FM Global

ISSUE 4 : 2012

[reason]

PROPERTY RISK AND INSURANCE SOLUTIONS FOR A COMPLEX WORLD

"You need patience. The effort and investment are long-term."

"Partnership, transparency and trust."

SMART MONEY

Funding risk improvement, getting a return on investment, and how making good business decisions create an enduring enterprise

"Be persistent at all levels. You need to repeat the message."

+ ***USG BEATS BACK A 500-YEAR FLOOD*** *AND SAVES A CORE BUSINESS UNIT*
+ ***SUBRAMANIAM****: AFTER SANDY, ASKING THE TOUGH QUESTIONS*

Introducing…

Jenny Chao, Ph.D.

SENIOR RESEARCH SPECIALIST
TECHNICAL TEAM LEADER
EXPLOSION GROUP

Jenny studies the physics of explosions. Since 2008, when she began her career with FM Global, her research has centered on understanding these physics and applying that knowledge to protection, suppression and mitigation solutions. "Our clients need real, technically sound solutions relevant to their business. This balance between scientific research and practical engineering makes FM Global an exciting company to work for."

Research holds a critical place in the FM Global business model. With scientists and researchers from 14 countries, speaking 16 languages, with 50 advanced degrees, the department blends integrated computational and experimental/testing activities, including both small- and large-scale experiments and testing at our 1,600-acre (647-hectare) Research Campus, as well as 10+ teraflop scientific computing at our Center for Property Risk Solutions.

Visit fmglobal.com/research

Insurance Evolved FM Global

50 YEARS AND COUNTING

In 2013, FM Global will commemorate 50 years of providing global property insurance capabilities to policyholders worldwide

Insurance Evolved

FM Global®

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FM GLOBAL AROUND THE WORLD

FM Global products and services are available around the world.
The countries listed below represent those where we regularly serve our clients.

ASIA PACIFIC
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New Zealand Pakistan Philippines Singapore South Korea
Sri Lanka Taiwan Thailand Vietnam

EUROPE, MIDDLE EAST AND AFRICA
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Bulgaria Burkina Faso Cameroon Croatia Czech Republic Denmark
Egypt Estonia Finland France Germany Ghana Greece Hungary
Iceland Israel Italy Jordan Kazakhstan Kenya Kuwait Kyrgyzstan
Latvia Lebanon Liechtenstein Lithuania Luxembourg Macedonia
Madagascar Morocco Mozambique Netherlands Norway Oman
Poland Portugal Qatar Republic of Ireland Romania Russia Saudi Arabia
Serbia Slovakia Slovenia South Africa Spain Sweden Switzerland
Tunisia Turkey Ukraine United Arab Emirates United Kingdom

NORTH AMERICA
Bahamas Canada Costa Rica Dominican Republic El Salvador
Guatemala Honduras Jamaica Mexico Nicaragua Panama
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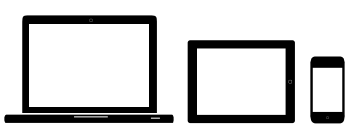


To view *Reason* magazine online, visit **fmglobal.com/reason**. To download FM Global's Risk Essentials app for your iPad, visit **itunes.com/apps/riskessentials**.

JENNY C. CHAO is senior research specialist at FM Global in Norwood, Mass., USA. She is responsible for conducting experimental research on explosion phenomenon and protection methods; she is the technical team leader of the explosion group.

- FAVORITE BOOK: *The Last Crossing* by Guy Vanderhaeghe
- FAVORITE RECORDING: *Paint It Black* by The Rolling Stones
- FAVORITE FILM: *The English Patient*, directed by Anthony Minghella

CHAD LYKINS is an account manager for Chicago operations. He works together with the client service team to manage client service and underwriting activities on existing accounts as well as new business.

- FAVORITE BOOK: *The Gunslinger* by Stephen King
- FAVORITE RECORDING: *Gangnam Style* by PSY
- FAVORITE FILM: *Christmas Vacation*, directed by Jeremiah S. Chechik

STEFANO TRANQUILLO is vice president and operations manager of FM Global's Northern Europe operations based in Windsor, U.K. He is responsible for ensuring the profit and growth of business written and serviced from this operation. He is also responsible for overseeing the field engineering servicing of all FM Global-insured locations within the operations' territory.

- FAVORITE RECORDING: *Bandadois* by Gilberto Gil
- FAVORITE BOOK: *The Alchemist* by Paulo Coelho
- FAVORITE FILM: *The Shawshank Redemption*, directed by Frank Darabont

TED WEBER is assistant vice president and senior engineering technical specialist at FM Global, based in Johnston, R.I., USA. He manages the company's "Learning from Losses" effort.

- FAVORITE RECORDING: Anything by Eric Clapton or Stevie Ray Vaughan
- FAVORITE BOOK: *The Adventures of Huckleberry Finn* by Mark Twain
- FAVORITE FILM: *Monty Python and the Holy Grail*, directed by Terry Gilliam and Terry Jones

If you have something to say, why not say it?

At FM Global, we're always open to new ideas, so send us your feedback!

You can submit your thoughts via email or through our website, where all discourse is healthy discourse!

email:
reason@fmglobal.com

web:
fmglobal.com/reason

The Main Ingredient

During the interviews conducted for the marketing study on *Investing in Risk Improvement* featured on the cover of this issue, one client wisely stated, "Risk improvement is about making a long-term commitment to facilities, staff and education." At FM Global, our business model is entirely predicated on long-term partnerships, and building trust along the way. Like any relationship, the one between insurer and client takes time to develop. Trust doesn't just exist. It needs to germinate. It builds as it's exercised and practiced. And it grows stronger as it's tested and proven.

Essentially, embracing the concept of risk improvement requires chain links of demonstrated trust. That is, there need to be bonds among numerous parties in order to succeed, including trust between the client service team and the risk manager, the risk manager and the c-suite, the engineer and the plant manager, the plant manager and employees, and so forth. In that way, each link serves as a trusted advisor to others. As each of these links set and strengthen, trust develops and risk improvement projects become more feasible.

And, as demonstrated in these pages, there are many ways to tackle risk improvement projects. If money is an issue—and when isn't it?—why not consider linking risk improvement to operations-level bonuses, using captive profits to fund risk improvement/premium incentives, put in place a premium allocation system that rewards risk quality, or …

The client interviews conducted for this research reveal how some risk managers experienced success getting buy-in and investments in risk improvement financed and implemented. Risk managers and plant managers might see their own situations reflected in some of these tactics and case studies, and so could benefit by the stories shared here.

