

Risk Management REVIEW



RISK MANAGEMENT
AND DECISION
PROCESSES CENTER

Est. 1984

SPRING 2007



Risk Center Participates in Wharton's 125th Anniversary Economic Summit

Co-Directors of the Wharton Risk Center, Howard Kunreuther and Robert Meyer, organized and moderated two panels at Wharton's 125th Anniversary Economic Summit on April 12-13, 2007. The topics of the two panels are well known to those familiar with the Risk Center, *Interdependent Security in an Uncertain World* and *Risk Management Strategies for Dealing with Catastrophes*, but it was an opportunity for some of the 1100 attendees of the Summit, mainly alumni of Wharton, to learn about these subjects and add their thoughts during the Q&A at the end of the sessions. The choice of these two themes for Wharton's 125th anniversary illustrates the level of criticality these issues have reached for many top decision makers in both the public and private sectors worldwide. The "Catastrophe Risk" session was especially well attended, and panelists from

the U.S. Dept. of Homeland Security – Price Roe; AIG – Dick Thomas; and Marsh & McLennan – John Merkovsky, joined by Wharton's Neil Doherty, participated in a lively and informative discussion.

The two sessions had some common themes, including interdependency and the need for private/public partnerships to help reduce losses and provide financial protection with respect to global risks. Planning for the risks that arise from interdependence among organizations, not to mention countries, requires long-term planning rather than basing major decisions on immediate past disasters, but there is a tendency for historical myopia to prevail. Prioritization of the most critical threats will allow the flow of federal resources to those areas which cannot be covered by the private sector.

At the "Interdependent Security" (IDS) session, panelists from the World Economic Forum – Sean

Cleary; Columbia University – Geoff Heal; and the Council on Foreign Relations – Steve Flynn, discussed IDS scenarios familiar and unfamiliar to the Risk Center; the latter was the earthquake-caused collapse of the levee system in California which stretches from Sacramento to San Francisco. With regard to the levee collapse, the panel was asked how the different interested parties were thinking about the disaster. It was noted that what is optimal for one isn't optimal for others; these types of problems are normally too complex and poorly framed to yield a good decision on how to proceed.

Also attending the "Catastrophe Risk" session was local cable TV channel CN8, and *Risk and Insurance* magazine. The presence of these media outlets suggest that the good work of the Risk Center is finding a much wider audience, which we hope will benefit from the insights provided by the discussions.

INSIDE THIS ISSUE:

Co-Director's
Corner –
Howard
Kunreuther 2

Co-Director's
Corner –
Robert Meyer 3

Biased Giving 5

Homeland
Security and the
Renaissance of
Nuclear Energy
Markets 6

Paul
Kleindorfer's
Thoughts from
Europe 8

Climate Change
and the Insur-
ance Industry 9

International
Environmental
Management
Initiative (IEMI) 10

Russell Ackoff
Scholars 12

New Risk
Center Research
Fellows 14

Risk Center in
the Media 16



Long-term Insurance Contracts

Scientists and insurers came together at a workshop in May 2006 jointly sponsored by Carnegie Mellon University and the Wharton Risk Center to discuss the issues of climate change and insurance. At one point in the meeting, the insurers were asked what they would most like to know with respect to the climate change issue that would help them in their decision making processes. There was unanimity among the group that the data that would be most helpful to them would be *What will happen next year?* In unison, the scientists responded that they would not be willing to say anything about climate change and its impact on weather-related events unless one focused on a 10 year horizon and better still a 25 year time period.

The principal reason that insurers want to have short-run forecasts is because standard property insurance policies are for 6 months or one year. A highly uncertain prediction on what might or might not happen 25 years from now does not add much value to their decision making process. One way to help bridge the gap between science and policy is for insurers to market **long-term insurance contracts** on property where the purchase of insurance is a condition for a mortgage. For such a long-term policy to be feasible, insurers would have to be able to charge a rate that reflects their best estimate of the risk over a 10 to 25 year period. The uncertainty surrounding these estimates could be reflected in the premium as a function of the length of the insurance

contract, in much the same way that the interest rate on fixed-rate mortgages varies between 15, 25 and 30 year loans. The obvious advantage of a long-term insurance contract from the point of view of policyholders is that it provides them with stability and an assurance that their property is protected for as long as they own it. This has been a major concern in hazard-prone areas where insurers have cancelled policies following severe disasters such as those that occurred during the 2005 hurricane season. One reason that insurers do not renew policies after these events is that state regulators have forced them to charge premiums in hazard-prone areas that are below the actuarially-based estimates.

If insurers were free to charge risk-based rates, they might be favorably disposed toward a long-term insurance contract. A key principle guiding a current study that the Wharton Risk Center is undertaking in conjunction with Georgia State University and the Insurance Information Institute, *Managing Large-Scale Risks in a New Era of Catastrophes*, is that premiums reflect the risk. The rationale for this principle is that risk-based premiums provide signals to individuals as to the hazards they face, and encourages them to engage in cost-effective mitigation measures to reduce their vulnerability to catastrophes.

A long-term insurance contract would provide economic incentives for investing in mitigation where current short-term insurance policies are unlikely to do the trick even if they are risk-based. Con-

sider the following simple example to highlight this point: Suppose a homeowner could invest \$1500 to strengthen the roof of her house to reduce the damage from future hurricanes. An insurer charging a risk-based premium would be willing to reduce the annual charge by \$300 to reflect the lower losses that would occur if a hurricane hit the area in which the policyholder was residing. Under current insurance contracts, many property owners would be reluctant to incur the \$1500 expense, because they would only get \$300 back next year and they are not clear how long they will reside in the area and/or whether their insurer would reward them again when their policy is renewed. With a 20-year insurance contract required as a condition for a mortgage the premium reduction would be viewed as a certainty. In fact, the property owner could take out a \$1,500 home improvement loan at an annual interest rate of 10 percent, resulting in payments of \$145 per year. If the insurance premium was reduced by \$300, the savings to the property owner each year would be \$155. Alternatively, this loan could be incorporated as part of the mortgage at a lower interest rate.

