element select/extended period of liability
  - Contingent time element
  - Contingent time element extended
Risk Transfer (continued)

- Solutions continue to be created (cont.)
  - Service interruption
  - On premises services
  - Civil or military authority (typically 30 days/5 miles)
  - Ingress/egress
  - Computer systems physical/non physical damage
The Opportunity

- Own and manage the risk
- Understand the exposures
- Harden the supply chain, owned and non-owned
- With knowledge of the exposures, tailored supply chain insurance solutions can be created

Together these steps create:

COMPETITIVE ADVANTAGE
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