Elsewhere in the issue, we explore a successful partnership at USG, a pioneering building materials company. Over the years, USG and FM Global have cultivated a successful alliance that reflects the pride both entities have in their commitment to safety, integrity and productive long-term relationships. And, oh yeah, they beat back a potentially devastating flood, too. You can read about it in this magazine, and see our new "Working Together" video, starring USG, on our website, www.fmglobal.com/reason.

Bob Gulla, managing editor
reason@fmglobal.com

Recessions

are the economy's forest fires; while painful, they seem to be necessary. Prepare for them as opportunities to rid your company of excess ***and develop your organization's resilience.*** When the fire is out, discover the room you now have for things to grow—**new ideas, new strategies and new opportunities.**

— *"Management Tip," Harvard Business Review*

On The AGENDA

INTERNATIONAL ROOFING EXPO 2013

San Antonio, Texas, USA
Feb. 5 – 7, 2013

The first and largest roofing industry gathering, the International Roofing Expo brings all segments of the roofing construction and maintenance industry together for three days of face-to-face interaction, product review, education and networking.

AMRAE

Lyon, France
Feb. 6 – 8, 2013

AMRAE (Association pour le management des risques et des assurance de l'enterprise) is a professional association whose members are the major players of business risk in the workplace. Through the exchange of information and experience among members, through numerous meetings and technical committees, AMRAE aspires to increase the professionalism and credibility of its members in order to better protect the results and optimize the costs of risk to their businesses.

RIMS 2013

Risk and Insurance Management Society Annual Conference
Los Angeles, Calif., USA
April 21 – 24, 2013

Launched in 1963, RIMS Annual Conference and Exhibition attracts some 10,000 risk and insurance professionals of all experience levels, business executives with risk management interests, brokers, insurers and service providers for the ultimate educational and networking experience.

SPS/IPC/DRIVES ITALIA

Parma, Italy
May 21 – 23, 2013

SPS/IPC/Drives Italia is the leading event for industrial automation in Italy. This new event, a sister event to the SPS/IPC/DRIVES exhibition in Germany, offers a wide range of seminars, conferences and workshops focused on current topics within the industry.

AIRMIC

East Sussex, U.K.
June 10 – 12, 2013

AIRMIC (Association of Insurance and Risk Managers in Industry and Commerce) is a member association supporting those responsible for risk management and insurance within their own companies. AIRMIC has more than 1,000 individual members representing more than 450 companies. The annual conference and exhibition offers networking opportunities for risk professionals, insurance professionals, insurers, brokers, loss adjusters, company secretaries, treasurers, finance directors, claims managers and professionals, analysts, journalists, consultants, health and safety and security practitioners, business continuity managers and solicitors.

UPDATES

Learn your lessons

A new, scenario-based hot work course available for the taking

A new hot work course is available to clients through the FM Global Client Training Center. *Advancing Your Hot Work Skills* is scenario-based, allowing clients the opportunity to refresh or practice their hot work skills in a safe setting. This training reinforces the implementation of loss management programs in client facilities, and it helps clients understand hot work hazards, how to reduce loss and drive down the overall cost of risk. *Advancing Your Hot Work Skills* is designed for managers, maintenance personnel and equipment operators. After completing the course, participants will be able to demonstrate the proper procedures used during the three phases of hot work—before, during and after—and to properly audit completed hot work permits.

Denny Anderson Gets the Nod

Named Risk Innovator for his work on the Sim*Zone*

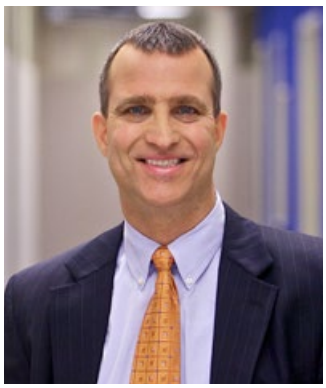
Risk & Insurance magazine recently released its fifth annual Risk Innovator issue and FM Global was again represented. Denny Anderson, vice president, manager, engineering application training, was selected as a "risk innovator" for his part in creating the Sim*Zone*, a place where FM Global's engineers study risk firsthand. Opened in 2011 at FM Global's Center for Property Risk Solutions in Norwood, Mass., USA, the Sim*Zone* is a state-of-the-art, hands-on training facility devoted to educating field engineers and clients about the many hazards confronting policyholders, along with the protection solutions available to minimize, or mitigate, those hazards.

Anderson, who has been with FM Global since 1977, was one of 15 winning innovators recognized by the magazine in 2012. Ten of the awards went to individuals, four of them were shared between two people, and one award was given to two teams.

Previous FM Global employees recognized as Risk Innovators include Wes Baker, assistant vice president and senior engineering technical specialist; Dr. Archibald Tewarson, retired senior research specialist; and Karen Freedman, vice president and manager, enterprise learning.

WINNING THE BIG ONE

Dave Pajak, Syracuse University risk executive, earns the 2012 Distinguished Risk Manager Award at URMIA



The University Risk Management and Insurance Association (URMIA) recently honored David Pajak, ARM, MBA, director of risk management and chief emergency management officer at Syracuse University, as one of two recipients of the 2012 Distinguished Risk Manager (DRM) award. The DRM award is one of the highest honors given by URMIA. Award recipients are nominated and selected by their peers. Since 1989, URMIA has recognized 45 members with the DRM award.

David Pajak has more than 20 years of experience in higher education risk management and has served as the director of risk management, environmental health and safety for Syracuse University since 1990 and as the chief emergency management officer since January 2008. Pajak was recently featured in a *Reason* magazine article about Syracuse University's eclectic mix of risk management challenges.

The University Risk Management and Insurance Association is an international nonprofit educational association serving colleges and universities. Its core purpose is to promote the advancement and application of effective risk management principles and practices in institutions of higher education. URMIA represents more than 1,875 individuals at more than 560 institutions of higher education and more than 100 companies with members ranging from small schools and community colleges to the largest educational institutions. For more information, visit www.urmia.org.

UPDATES

TRAILBLAZER!

Walker profiled in national magazine

"You can do anything you want, in any environment, if you want it badly enough."

Maxine Walker, vice president and division claims manager, Western division, FM Global, was featured in the November 2012 issue of *Risk & Insurance* magazine in a profile by Janet Aschkenasy titled, "Blazing Her Own Trail." Walker has been with FM Global for 31 years, beginning with the company as a loss prevention engineer and eventually working her way over to claims. Walker sits on the board of directors of the Loss Executives Association and is a registered professional adjuster.

Sparky's Wish List

Support for a new educational fire prevention awareness program

In support of its ongoing efforts to provide financial assistance to organizations working to combat fire, FM Global partnered with the National Fire Protection Association (NFPA) to help launch Sparky's Wish List™—a new online registry designed to promote fire safety in communities across the United States.