There are many issues that have to be addressed if one is to develop long-term property insurance contracts. For example, could one offer adjustable rate insurance policies similar to these types of mortgage contracts? Could a property owner change his insurance policy over time in a manner similar to refinancing a mortgage? What role

(Continued on page 4)

Co-Director's Corner

The Costs and Benefits of Inherently Unreliable Forecasts

On April 3rd of this year, the research team of Colorado State University headed by William Gray, published its long-awaited 2007 long-range forecast for the hurricane activity in the Atlantic Basin. The forecast, mirroring those provided by other teams in the growing field of long-run storm forecasting, does not bode well for coastal residents in the United States, particularly in Florida and the Gulf: hurricane activity has been forecast to be well above average, with seventeen named storms, nine hurricanes, and a well above average chance of a major storm affecting the coast.

Although the news media have been quick to spread the alarm implied by the forecast, lost in the coverage is a simple, possibly disturbing fact: in recent years, such early-season forecasts are not particularly reliable. In April of 2005, for example, two months before the start of the most active and destructive hurricane season on record, the CSU team predicted that the coming season would be only slightly more active than normal, with thirteen named storms and seven hurricanes (there were twenty-eight named storms and fifteen hurricanes). Then, last year, the CSU team made the opposite error: whereas the April forecast called for another active year with seventeen storms and nine hurricanes, in the end, only nine storms and five hurricanes were verified. What is laudable about the CSU effort, however, is that the research team makes no

effort to hide the errors; to the contrary, they are first to issue the disclaimer that we are observing a science in its nascent stages, and perfectly reliable long-term forecasts are likely years away.

The inherent unreliability of long-term forecasts gives rise to an obvious question: does the act of publicizing forecasts for which there are limits to reliability help or hurt the overall goal of hazard preparedness? Although the above example focuses on the current case of hurricanes, it is a problem that is inherent to the management of human response to *all* hazards — such as the Office of Homeland Security's decisions to raise or lower terrorism alert levels, or the decision about whether to publicly release a forecast suggesting that an earthquake may be imminent. By making forecasts public, one hopes that, in the long run, the benefits of keeping out of harm's way those who are truly threatened exceeds the costs of unnecessarily alarming those who, in fact, would not have been harmed.

What is the optimal trade-off between these costs and benefits? Our knowledge about this question, perhaps surprisingly, is far from well developed. The conventional view is that because the cost of being unprepared for hazards typically greatly exceeds the cost of being falsely prepared, warning systems (such as those developed by the National Weather Service) have historically

been developed to minimize the risk of false negatives; that is, it is much better to be safe than sorry.

One need not go far to find to find anecdotal examples that would seem to support the wisdom of such an approach: while the massive, unneeded evacuation of the greater Houston area in advance of Hurricane Rita in 2005 was both costly and deadly, few would suggest that these costs were greater than would have been incurred had the storm hit with full force and the area had not been evacuated.

At the other extreme, however, is the argument that the cost of high rates of false positives is much larger than what is typically assumed. Specifically, by issuing a false alarm, one not only imposes the short-term costs of preparation, but also the larger long-term costs of reduced future rates of compliance. Specifically, repeated exposure to false alarms (such as terrorist attacks that never come, hurricanes that never hit) have the inherent effect of diminishing overt beliefs in reliability of warnings as well as the perceived relationship between mitigation acts and safety.

An anecdotal example is the response of residents of South Florida to Hurricane Wilma in October, 2005. In advance of the storm, residents in the Miami-Fort Lauderdale area were urged to begin taking preparations, such as securing supplies of bottled



(Continued on page 4)

(Kunreuther, continued from page 2)

would the modeling companies and the scientific community studying climate science have in providing estimates for developing risk-based premiums and suggesting a rationale for changes over time as new information becomes available? What types of risk transfer instruments would emerge from the reinsurance market, as well as from the capital markets to protect insurers against catastrophic losses? What role would the federal government play in providing such protection? There is also the question as to whether property owners

should be required to purchase insurance, or whether this would be at the discretion of the banks issuing a mortgage.

A major issue that also needs to be addressed is the role that state regulators will play in the process. They should stay out of the rate-setting business for the reasons outlined above. However, regulators still need to make sure that insurers have sufficient surplus to protect unsuspecting consumers against the possibility of insurers becoming insolvent following the next severe disaster.

We welcome your comments and thoughts on this idea of long-term insurance as the Wharton Risk Center moves forward with its collaborative studies on the role of insuring, mitigating and financing recovery from natural disasters.

— Howard Kunreuther
Co-Director
Wharton Risk Management and
Decision Processes Center
kunreuther@wharton.upenn.edu

(Meyer, continued from page 3)

water, batteries, and filling the cars with gas. Yet, surprisingly large numbers of residents failed to do so, and the storm's aftermath found thousands waiting in lines for scarce supplies. The explanation for the lack of preparation was simple: while residents had extensive experience in *preparing* for storms, far fewer had direct experience *recovering* from them: almost all of the previous hurricane warnings had proven to be false alarms. In short, what people in southeast Florida were instinctively learning was *not* that preparation actions were essential, but rather, that hurricane warnings are usually false alarms and that storms can be survived without taking recommended precautions.

So, should warning systems put equal weight on the costs of false negatives versus positives? Not necessarily. It should be recalled that while many Florida residents may well have been lulled into a false sense of security after having been exposed to a series of false alarms, far more were *not* waiting in lines for supplies after Wilma than were. Therein, we suspect, lies a less tangible positive long-term effect of warnings which overrides the negative effects of false alarms: the effect of heightened ambient awareness of and knowledge about hazards. And it is in this context that long-term forecasts such as produced by the CSU team — however unreliable — might well serve a

useful function. In the long run, it may be less important to be able to predict the precise year that the United States will suffer a major hurricane than to convey to the public that we are in a period of heightened risk of such storms, and to call attention to the dangers they pose. To that end, there is no debating the accuracy of the CSU analysis.

— Robert Meyer
Co-Director
Wharton Risk Management
and Decision Processes Center
meyerr@wharton.upenn.edu

Biased Giving

When does the public react with compassion towards victims of natural disaster and other tragic events? Do donors direct aid towards the victims most in need? My colleagues and I have investigated these questions and found that sympathy and aid-giving are indeed often irrational. Identifiable victims of misfortune — a little girl who has fallen in a well or the latest kidnap victim — attract outpourings of sympathy, media attention, and aid.

A classic example of this is “Baby Jessica,” who fell in a well in Texas in 1987. People around the world sent money — amounting to over \$700,000 — for her rescue effort. Although it is comforting to know that the public has the capacity to care for others, they are often misguided as to the targets of their sympathy. In contrast to victims like Baby Jessica, there is an utter lack of sympathy directed towards statistical victims — victims of poverty, genocide and disease, and victims of future disasters which could be prevented if more money were allocated towards reducing various risks in society. If the sympathy that is directed towards such identifiable victims could be redirected toward helping statistical victims, potentially many more lives could be saved. Yet, such statistical victims do not trigger compassion in the way that a particular identifiable victim does.