"**Fire safety education saves lives,** but with current budget pressures, it's hard for many departments to pay for a range of educational material, Sparky's Wish List is designed to help close the gap between what fire departments can afford and what they need to educate on fire safety."

Jim Shannon, NFPA PRESIDENT

The FM Global Foundation's US$50,000 contribution was used to purchase educational material for more than 80 fire departments that service the communities where many of the company's largest clients are based. "It is gratifying to know that the material shipped was placed in the hands of local firefighters working every day to keep our kids and communities safe," said Brion Callori, senior vice president, manager, engineering and research at FM Global. "We are very pleased to support this program and we encourage others to join us."

Through a simple, online tool created by NFPA, fire departments are creating "wish lists" of needed materials, which are then purchased by businesses, community members and others. Items on the registry are priced starting at US$12.50. In total, FM Global purchased US$50,000 worth of banners, DVDs, coloring books, brochures, storybooks, stickers and other material used during Fire Prevention Week in October.

"Fire safety education saves lives, but with current budget pressures, it's hard for many departments to pay for a range of educational material," said Jim Shannon, NFPA president. "Sparky's Wish List is designed to help close the gap between what fire departments can afford and what they need to educate on fire safety."

Fire departments in the United States respond to more than 350,000 home fires annually. "FM Global has been a generous donor to fire prevention causes for many years," said Shannon. "We are honored to work with them to help local departments continue to meet community needs during these challenging financial times."

The effort is named for Sparky the Fire Dog®, NFPA's official mascot and spokesdog. He visits schools and participates in community events to spread fire safety messages, often accompanied by his firefighter friends. Visit www.sparkyswishlist.org for instructions and other information.

You Really Like Us!

FM Global recognized at "Buyers Choice" awards

Insurance buyers representing both large and mid-size organizations say FM Global is the best commercial property insurer for "service," "expertise" and "overall," in *Business Insurance* magazine's 2012 Buyers Choice awards.

The findings are based on data collected by Blackstone Group, an independent global market research firm. Buyers ranked key service and expertise attributes such as "providing good value for premium paid," "demonstrating reliable customer service and responsiveness" and "providing timely claims payments." Buyers then identified who they would recommend who best demonstrated such attributes. The magazine noted "FM Global sets itself apart with (its) emphasis on engineering services."

The Feeling Is 'Mutual'

Ratings companies affirm FM Global's market leadership

Insurance ratings companies A.M. Best and Fitch have affirmed FM Global's financial performance. A.M. Best affirmed FM Global's A+ (Superior) financial strength rating and "stable" outlook, noting FM Global's "excellent level of risk-adjusted capitalization, historically solid underwriting and operating performance, benefits gained from its innovative loss prevention process and approach to property conservation, as well as its market leadership position in the commercial property market."

Fitch Ratings affirmed FM Global's "AA" (Very Strong) financial strength rating and "stable" outlook, reporting that "the ratings continue to reflect FM Global's strong capital and long-term underwriting profitability, competitive advantages derived from the company's engineering expertise and global presence in specialty commercial property insurance markets, as well as benefits drawn from the company's mutual status."

A GOOD VIEW

New 'Layered Sketches' provides multilayered view of risk

An enhancement to Sketches, a risk management tool available on FM Global's secure client extranet, *My*Risk®, will be available to clients in a staged rollout.

Dubbed "Layered Sketches," the enhancement calls for multidimensional views of potential risks to a location, layered on top of each other to reveal detailed information not available through the traditional paper sketches or single-dimension electronic Sketches currently available. These additions might include dimensions such as aerial views or client-supplied drawings, and they allow for custom configuration of standard details like construction, building exteriors and interiors, as well as fire protection and elevations.

The enhanced capability helps risk managers to better understand their risks globally, across many locations that they might not otherwise visit. Also, the format allows for easy dissemination of information that can be readily shared with various audiences, ranging from client facilities personnel to contractors and city inspectors.

David Henderson (right), operations vice president and claims manager, U.K., receives an award from presenter/comedian Alfie Moore.

MAJOR ADJUSTMENTS SEEN

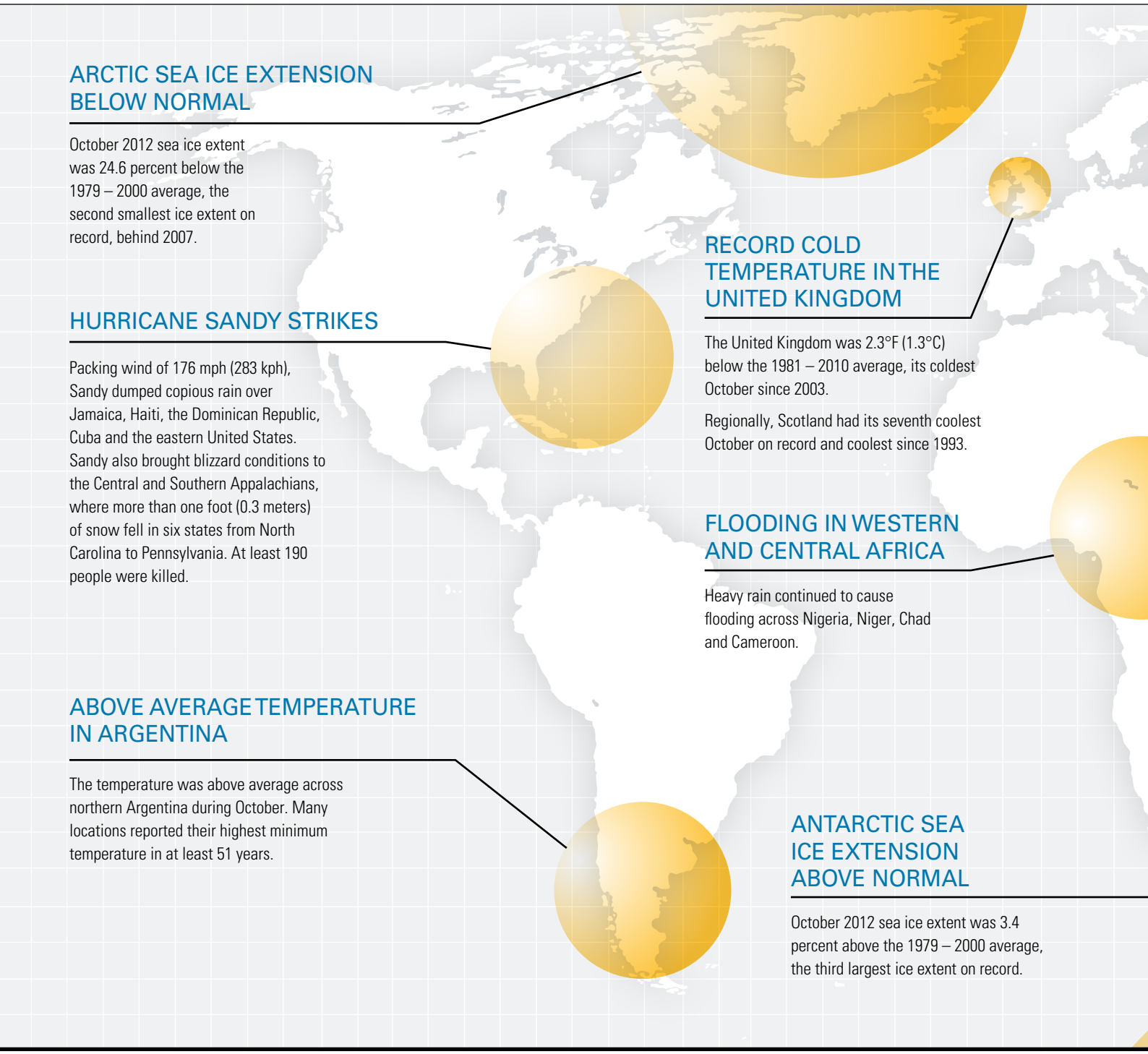
U.K. magazine presents recognition award for loss adjuster achievement

FM Global recently received the "Loss Adjuster Training Scheme of the Year Award" from *Post Magazine*, the U.K.'s leading weekly insurance publication.

According to the magazine, the award highlights "excellence and achievement in loss adjusting" and honors an organization that "has successfully utilized training" to contribute to "a reduced claims life cycle," "improved customer satisfaction," "enhanced decision-making" and "business success."

Around the World

A look at the global climate anomalies and significant weather events that occurred in October 2012.



ARCTIC SEA ICE EXTENSION BELOW NORMAL

October 2012 sea ice extent was 24.6 percent below the 1979 – 2000 average, the second smallest ice extent on record, behind 2007.

HURRICANE SANDY STRIKES

Packing wind of 176 mph (283 kph), Sandy dumped copious rain over Jamaica, Haiti, the Dominican Republic, Cuba and the eastern United States. Sandy also brought blizzard conditions to the Central and Southern Appalachians, where more than one foot (0.3 meters) of snow fell in six states from North Carolina to Pennsylvania. At least 190 people were killed.

RECORD COLD TEMPERATURE IN THE UNITED KINGDOM

The United Kingdom was 2.3°F (1.3°C) below the 1981 – 2010 average, its coldest October since 2003.

Regionally, Scotland had its seventh coolest October on record and coolest since 1993.

FLOODING IN WESTERN AND CENTRAL AFRICA

Heavy rain continued to cause flooding across Nigeria, Niger, Chad and Cameroon.

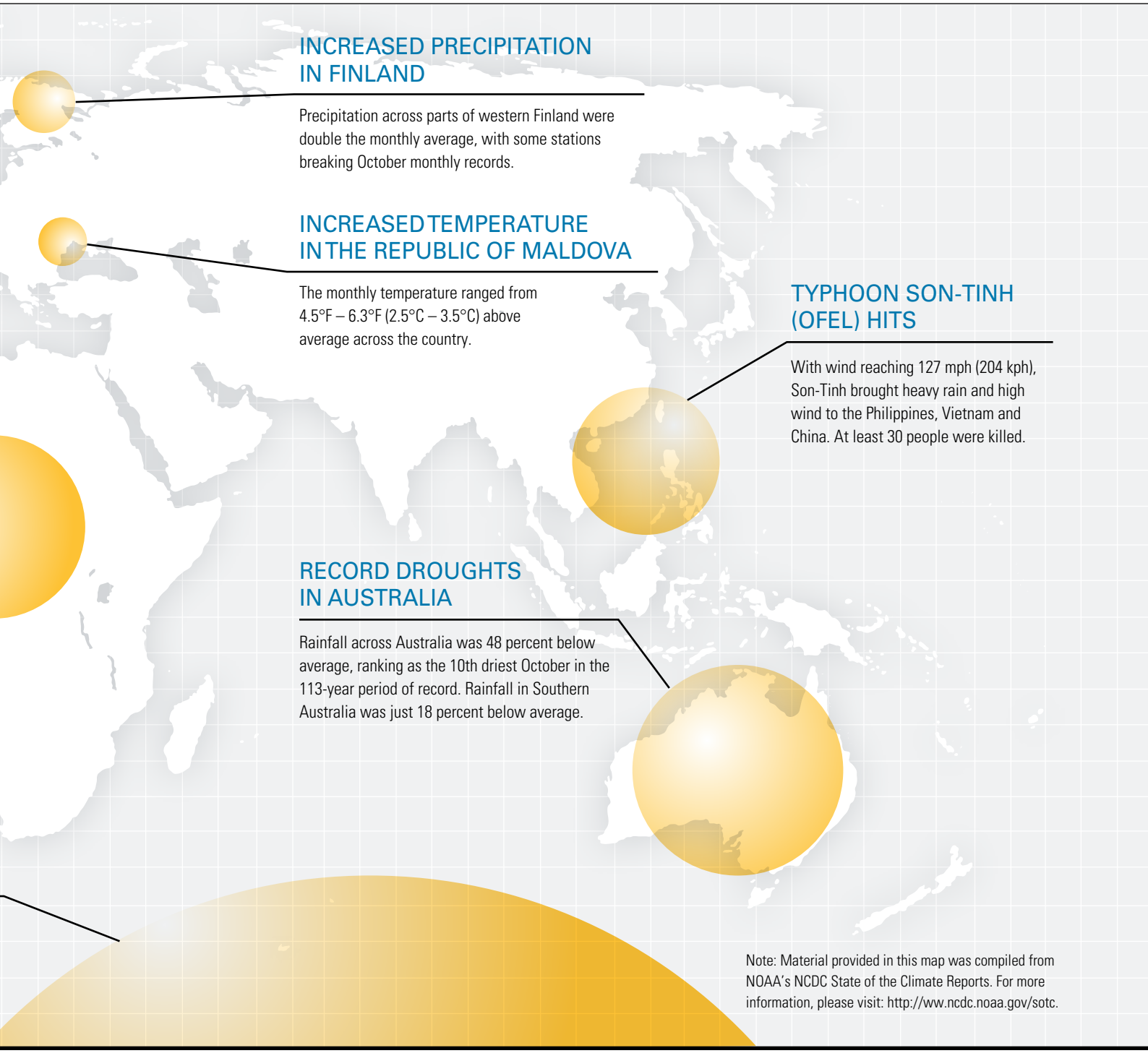
ABOVE AVERAGE TEMPERATURE IN ARGENTINA

The temperature was above average across northern Argentina during October. Many locations reported their highest minimum temperature in at least 51 years.