Why do identifiable victims pull at our heartstrings? First of all, an identifiable victim is concrete and vivid whereas statistics are abstract and pallid. Psychological research generally finds that people pay greater attention and have stronger emotional reactions to vivid, as opposed to pallid information. The

emotional system of the mind responds to a picture of a child in need on a charity advertisement, but not to dry statistics.

The other reason is that the mind responds to proportions, not to absolute values. This is why we gasp when seeing a 50% off sale, regardless of whether the original price was \$5 or \$500. Similarly, saving ten lives out of a group of 100 is a high proportion and thus evokes a greater emotional response than saving ten lives out of a group of 1,000,000. An identifiable victim is the extreme, in this sense. When individual victims are identified, they become their own reference (i.e., there was only one Baby Jessica to save), and thus receive the greatest level of sympathy.

Further evidence of sympathy acting irrationally comes from our studies which demonstrate that providing potential donors with statistics actually *hurts* donations. In a series of studies, we provided study participants with either statistics about starvation in Africa or with a picture of a single African girl. Participants were subsequently given the opportunity to donate money to an anti-poverty organization. In one of our studies, participants were provided with *both* statistics and a picture. As expected, the people who saw the picture gave more than twice as much as those who saw the statistics. However, the group who saw *both* the picture and the statistics gave significantly *less* on average than did the group that saw just the picture.

This paradoxical twist occurs because the emotional and calculating

“In a series of studies, we provided study participants with either statistics about starvation in Africa or with a picture of a single African girl.”

systems of the mind often act in opposition. As discussed above, showing a picture triggers a heartfelt, emotional response. But showing abstract, impersonal numbers triggers the mind’s calculating system of thought, which dampens the response of the emotional system. Thus, the appeal to rationality perversely inoculates people’s altruistic impulses. These findings emphasize that the most effective pitch is the one that evokes only an emotional response.

In light of these systematic biases in human sympathy, what can policymakers, fundraisers and the media do to promote efficient aid-giving? The good news is that people have the capacity to care for others, but their motivation needs to be channeled towards the most critical causes. Policymakers should not assume that as a crisis grows, sympathy will respond in kind. The public must feel a personal connection to an individual’s suffering in order to evoke the kind of emotion that engenders giving. Only then will people be galvanized into action for a worthy crisis.

— Deborah A. Small
Assistant Professor of Marketing,
Wharton School,
Wharton Risk Center Fellow
For references and comments,
please contact Deborah at
deborahs@wharton.upenn.edu



Homeland Security and the Renaissance of Nuclear Energy

Increases in world population and per capita energy demand in the next few decades are expected to cause a substantial rise in world energy use. The International Energy Agency in 2006 predicted global primary energy demand will increase by over 50 percent by 2030, and world electricity demand will double over the same period. In addition, growing concern over carbon-based energy's effect on global warming has revived interest in non-carbon-based energy sources including nuclear power.

Currently, 435 nuclear power plants operate in 30 countries; the United States, France and Japan operate half of these plants,

and along with Russia and Germany, they represent nearly 70 percent of the worldwide commercial nuclear generating gross capacity in 2007. But these figures are already changing. Indeed, an additional 28 plants are under construction, another 64 are planned, and 158 are proposed by countries ranging from China to South Africa.

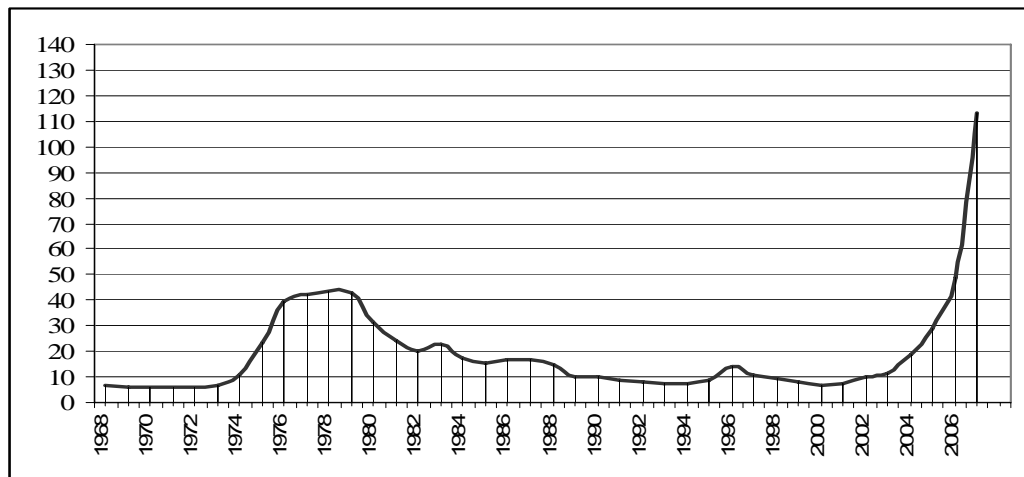
The past few months have certainly demonstrated a renaissance in uranium markets, best illustrated by recent movements in uranium prices. For many years the spot market (quick delivery) for uranium remained quite low, typically trading below \$10 a pound between 1989 and 2003 (Figure 1); with a 26-year low

record in 2000 at less than \$7.

Since 2003, however, prices have reached new records. In August 2006, prices soared above the \$50 level for the first time in its history. The price has continued to increase very significantly since, reaching \$75 in February 2007 and \$113 in April 2007 — an historical record in real prices.

Several things explain that change: an increasing global demand for energy which encompasses nuclear energy in particular, the disparity between supply and demand (accelerated by the prospect of the end of the Russian-U.S. dismantlement program in 2013), and the entry of hedge funds into this market.

Figure 1.
Evolution of Uranium Spot Market: 1968 — April 2007 (in current prices)



Source: Data courtesy of Trade Tech (dollar per pound equivalent U₃O₈).

(Continued on next page)

(Continued from previous page)

While these movements are certainly good for the future of nuclear energy markets, one cannot analyze these markets without raising questions related to how to assure international security. Uranium is actually a very specific commodity compared to other energy sources such as oil or gas. Indeed, the same enrichment process used to deliver electricity producing uranium from mines (LEU) — low-enriched uranium) can be prolonged to produce highly enriched uranium (HEU) — used to make nuclear weapons.