ANTARCTIC SEA ICE EXTENSION ABOVE NORMAL

October 2012 sea ice extent was 3.4 percent above the 1979 – 2000 average, the third largest ice extent on record.

While there may be debate about climate changes and causes, there has been much activity of late. In fact, record to near-record warmth over land from April to September and above-average sea surface temperature across much of the world's oceans resulted in the first 10 months of 2012 ranking as the eighth warmest such period on record, with a combined global land and ocean average surface temperature of 1.04°F (0.58°C) above average. Much of the United States, south central Canada, northern Argentina, part of southern Europe, parts of the northwestern and southern Atlantic Ocean, and parts of the southern Indian Ocean all experienced record warmth for the year to date.



Note: Material provided in this map was compiled from NOAA's NCDC State of the Climate Reports. For more information, please visit: http://ww.ncdc.noaa.gov/sotc.

Talking Points *with Georgene Saliba*

Administrator for risk management and patient safety at Lehigh Valley Health Network, one of the United States' most widely respected health care organizations

You didn't start your career in risk management. Can you talk a little about your background?

I graduated from nursing school and I have an R.N. degree; and when I was pursuing a bachelor of science in nursing I picked risk management for my independent study. A year later I was offered a part-time position in risk management. I've been in risk management ever since, and I now lead the department.

How satisfying has your career in risk management been?

I always promised myself that if it wasn't what I wanted to do when I woke up in the morning, I'd move on. Twenty-nine years later, it is still eventful. When I think I've heard it all, I answer the phone … I'm clinical by background. If you told me way back in nursing school that I would eventually be placing insurance for a billion-dollar company, I would have told you you were crazy! Risk management has allowed me to grow, both personally and professionally. I love the interaction with people; I love the health care setting. But risk management allows me to learn more, and that's what I've always strived to do: keep learning.

How did you first become familiar with your insurer?

The FM Global relationship for me began about eight years ago. In fact, we just celebrated our eighth anniversary. I think what drew me to FM Global were the people and the partnership. They weren't just my insurance company. They were there to help me in my job. Again, I have a clinical background, so having their engineers as partners provided me with greater depth and understanding. Seeing the Research Campus was phenomenal! It gave me insight that I would not have had. FM Global is a company that works with us. They are part of us, and they help us understand our risks in order to insure our property. I want to protect patients, and they help me do that. The relationship is truly a partnership.

Can you give an example of how the partnership has worked?

We were building a residence for families of patients coming from outside of our geographic area. Because it's not a hospital building per se, you can build it at residential code. You don't have to have a residential building fully sprinklered. But my engineering team talked to me extensively about dormitory fires and the like. We weren't originally going to sprinkler the roof, because that wasn't required. It would cost more money to install these extra sprinklers. But the argument was very compelling, to see a video of how fire can quickly engulf an entire building. By the way, the building was already in construction, so it was going to cost more to retrofit the plumbing. But I went to my CFO and said, "Here's what's going on. Here's what it's going to cost, and one life lost in a fire is going to cost us a lot more than this." That education made me stand up and say very convincingly that this was the right thing to do.

You sound like you understand not just the "what," but the "how" …

The engineers bring to the table the expertise, the understanding, the rationale and why it makes sense. It's not just, "You've gotta do this because these are the regulations." They bring the expertise and the knowledge of what they've seen and what could happen if you don't fully understand the risk.

This partnership allows for a nice alignment.

FM Global is a mutual company and we're a not-for-profit, so we're in it together. It's a service standard, and we're both here for service. To mutually benefit, our money goes back into my insurance. It's a partnership, a sharing. It's mutual.

The building was already in construction, so it was going to cost more to retrofit the plumbing. But I went to my CFO and said, **"Here's what's going on. Here's what it's going to cost, and one life lost in a fire is going to cost us a lot more than this."**

Lehigh Valley continues to grow. Is FM Global keeping pace with the challenges of a growing company?

As we continue to grow, especially related to buildings and leased properties, FM Global provides the expertise for this growth, the outside engineering expertise that allows us to see clearly the buildings we're looking at.

What are some of the risk management issues that keep you awake at night?

A lot of things! We have a fleet of cars, and I worry about one of them hitting a school bus. I worry about floods. I worry about losing power. We have back-up generators to our back-up generators, but I have seen some failures. I worry about evacuating 1,000 patients. We have a great emergency response plan, but those plans are predicated on everything working well—the idea that it won't scares me. I don't want to lose anybody. The thought of a fire keeps me awake. We have all fire-rated walls, and they will prevent penetration from one building to another. But I worry about a failure. From a clinical risk management and patient safety perspective, I worry about medical error every night. We're human. We make mistakes. As much as we try to standardize processes there will always be a human side to medicine.

What are your current risk improvement projects?

This organization is constantly in change to meet the needs of the community. We built a new tower, a green building, a few years ago and kept the seventh floor of that building as shell space. Well, the seventh floor is now being outfitted for more patient beds to meet those needs. Another thing we do as we expand is lease buildings. Some of them are in shopping malls, and we ask FM Global to the table with those plans to help us have it properly sprinklered and to help us meet the different regulations and requirements for those locations. It's reassuring to have FM Global at the table with us for all of these projects.

FM Global has 100 percent of your program. What are the benefits of this kind of continuity?

FM Global has 100 percent of my property program. It's the only line of my insurance that a company has 100 percent. I don't always like my eggs in one basket. From a property perspective, and really understanding who we are and what we're doing, it's our relationship with FM Global that's really important. As I add a property, or improve one, they understand the core values of this institution. I have no problem with them having 100 percent of the program, because I need a company that understands that core value. That's what I know I get when I work with FM Global.

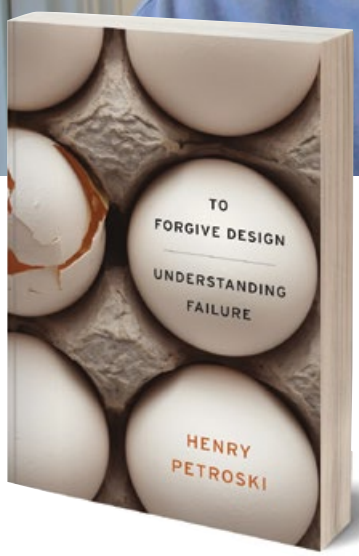
What kind of lessons have you learned in your role as risk manager, and what sort of advice might you have for people in the same position?

Don't be afraid of going outside your comfort zone. I began my career as a nurse. I took on new responsibility. I wanted to learn more. I wanted to learn the insurance, and do that part of risk management. I started with small pieces and then went into the D&O, crime, fiduciary, auto, etc. Don't be afraid to take on new things. It's also important for the risk manager NOT to be known as the naysayer. Listen open-mindedly. It's easy to say, "No, that's too much of a risk. I'm not going to do that." That won't get you anywhere, and it certainly won't get people to talk to you. What you have to say is, "What are you trying to do? How can I help you get from point A to point B?" Recognize what your risks and benefits are, taking into account your appetite for risk. Always keep your eye on the ball. What is the outcome? Safety and patient safety need to be at the forefront, but you can work with the people around the table so that they know they can come to you for advice.

You also want to get the ear of the c-suite. And when you get it, you want to walk in knowledgeably. Bring the data. If you make your case with confidence, you'll get them to come to you. Keep yourself in the forefront. Let people know who you are and that you're there to help.

Making the Same Mistake Thrice

In exploring the root cases of failures and disasters, Henry Petroski, a Duke University professor, discovers a persistent human failing: We think we're much smarter than we actually are



Although our culture celebrates successes, those successes are often built on lessons learned from failures. And it is those failures that have been the focus of research and attention by Dr. Henry Petroski, the Aleksandar S. Vesic professor of civil engineering at Duke University. Much of Professor Petroski's research has focused on the relationship between success and failure in design. Over the years, his research has been sponsored by the U.S. Army Corps of Engineers, the National Science Foundation, the Alfred P. Sloan Foundation and other organizations. He has published 15 books, including the recently released *To Forgive Design*, (Belknap, 410 pages, US$27.95), which chronicles some of the most dramatic and startling engineering failures of modern history, among them the collapse of a bridge over the St. Lawrence River in Quebec in 1907 and the structural failures of the Comet airliner in the 1950s.

For Petroski, the point is not merely to report on disasters but to analyze and contemplate their root causes. In the main, that turns out to be "us"—people. And, it is not so much a question of what failures teach us to do as what they tell us not to do, he stresses.

For example, in the case of the Quebec bridge, the chief engineer should have had the "big picture" in mind and should have understood the implications of decisions made on smaller parts of the project. However, he never even visited the construction site and instead allowed younger engineers, with little or no field experience, to send him back reports, upon which he based his further instructions. "That would certainly be a key lesson; projects must be overseen by people with actual experience," said Petroski. Like most lessons from failure, that's not very profound, he admitted. "You say to yourself, 'gee, they should have known that.' But it seems to take a failure for people to learn," he said.

Learning lessons isn't simply a matter of acquiring experience and being cognizant of failures, he noted. We all tend to learn lessons in the short term. However, in the long term, measured in decades or more, we forget, regardless of whether we lived through a bad event or not. The dominant factor is how far removed individuals are in time from a serious incident or calamity that could provide cautionary guidance for their decision-making. "There seems to be a loss of memory. In the 1950s, Florida was hit with some terrible hurricanes, with roofs torn off of houses. Then, there was a long period without any really severe storms. So, builders began to use less conservative

techniques like using weaker material and not employing as many nails," he explained. "Then, when the next big hurricane finally came, there was terrible damage and it was as if they hadn't learned anything," said Petroski.

"In the 1950s, Florida was hit with some terrible hurricanes, with roofs torn off of houses. Then, there was a long period without any really severe storms. So, builders began to use less conservative techniques like using weaker material and not employing as many nails. Then, **when the next big hurricane finally came, there was terrible damage and it was as if they hadn't learned anything.**"

Dr. Henry Petroski
THE ALEKSANDAR S. VESIC PROFESSOR OF CIVIL ENGINEERING AT DUKE UNIVERSITY

It happens in institutions too, NASA being a prime example. "There were many lessons learned from the Challenger disaster in 1986, but 17 years later, in 2003, when Columbia disintegrated, it turns out that many of the same poor practices that NASA had been scolded for before were again found to be the root cause of the tragedy," said Petroski. And, he added, that is despite the fact that NASA consistently focuses on failures and how to avoid them!

"The short lesson we can take from these failures is that a culture seems to develop among people where they expect things to happen in a certain way. Then, even when there are many little warnings—indicators—that things are going wrong, the people or organization tends to rationalize those things away," said Petroski.

"If something happened 10 or 20 years ago, they start to rationalize; they come to believe that the tools, techniques and models have improved to the point where those issues aren't a concern any more," said Petroski. In other words, there is a persistent human failing that tends to lead us to think we are smarter now than ever before and that, therefore, we can take more risk. "It isn't usually put in those terms but that is what it comes down to," he said. There is also difficulty with the concept of risk, in Petroski's view. "We know these disasters are rare events—the exception to the rule—and we tend to think of them in terms of numeric or statistical terms, such as a one-in-a-million chance," he noted. Although those may be the actual odds, they don't tell us *when* something will go wrong. "With the Titanic, it happened on the maiden voyage," he added.

Nor is it a new problem. Petroski said some of the earliest writers on technology, such as Marcus Vitruvius Pollio, a Roman writer, architect and engineer, wrote about failures. "Two thousand years ago, they understood that accidents and failures were happening that shouldn't be happening," Petroski said.

Setting and maintaining higher standards is an important, ongoing process, noted Petroski; however, we tend to forgo best practices when things are working well. We relax and become less conscious of risk.

Although governmental oversight has a role in taming failures and reducing risk, Petroski said businesses, individuals and insurers can and should be motivated by their own self-interest to constantly study failures and avoid them.

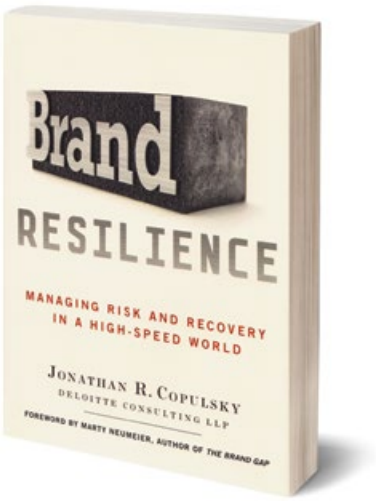
"Insurance companies are very interested in failures; they often perform and publish valuable studies," he explained. Indeed, in the 19th century, when steam boilers were blowing up regularly, particularly on ships, it was insurance companies that became interesting in solving the problem, he noted. Because they were providing insurance, they wanted to institute practices that would help prevent failures from occurring. Among the steps they advocated were proper inspection by qualified professionals.

Even the insurance policies that insurance companies write play a "guiding hand" role that encourages good practices and discourages bad practices.