It is often not in a country's economic interest to begin enriching uranium to make fuel for its nuclear reactors. Given industry economies of scale and the need for significant technological investments, buying enriched uranium from established producers in other countries is currently cheaper, especially for smaller quantities of enriched uranium. Nevertheless, some countries might decide not to buy, but to develop uranium enrichment capacity on their own soil — Iran and North Korea recently made the headlines, and other countries are seriously considering developing such enrichment capacity.

Debate on the internationalization of the dangerous aspects of the nuclear fuel cycle actually predates the inception in the 1950s of the International Atomic Energy Agency (IAEA).

But the issue, never fully resolved, has become even more vexing with the world's changes since the 1950s. Warren Buffett's recent pledge through the Nuclear Threat Initiative to contribute \$50 million to the IAEA's establishment of some type of nuclear fuel bank certainly raised awareness of the whole issue of fuel supply assurances. A new bill recently introduced in Congress will also support this effort. There are also several governmental plans being discussed to address the non-proliferation challenge. But in a growing interdependent world where risks are becoming more global, none of these plans alone would be enough; it is critical to provide complementary approaches.

The Wharton Risk Center has teamed up recently with the Belfer Center for Science and Technology at Harvard's Kennedy School to study this question, at the crossroads of the future of energy markets and international security. In a recent report, *A New Energy Paradigm* (available on the Risk Center website along with an op-ed published by the *International Herald Tribune*), Debra Decker (Harvard) and I have proposed what we believe is an innovative approach: providing fuel supply assurances to all countries that would meet pre-defined security requirements by making use of the financial capacity and expertise of the largest industry in the world — insurance and reinsur-

ance. The industry seems a very natural candidate for this task, and a neutral third party on the international fuel demand/supply scene.

We proposed the creation of a mutual insurance company, backstopped by some of IAEA member countries; the insurance company would cover economic losses due to business interruption — that is, no fuel in the reactor. We also propose creation of an options and futures market that will make the uranium market a more liquid one.

This concept — *insuring for assuring* — is now being discussed within several national and international organizations both in the public sector and industry.

We look forward to interacting with them and others to develop new markets and to assure a safer world.

— Erwann Michel-Kerjan
 Managing Director
 Wharton Risk Management and
 Decision Processes Center
 erwannmk@wharton.upenn.edu

Thoughts from Europe

New Frontiers in Commodity Risk Management



Many manufacturing companies, in Europe and elsewhere, have begun to see large increases in the level and volatility of prices of commodity inputs, from energy to basic chemicals to agricultural inputs. The reasons for this are different depending on the sector, but a major ingredient in several sectors has been increases in the price of crude oil and natural gas. This has had expected effects for energy intensive industries such as petrochemicals and aluminum. But these direct effects have only been a shadow of broader interdependencies now emerging as a result of continuing political instability in oil-rich regions of the world and a growing sense of urgency about climate change and carbon policies. These forces together have pushed management in the commodities arena to a new sense of urgency to assess commodity risks they face and to develop strategies to deal with these.

As an example, consider the food industry. Commodity prices and other supply-side factors for the food industry have strongly affected input prices for key commodities. This has come on top of the increasing pressure on all businesses to deliver continuously improving margins and to operate in a sustainable manner. Against this background, senior management in companies like Kraft, Nestlé and Unilever are concerned that prices of everything from basic ingredients to containers and packaging materials may

become highly volatile. For example, the sustained high prices of mineral oil and increasing concerns with climate change have made vegetable oils and fats — traditional raw materials for margarine, dressings, mayonnaise and other food products — attractive as an alter-

“Producers and industrial consumers of plastics have long understood that the prices of key feedstocks for plastics are correlated with basic crude oil prices.”

native source of energy in the form of biofuels. The land availability and potential future competition for crop land between subsidized energy crops and food crops, as well as political solutions (such as portfolio standards or subsidies) contribute to the complexity and uncertainty of this issue. Farmers, vegetable oil producing industries, investors, banks, politicians, the car industry, and global crude oil participants are all involved in this debate. The stakes for the food industry in different regions of the world are enormous.

The fats and oils markets are but one example of the huge changes and increasing interdependencies arising between agricultural and energy markets. For other commodity markets, other drivers are emerging, such as new demands from India and China for certain

commodities, or political or regulatory decisions that may constrain or favor the use of one commodity versus another in a particular region. These developments are driving companies with commodity-intensive businesses to develop new strategies and competencies to cope with, and perhaps profit from, this increased complexity and uncertainty. The general approach to this which I have seen in European companies features two strategic initiatives: the first is increased use of scenario planning and scanning for key commodities or lines of business, following the approach pioneered at Royal Dutch Shell in the 1970s and 80s; the second is the development of new short-term commodity risk management competencies.

Scenario planning helps to map the territory 10 to 15 years out, and point to key stakeholders and uncertainties that could be major future sources of profit or vulnerability for a company dependent on specific commodity markets. If trends and uncertainties are anticipated, a company can prepare a “play-book” of contingent response strategies that allow it to switch among technologies, feedstocks or supply sources, with some degree of grace and, perhaps, ahead of its competitors. Scenario planning and scanning mechanisms have seen a surge in recent use in commodity-driven businesses in Europe.

Short-term commodity risk management competencies involve using new models and new data sources to link market-based knowledge with sourcing and pric-

(Continued on page 13)

Climate Change and the Insurance Industry

Researchers from the Risk Center are collaborating with the Climate Decision Making Center¹ (CDMC) at Carnegie Mellon University on investigating the relationship between climate change and the insurance industry. They include Erwann Michel-Kerjan and Howard Kunreuther (Wharton Risk Center); Granger Morgan, Jay Apt and Iris Grossmann (Climate Decision Making Center, Carnegie Mellon University); Daniel Hoffmann (Pacific Risks); Hadi Dowlatabadi and Christina Cook (Institute for Resources, Environment and Sustainability, University of British Columbia).

Climate change may impact the insurance industry in many ways, both directly, for instance through property damage or business interruption claims due to extreme weather events, and indirectly, for instance through directors' and officers' (D&O) claims for losses due to climate or carbon emissions lawsuits. The main three areas of interest for this project are:

(1) Insurers' responses to possible changes in the occurrence of climatic extremes, such as hurri-

canes; (2) D&O coverage of risks related to carbon emissions regulations or climate risks; (3) Insurance of the risks of new climate related technologies (for example, Carbon Capture and Storage²).