That's the "silver lining" in the failure picture: Insurers have a vested interest and will continue to work to prevent disasters. Still, he admitted, human nature seems immutable. "Even before recorded history, there were probably failures. People just don't learn," he said. But they do learn more about the exposure. And, despite continued challenges, Petroski admited that science and technology continue to improve, making it *possible* to create safer and better designs. "Learning from failure is really something that applies at least as much to management as it does to engineering," he added. "It is an ongoing challenge."

Playing Good Defense

In an interconnected world, protecting the brand from damage emerges as a corporate imperative



BRAND RESILIENCE, *Jonathan Copulsky*
Palgrave McMillan, New York, N.Y., 2011

In today's hyperconnected world, brands have become uniquely susceptible to damage from a host of unexpected sources: the angry customer who starts a website, the bored employee who posts a damaging YouTube video, or the company executive who makes an off-the-cuff tweet with unintended results. Consequently, chief marketing officers need to not only nurture and develop their brands, but also protect and fortify them from these unexpected threats, creating brand resilience.

Think about the top 10 brands globally and the hundreds of billions of dollars in market value they possess. How much of that value is at risk when brands do not fulfill their promise?

In *Brand Resilience*, Jonathan Copulsky contends that brands today are about trust and no longer about the quality of a product or service. Will the product or service that they provide meet the expectations set by their brand? Will others whom the consumer trusts believe in their brands? The Internet, and more specifically the advent of social media, has provided the means to instantaneously voice the opinions of individual consumers to hundreds of millions of their peers about a brand experience. The author sites a litany of corporate examples in today's information age where ubiquitous corporate brands were ruined overnight—brands that took years and decades to build.

The good news is that Copulsky postulates a robust brand resiliency framework. Taking inspiration from the U.S. Army's counterinsurgency tactics, the author lays out a clear approach to identifying potential sources of brand sabotage, creating mechanisms to protect from those threats, and then developing systems that monitor and adapt to the ever-changing nature of those threats.

Assessing risk inside and out

There are significant risks, such as disgruntled employees, consistent lack of product/service performance, third-party websites posting scathing reviews of new products, and outsourced suppliers' labor practices. The key here is to have good risk intelligence—and the ability to produce and act upon such intelligence. It requires leveraging the organization to identify not only likely events, but also the unimaginable.

Galvanizing employees

As in any organizational initiative, getting the organization on the same page requires a clear mission, a purposeful outreach program and a strategy for employee ownership of the mission. Support from senior management is critical.

Deploying early warning systems

Predicting brand sabotage is extremely challenging. Casting a net over a wide range of potential sources of brand sabotage can minimize potential incidents. The author suggests crowdsourcing (using internal and/or external human networks) information, monitoring chatter related to the brand across many media sources, filtering out the

irrelevant and making compelling cases for relevant signals.

Repelling attacks on the brand

This is where crisis management planning becomes critical. Think of a brand attack as an event, with the opportunity for pre- and post-event actions. Keep a timeline in mind as the response is developed and executed. Sometimes it requires an aggressive response. Well-executed apologies can defuse reactions. Practice is critical to getting it right.

Consider how **a natural disaster or fire could have a significant adverse impact on the brand,** even in a supply chain, such as what happened to Ericsson over a decade ago and, more recently, to Toyota and Honda following the Japan earthquake.

Learning and adopting defenses

In China, the word "crisis" means "opportunity." The opportunity can be to do an extensive postmortem to understand what happened, why it happened, what could have been done to prevent it, and what could have been done better to address it. Learning from an incident provides an opportunity to review and modify policies and procedures, accordingly.

Measuring and tracking resilience

Critical actions can include: leveraging ongoing client satisfaction and brand-tracking surveys, understanding firsthand what happens at the front lines to deliver the brand, tracking brand shocks, starting a program for measuring brand value, and considering survey measures of brand understanding among employees.

Generating popular support

Popular support is critical to achieving and sustaining success. Systematically identifying and building strong relationships and rewarding brand advocates is a critical activity.

In Copulsky's words, the implications here are that "marketing is no longer about building a brand; there's now a need for brand defense." In essence, there is an inherent potential alliance forged between risk management and marketing. Many operational, financial and strategic risks are intertwined with brand risk. Consider how a natural disaster or fire could have a significant adverse impact on the brand, even in a supply chain, such as what happened to Ericsson over a decade ago (a fire at a supplier's microchip manufacturing plant that cost the Swedish company US$400 million in lost sales, and its position in the mobile-phone business) and, more recently, to car manufacturers Toyota and Honda with the Japan earthquake. The lack of availability of a product to a client due to a supply chain disruption can damage the brand. In assessing and managing risk, the consequences in losing trust in a brand need to be factored. In particular, the case for investing in risk improvement becomes more compelling.

Meet Brecker Bunny!

The fire prevention grant program underwrites a product of a different sort

BRECKER BUNNY LEARNS TO BE CAREFUL!
by Hilary D.R. Bilbrey (author) and Michael Rose (illustrator)

"With financial assistance from the FM Global Fire Prevention Grant Program, we were able to fund one print run of 1,250 copies of *Brecker Bunny Learns to Be Careful!*"

Dan Gengler
CHAIRPERSON OF THE WISCONSIN ALLIANCE FOR FIRE SAFETY (WAFS)

Has FM Global wandered into the world of children's book publishing? Hardly, but through the company's Fire Prevention Grant Program, the FM Global Foundation helped underwrite a print run of Hilary Bilbrey's *Brecker Bunny Learns to Be Careful!*

The grant application came from Dan Gengler, chairperson of the Wisconsin Alliance for Fire Safety (WAFS). Established in 1991, WAFS promotes fire safety and burn prevention throughout the state, and its members provide support for burn survivors of all ages who live in Wisconsin.

Since 2009, WAFS has been distributing copies of Bilbrey's book to fire departments, schools and day care facilities around the state. "With financial assistance from the FM Global Fire Prevention Grant Program, we were able to fund one print run of 1,250 copies of *Brecker Bunny Learns to Be Careful!*" explained Gengler. "The book has proved to be a terrific resource for educating young children about burn safety."

Michael Spaziani is the director of FM Global's Fire Prevention Grant Program and says that fire departments and brigades, as well as national, state, regional, local and community organizations can apply for funding to support a wide array of fire prevention, preparedness and control efforts. "Dan Gengler and WAFS are passionate about fire safety and burn prevention, and FM Global was eager to assist them in their good work in Wisconsin by helping to underwrite the printing of *Brecker Bunny Learns to Be Careful!*" Spaziani said.

The book tells the story of a little bunny who likes to be adventurous. Despite his parents' best efforts to teach Brecker Bunny the rules of burn safety, Brecker Bunny forgets and finds himself with a bad burn. In the book, Brecker Bunny eventually teaches others how to stay safe.