The development of hurricane activity in a warmer climate is uncertain. The most recent study shows no upward trend in the global frequency and percentage of major hurricanes nor in the total power dissipated by storms over their duration (Kossin et al., 2007). An upward trend in hurricane intensity in the Atlantic since 1980 has been shown, but it is not clear whether and to what degree this may be due to climate change and to what degree it reflects naturally occurring multidecadal oscillations (Landsea, 2007). We are working on a framework to translate this uncertainty into different scenarios of impacts on the insurance industry. The scenarios will be characterized by different estimates for the number of land-falling hurricanes of category 3, 4 and 5 over the next 25 years and will estimate the resulting property and contents damage to residential structures in Florida. On the basis of

these results, the feasibility of new forms of homeowner policies will be investigated, including long-term contracts with mitigation requirements (see H. Kunreuther, page 2). Mitigation may prove an important component of householder policies given the relationship of growing population and value at risk to the recorded increased losses. In fact, research has shown that earlier active Atlantic hurricane periods exhibited similar losses, if normalized to today's population and wealth values (Pielke and Landsea, 1998).

A second important question concerns the coverage of lawsuit risks in D&O policies. With carbon emissions regulations on the horizon, there is a potentially growing risk that shareholders will sue directors and officers if prior investment decisions have neglected anticipation of regulatory changes and appear to cause a drop in stock prices. This concerns, in particular, the large number of coal-fired power plants that are planned in the near future, most of them without Carbon Capture and Storage (CCS) retrofit options.

(Continued on page 13)

¹Research at the CDMC involves the development and application of methods to describe the irreducible scientific and technological uncertainties inherent in climate change, its impacts and mitigation, as well as the creation and evaluation of decision strategies and tools for policy makers in the face of uncertainty.

²CCS is the capture of carbon dioxide from power plants, either prior to or after combustion, or via oxyfuel combustion, and the subsequent storage in geological formations or the deep ocean.

International Environmental Management Initiative at the Wharton School

In 2006, Penn President Amy Gutmann and Provost Ronald Daniels created the Global Initiatives Fund and provided the initial funding to establish an International Environmental Management Initiative (IEMI) with research and education resources throughout the world. IEMI's primary focus will be on global environmental issues related to business. The mission of the IEMI will be to sponsor scholarly research, exchange, and education that will explore solutions to the international environmental management challenges of greatest concern to the business community, and the strategies adopted by business enterprises jointly with the public and non-profit sectors for addressing these challenges and opportunities. A working group of nineteen professors representing seven schools within the University, including the Wharton Risk Center, was established with the seed money. The proposed IEMI will be based initially at the Wharton School, with Professor Eric W. Orts as its Director. Professor John C. Keene, Professor of City and Regional Planning, Emeritus, is currently serving as executive director of the project to create the IEMI. The Wharton School participants will be major catalysts for getting business interests and representatives involved in the process. IEMI will serve as a facilitating institution and, in keeping with the international scope of the problems, aims to create a global network of educational institu-

tions, businesses and non-profit organizations for research and educational efforts. For example, IEMI will develop a collaborative Master's level certificate program in environmental management with the Paris Institute of Technology and Tsinghua University in Beijing, a program that may later be expanded to include other academic institutions. Expanding or enhancing joint degree programs, as well as curriculum offerings, will also be considered.

On March 15-16, 2007, an agenda-setting summit was held at Penn with senior environmental managers from a number of multinational corporations, NGO officers, representatives from government, and Penn professors. At the summit, participants identified the environmental issues of greatest concern to them and suggested how IEMI might be able to help in addressing these issues. Participants also recommended that a business plan for IEMI be developed and that a second "founding" summit should be held in the near future. This follow-up meeting is scheduled for June 12, 2007.

— Eric Orts
*Guardsmark Professor of Legal Studies and Business Ethics,
 The Wharton School
 Wharton Risk Center Fellow
 ortste@wharton.upenn.edu*

Major environmental management issues and concerns identified by attendees of the agenda-setting summit:

- Adjusting corporate practices to take into account institutional and cultural differences, as well as the varying legal and administrative environmental standards in different countries
- Best practices in integrating environmental sustainability policies and programs throughout all levels of the corporate decision making structure
- Reframing corporate decision making processes to recognize environmental impact on the "bottom line," and how to best communicate these processes and decisions to the public
- Critical assessment of public reporting of environmental performance by companies
- Building environmental costs and benefits into the business model
- Privatization, pricing/subsidizing, and management of water and power supplies and distribution
- Formulating proactive corporate policies that address initiatives seeking to reduce climate change related to carbon emissions, and examining new "carbon markets"
- Researching innovative strategies for reducing toxic substance disposal
- Practical issues of how exactly climate change regulations will work, and how and whether they will prove effective and efficient

IEMI Proposed Deliverables

Annual Summit

Host an annual summit on a major business issue related to the environment. These interdisciplinary summits will inform the IEMI membership and provide them with knowledge they need to advance the objectives of their companies, as well as to provide new perspectives on major global policy problems.

Research on Major Topics Relating to “Business and the Environment”

Increase knowledge that will be useful to business for making decisions that will meet the goals of business and promote environmental protection.

Developing Future Employees

Educate and train the next generation of business leaders with a global perspective on issues relating to the environment and corporate social responsibility.

Executive Education

Train existing corporate leaders on cutting-edge business issues related to environmental management in a global context.

Establish an International Network of Academic and Business Partners

Develop a global network of business and academic leaders as partners in meeting the research and educational goals of IEMI and its members, and also to provide access to the research capabilities and knowledge of scholars in the participating universities.

The IEMI Advisory Board is now forming.

*Faculty organizers are seeking participants from
an array of sources including NGOs,
government and academia.*

*Interested individuals are encouraged to contact
Eric Orts at ortse@wharton.upenn.edu.*

Russell Ackoff Doctoral Student Fellowships Announced

This year's recipients of the **Wharton Risk Center Russell Ackoff Doctoral Student Fellowships** presented summaries of their award-winning projects at a luncheon on May 9, 2007. The Fellowships provide funding for doctoral research on human decision making at Penn. The funding — research awards in the \$1,000-\$3,000 range — can be used to support data collection, travel and other research-related expenses.

The 2007 Fellowships were awarded to:

<i>Recipient</i>	<i>Department</i>	<i>Proposal Title</i>
Colleen Baker	Legal Studies and Business Ethics	Does Antitrust Law Increase Systemic Risks Associated with Interdependent Security Issues in Financial Markets?
Rajesh Bhargave	Marketing	Advice Taken but Not Followed: Vividness, Identifiability and Word-of-Mouth Behavior
Ying Chen	Insurance and Risk Management	Optimal Portfolio Analysis with Wage-Indexed Social Security
Jeonghye Choi	Marketing	Evolution of Social Interactions Over Time and Space: Evidence from New Customers in the Online Grocery Industry
Felipe Csaszar	Management	An Efficient Frontier in Organization Design
Xiaoyan Deng	Marketing	Exploring Customer Judgment and Decision Making in the Context of Mass Customization
Yanliu Huang	Marketing	When Familiarity May Not Be a Good Thing: What Type of Specific Disease Should Be Highlighted in Generic Health Communications
Sam K. Hui	Marketing	Analysis of Path Data in Marketing with Application to Grocery Shopping Behavior
Eric Keuffel	Health Care Systems	The Effect of Temporary Unemployment Spells on Health Prevention Behaviors — A Panel Data Analysis
Alexander Leeds	Operations and Information Management	Goal-Based Choice: The Evolution of Goals and the Resolution of Choice
Robert D. Lieberthal	Health Care Systems	A Behavioral Study of the Sustainability of Intergenerational Transfers
Marianne Promberger	Psychology	Public Policy and Changing Preferences
Nicole Ruedy	Operations and Information Management	Does Power Lead to Unethical Behavior?
Neela Saldanha	Marketing	Mixed Indulgence: Consumer Perceptions, Evaluations and Choice
Tess Wilkinson-Ryan	Psychology	Moral Judgment in Contract Cases

(Commodities, continued from page 9)

ing strategies. For example, producers and industrial consumers of plastics have long understood that the prices of key feedstocks for plastics are correlated with basic crude oil prices. They are now seeing the benefits of mapping these interdependencies through formal modeling and taking hedging positions in crude oil and other related futures markets.

The development of the competencies to do this promotes both better risk management and better internal company knowledge of the markets which, directly or indirectly, will determine the prices of plastics they face going forward. These same trends and integration of hedging and operational sourcing decisions are becoming increasingly visible in many other areas, and commodity indices and electronic market-

places for hedge instruments have blossomed in their wake.

The result of these developments is very much unresolved at present. Traditional tensions between operating risks and corporate treasury risk management functions are resurfacing, along with questions of governance and responsibility for identifying and responding to the large profit swings associated in many businesses with commodity risk. However this plays out, the world of commodity risk management has clearly become a renewed focus of strategic interest for companies and the research community.

— Paul Kleindorfer
 Anheuser Busch Professor of
 Management Science (Emeritus),
 Distinguished Research Professor,
 INSEAD;
 Wharton Risk Center Senior Fellow
 kleindorfer@wharton.upenn.edu

(Climate Change, continued from page 9)

The insurance of risks related to new climate related technologies such as CCS constitutes a third important question (Wilson et al., 2003). Potential sources of liability include, on the one hand, direct damages such as harm to human health and the environment through CO₂ leakage. On the other hand, operators of CCS projects will wish to be insured against losses of the associated carbon credits in case of leakages, also on a longer time scale.

— Iris Grossman
 Post Doctoral Research Fellow,
 CMU Climate Decision Making Center.
 For full references and your
 comments, please contact Iris at
 irisg@andrew.cmu.edu.

In February, 2007, The Wharton Risk Center issued a report on Phase I of its study ***Managing Large-Scale Risks in the New Era of Catastrophes: The Role of the Private and Public Sectors in Insuring, Mitigating and Financing Recovery from Natural Disasters in the United States.***

This effort, an Extreme Events Project, is undertaken in conjunction with Georgia State University and the Insurance Information Institute. The final report will be issued in the Fall.

You can request to download a pdf of the report by clicking on the link at:

<http://opim.wharton.upenn.edu/risk/>

Risk Center Appoints New Fellows

Jonathan Baron

Professor, Psychology;
Chair, Psychology
Graduate Group;
Chair, Quantitative
Data Analysis Commit-
tee, College of Arts and
Sciences



Jonathan Baron is Professor of Psychology at the University of Pennsylvania, where he teaches Judgments and Decisions, and Behavioral Law and Economics. Baron's research is based on the utilitarian idea that society should be organized to do the most good (or, to maximize utility). Some of his research examines people's intuitive principles for decision making and moral judgment, and explores how these principles can stand in the way of doing the most good.

Baron is the author of *Rationality and Intelligence* (1985); *Thinking and Deciding* (1988, 1994, 2000, 4th edition in press), a widely used textbook for advanced undergraduates and beyond; *Morality and Rational Choice* (1993); *Judgment Misguided: Intuition and Error in Public Decision Making* (1998); and *Against Bioethics* (2006). He has co-edited three books and published over 175 articles and chapters, and is editor of the journal *Judgment and Decision Making*.

Baron holds a B.A. from Harvard (1966) and a Ph.D. from Michigan (1970), and is a Fellow of the American Association for the Advancement of Science and of the Association for Psychological Science.

Eric Bradlow

K.P. Chao Professor,
Professor of Marketing,
Statistics, and Educa-
tion; Academic Director,
Wharton Small Busi-
ness Development
Center



Professor Eric T. Bradlow is the K.P. Chao Professor and Academic Director of the Wharton Small Business Development Center. An applied statistician, Professor Bradlow uses high-powered statistical models to solve problems on everything from Internet search engines to product assortment issues.

Specifically, his research interests include Bayesian modeling, statistical computing, and developing new methodology for unique data structures with application to business problems.

Professor Bradlow was recently named a fellow of the American Statistical Association, and is past chair of the American Statistical Association Section on Statistics in Marketing. He is a statistical fellow of Bell Labs, and was named DuPont Corporation's best young researcher while working there in 1992.

Professor Bradlow earned his Ph.D. and Master's degrees in Mathematical Statistics from Harvard University, and his B.S. in Economics from the University of Pennsylvania.

Cary Coglianese

Edward B. Shils
Professor of Law and
Professor of Political
Science



Cary Coglianese comes to Penn Law from Harvard, where he spent twelve years on the faculty of the John F. Kennedy School of Government and served as faculty chair of the school's Regulatory Policy Program and director of its Politics Research Group.

His research focuses on issues of regulation and administrative law, with a particular emphasis on the empirical evaluation of alternative regulatory strategies and the role of disputing and negotiation in regulatory policy making. His work has appeared in the *Administrative Law Review*, *Duke Law Journal*, *Law & Society Review*, *Michigan Law Review*, *University of Pennsylvania Law Review*, and *Stanford Law Review*.

Coglianese is founder and co-chair of the Law & Society Association's international collaborative research network on regulatory governance; Vice Chair, E-Rulemaking Committee of the American Bar Association's section on Administrative Law and Regulatory Practice; and Vice Chair of the Innovation, Management Systems, and Trading Committee of the American Bar Association's section on Environment, Energy, and Resources. He is a founding editor of the new international, peer-reviewed journal, *Regulation & Governance*.

Neil Doherty

Frederick H. Ecker
Professor of
Insurance and Risk
Management;
Chair,
Insurance and Risk Management



Neil Doherty is the Frederick H. Ecker Professor of Insurance and Risk Management and Chair of the Insurance Department at the Wharton School.

His principal area of interest is in *corporate risk management*, focusing on the financial strategies for managing risks that traditionally have been uninsurable. Such strategies include the use of existing derivatives, the design of new financial products and the use of capital structure. He has written three books in this area: *Corporate Risk Management: A Financial Exposition* (1985); *The Financial Theory of Insurance Pricing* (1987, with S. D'Arcy); and *Integrated Risk Management* (2000). Also involved in the *economics of risk and information*, he has written papers on adverse selection, the value of information, and the design of insurance contracts with imperfect information, which have appeared in leading economics and insurance journals.

Michael Elliott

Assistant Professor
of Biostatistics and
Assistant Research
Scientist at the
Institute
for Social Research



Michael Elliott is an Assistant Professor of Biostatistics and an Assistant Research Scientist at the Institute for Social Research. He received his Ph.D. in biostatistics in 1999 from the University of Michigan. Prior to joining the University of Michigan in 2005, he held an appointment as Assistant Professor at the Department of Biostatistics and Epidemiology at the University of Pennsylvania School of Medicine, and prior to that as a Visiting Research Scientist at the University of Michigan Transportation Research Institute.

Dr. Elliott's research interests include the design and analysis of sample surveys, U.S. Census undercount, and missing and latent variable data structures with applications to causal estimation and modeling. He serves on the Behavioral Risk Factor Surveillance System (BRFSS) Survey Oversight committee.

Scott
Harrington

Alan B. Miller
Professor;
Professor of
Health Care
Systems and
Insurance and Risk Management



Scott E. Harrington is a Professor in the Health Care Systems and Insurance and Risk Management Departments at Wharton.

A former president of both the American Risk and Insurance Association and the Risk Theory Society, he has published articles in numerous journals including the *Journal of Business*, the *Journal of Law and Economics*, the *Journal of Financial Intermediation*, the *Journal of Risk and Insurance*, the *Journal of Banking and Finance*, the *Journal of Risk and Uncertainty*, and the *Journal of Insurance Regulation*. He has contributed articles to books published by Oxford University Press, the American Enterprise Institute, the Brookings Institution, and the Federal Reserve Bank of Boston, among others. He is co-author or co-editor of numerous books including *Cycles and Crises in Property/Casualty Insurance* and co-author of the McGraw-Hill textbook, *Risk Management and Insurance*.

In order to meet a growing interest in research on catastrophe risk management and decision making, the Center recently appointed 20 new Research Fellows. More Fellows will be introduced in coming editions of *Risk Management Review*.

Risk Center Fellows are typically experts from academia, or former practitioners from industry and government. For more information on becoming a Wharton Risk Center Fellow, please contact Erwann Michel-Kerjan, Managing Director, at erwannmk@wharton.upenn.edu.

WHARTON RISK CENTER IN THE MEDIA

New York Times Op-Ed, 5/10/07 – Deborah A. Small, Risk Center Research Fellow and Assistant Professor of Marketing, co-author of *Psychic Numbing and Genocide*, was cited by Nicholas Kristof in his column discussing the lack of response to the tragedy of Darfur.

New Orleans Times-Picayune, 5/1/07 – In a dialog with Louisiana Insurance Commissioner Jim Donelon at a Bureau of Government Research briefing in New Orleans, **Howard Kunreuther**, Co-Director of the Risk Center and Cecilia Yen Koo Professor of Decision Sciences and Public Policy, was quoted on the importance of risk-based insurance for encouraging mitigation. A discussion of the briefing also appeared in the **New Yorker** on May 2.

Houston Chronicle, 4/14/07 – Barbara Kahn, Risk Center Research Fellow and Dorothy Silberberg Professor; Professor of Marketing, was quoted in a story about a new television ad campaign by London-based oil giant, BP.

Edmonton Journal (Canada), 3/14/07 – Maurice Schweitzer, Risk Center Research Fellow and Associate Professor of Operations and Information Management, was cited in a column about lie detection.

Best's Insurance News, 3/5/07 – Erwann Michel-Kerjan, Managing Director of the Risk Management and Decision Processes Center, was quoted in a story about whether risk-based pricing is the best way to manage catastrophe risk. The study that he co-authored with several other Risk Center members on managing large-scale risks was also cited.

CIO Magazine, 3/1/07 – Maurice Schweitzer was interviewed regarding the research which he conducted on the effect that deception has on trust.

National Public Radio (NPR), 2/28/07 – Barbara Kahn was interviewed on "Morning Edition" for a story about Toyota and the site selected for its new assembly plant.

The Economist, 2/10/07 – Erwann Michel-Kerjan was cited in an article regarding the growing demand for innovative risk management tools used by hedge funds.

The Philadelphia Inquirer, 2/2/07 – Barbara Kahn was quoted in a story about guerilla marketing campaigns.

The Philadelphia Inquirer, 1/25-26/07 – Mark Pauly, Risk Center Research Fellow and Bendheim Professor; Professor of Health Care Systems, Business and Public Policy, Insurance and Risk Management, and Economics, was cited in a story on the evolution of the current health insurance system and the impact that the President's proposed changes might have on employers and individuals, and was quoted in an article about the President's plan to provide more health insurance coverage by using tax credits to help finance affordable plans through private insurers.

***The Philadelphia Inquirer*, 1/21/07 – Mark Pauly** was quoted in an article about Governor Rendell's health care plan for Pennsylvania.

***Financial Times*, 1/19/07 – Mark Pauly** was quoted in an article about plans for universal health care coverage in Massachusetts and California, and how they might serve as models for the rest of the nation.

January 16, 2007 – Baker Panel issues its final report on BP U.S. refineries. Risk Center Senior Fellow **Irv Rosenthal** served on the 11-member panel, chaired by former Secretary of State James Baker.

***Exame (Brazil)*, 12/28/06 – Barbara Kahn** was quoted in a feature about the increasing power of the consumer.

***Medical News Today (UK)*, 12/23/06** – Research by **Eric Bradlow**, Risk Center Research Fellow and K.P. Chao Professor of Marketing, Statistics and Education, and an associate was highlighted in an article about the relationship between hospital performance measures and mortality.

***International Herald Tribune*, 12/23/06 – Erwann Michel-Kerjan** co-authored an op-ed (with Debra Decker, Harvard) citing the need for a mutual insurance facility to ensure global uranium supplies.

CN8 – *Money Matters*, 12/14/06 – Eric Bradlow was interviewed on the telecast about his research on grocery shopping.

***The Philadelphia Inquirer*, 12/8/06 – Barbara Kahn** was quoted in an article about the fate of the Frango, Marshall Field's mint-chocolate candy, recently introduced to the Philadelphia area in Macy's stores.

NPR, 11/30/06 – Neil Doherty, Risk Center Research Fellow and Frederick H. Ecker Professor of Insurance and Risk Management, was interviewed on "Morning Edition" for a segment on term life insurance and the role the internet has played in decreasing costs.

***Le Figaro*, 11/13/06 – Erwann Michel-Kerjan** co-authored an op-ed (with Thierry Malleret, World Economic Forum) on the challenges for top decision makers in managing the new era of global risks.

Corporate Associates and Research Sponsors are a vital part of the Wharton Risk Management and Decision Processes Center's operations. We invite you to partner with us by becoming an Associate or Research Sponsor.

As a Corporate or Individual Associate or Research Sponsor, you will be more closely involved in the work of the Center. In addition to providing crucial funding for the Center's operations, Corporate Associates sit on the Center's Advisory Committee, participate in roundtable discussions and offer information and insight into the value, direction and timing of research projects. Research Sponsors typically meet twice a year to discuss updates on research initiatives they are funding, and provide their perspectives on future directions the Center might consider pursuing.

Associates and Sponsors may attend our workshops and conferences at no cost. These meetings provide a wonderful opportunity to consult with experts from research institutions, industry and government agencies from the U.S. and abroad. You will also have the opportunity to contribute to the [Risk Management Review](#) and to receive research papers published in our Working Paper series.

Associate Membership and Sponsorship contributions to the Risk Management and Decision Processes Center at the Wharton School are tax-deductible.

2007 CORPORATE ASSOCIATES

Allstate Insurance Company	PricewaterhouseCoopers, LLP
American Insurance Association	Property Casualty Insurers Association of America
American International Group, Inc.	Reinsurance Association of America
Guardsmark, LLC	Rohm and Haas Chemicals, LLC
Liberty Mutual	Société Générale Bank
Lockheed Martin	St. Paul Travelers
Munich Reinsurance America, Inc.	State Farm Fire & Casualty Co.
National Association of Mutual Insurance Companies	Sunoco, Inc.
Nationwide Mutual Insurance Company	Swiss Reinsurance Company
PartnerRe	WeatherPredict Consulting, Inc.
	Zurich North America

We thank our Corporate Associates for their support and partnership.

For information about membership in the Corporate or Individual Associates Program, please contact:

Howard Kunreuther
phone: 215-898-4589
fax: 215-573-2130

email: kunreuther@wharton.upenn.edu

Robert Meyer
phone: 215-898-1826
fax: 215-898-2534

email: meyerr@wharton.upenn.edu

Erwann Michel-Kerjan
phone: 215-573-0515
fax: 215-573-2130

email: erwannmk@wharton.upenn.edu

Or visit our website at <http://opim.wharton.upenn.edu/risk/sponsors.php>


*The Wharton Risk Management Review
Is published periodically during the
academic year by the Wharton Risk
Management and Decision Processes Center.*

*We invite your submissions and comments.
Please contact*

Peter J. Schmeidler, Editor
pschmeid@wharton.upenn.edu

***What do you think of our
new expanded issue?***

**We look forward to hearing
from you!**



**The Risk Center welcomes
Carol Heller as its new
Conference Coordinator.**

To be added to or removed from our mailing list,
please contact Carol Heller at:

Risk Management and Decision Processes Center
The Wharton School
University of Pennsylvania
558 Jon M. Huntsman Hall
3730 Walnut Street
Philadelphia, PA 19104-6340
Telephone: 215-898-5688
Fax: 215-573-2130
Email: heller@wharton.upenn.edu

WHARTON RISK MANAGEMENT AND DECISION PROCESSES CENTER

**Risk Management and Decision
Processes Center
The Wharton School
University of Pennsylvania
558 Jon M. Huntsman Hall
3730 Walnut Street
Philadelphia, PA 19104-6340**

Since its creation more than 20 years ago, the mission of the Wharton Risk Management and Decision Processes Center has been to carry out a program of basic and applied research to promote effective corporate and public policies for low-probability events with potentially catastrophic consequences. The Risk Center has focused on natural and technological hazards through the integration of risk assessment and risk perception with risk management strategies. After 9/11, research activities have extended to include national security issues (e.g., terrorism risk insurance, protection of critical infrastructure).

Building on the disciplines of economics, finance, insurance, marketing, psychology and decision sciences, the Center's research program is oriented around descriptive and prescriptive analyses. Descriptive research focuses on how individuals and organizations interact and make decisions regarding the management of risk under existing institutional arrangements. Prescriptive analyses propose ways that individuals and organizations, both private and governmental, can make better decisions regarding risk. The Center supports and undertakes field and experimental studies of risk and uncertainty to better understand the linkage between descriptive and prescriptive approaches under various regulatory and market conditions.

Providing expertise and a neutral environment for discussion, Risk Center research investigates the effectiveness of strategies such as incentive systems, risk communication, insurance and regulation in the context of extreme events. The Center is also concerned with training decision makers and promoting a dialogue among industry, government, interest groups and academics through its research and policy publications and through sponsored seminars, roundtables and forums. Our Newsletter and Project Snapshots provide updates of Center activities and publications.

Risk Center on the World Wide Web

**Visit the Wharton Risk Management and Decision Processes Center's homepage
on the World Wide Web at: <http://opim.wharton.upenn.edu/risk/>**