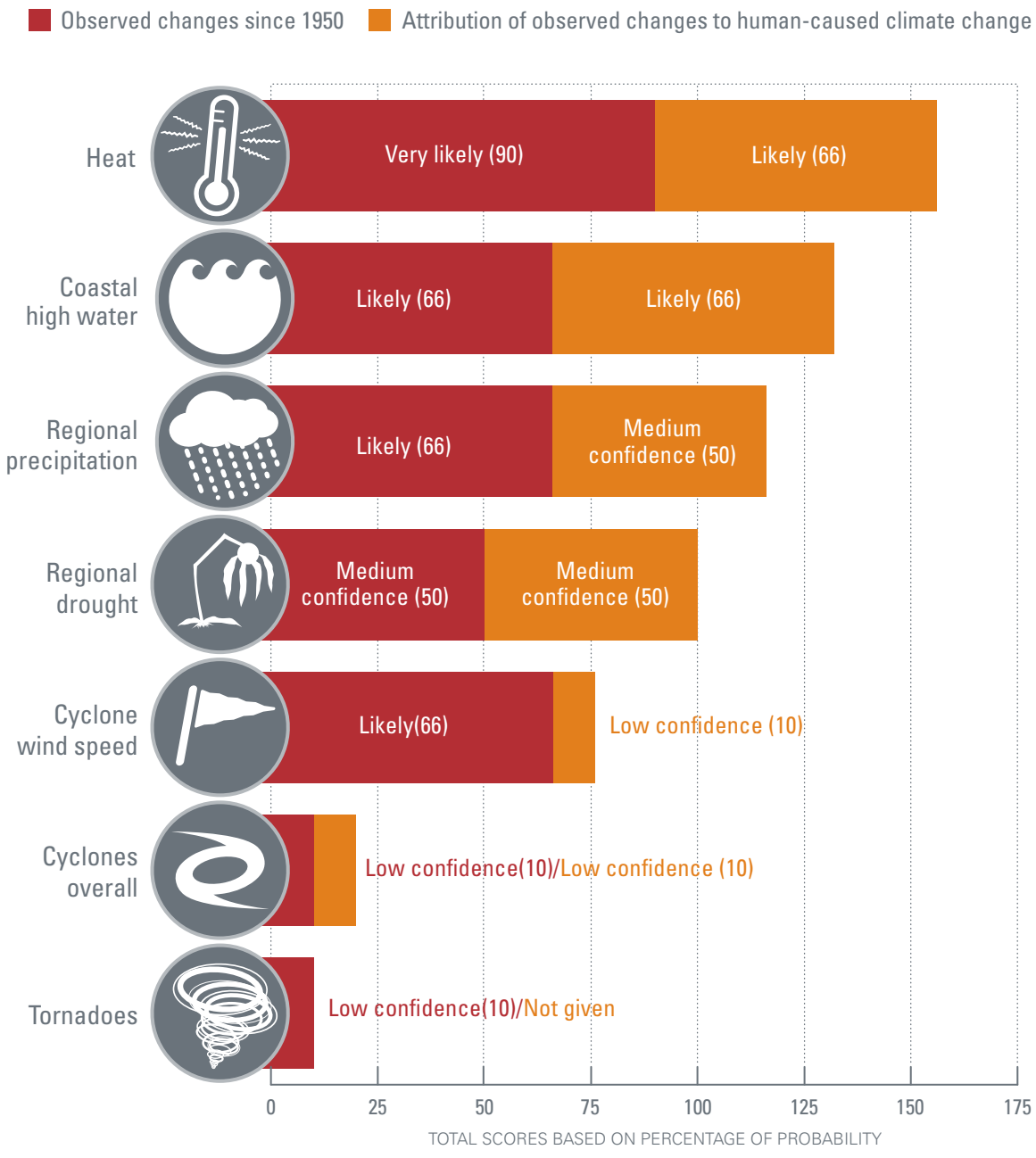
For author Hilary Bilbrey, writing the book was very personal. At 18 months old, Bilbrey's young son was accidentally burned in the bathtub because the home's water tank was inaccurately set to a high temperature. Finding no age-appropriate resources to explain to their son what was happening to him, Bilbrey and her husband chose to create something. In doing so, they discovered an opportunity to educate children and families about fire safety and burn prevention.

"We've had great response to our free distribution of *Brecker Bunny Learns to Be Careful!*; it's become an important resource for our community outreach efforts," explained Gengler. "Our copies have been fully distributed, and we are actively raising funds for another print run."

For more information about WAFS, go to www.wafs.org.

Taking Our Temperature

A look at how climate change around the world likely contributes to the following weather-related events through observed changes and attribution of observed changes.



Data: IPCC, SREX, 2012

The X Factor

Why it's critical to embed risk management considerations into all business decision-making

There is no doubt that business exposure to natural catastrophes is on the rise. According to recent annual research into the effect of natural catastrophes and man-made disasters, insured losses have increased, on average, from less than US$9.6 billion to more than US$96 billion in recent years. Further, the globalization of business has meant that the number of organizations exposed in high-risk areas prone to flooding and earthquakes has also increased dramatically. Despite these alarming statistics, however, the risk management industry is still facing a challenge when it comes to getting senior management-level buy-in to risk protection against catastrophic loss.

Why is it that some c-suite executives ignore the enormous potential risk brought by natural hazards? More importantly, how can we work to change board members' attitudes to risk?

Natural catastrophes can have far-reaching implications on entire business models. An illustration of this can be seen in many high street technology retailers where the cost of hard drives has increased substantially. The increase in prices late last year stemmed from the severe floods in Thailand, which destroyed nearly one-third of the world's hard-drive manufacturing capacity. Furthermore, many information technology analysts have forecast that the production of hard drives will not be back to normal until

2013, by which time its main competitor, the solid-state drive, may have already taken the majority of the market share. This single event of flooding in Thailand demonstrates the impact that natural disasters can have on businesses in both the short term and for years to come.

> Insurance on its own doesn't take into account reputation, market share and share price, and **cannot fully protect an organization from the effects of business interruption following natural catastrophes.**

Human psychology, in terms of its manifestations in behavior, appears to be the foremost factor in why people underestimate the risk of a natural disaster. The assumption is that if a natural catastrophe occurs, the consequences of that incident will have greater repercussions elsewhere. There is also a curious human behavior that assumes that because a disaster has now happened, it won't happen again. This can be seen in post-Hurricane Katrina, New Orleans, La., USA. Despite the disaster's human and financial devastation, much of the city still remains ill-prepared to withstand another major hurricane.

A psychological study by the Wharton School of the University of Pennsylvania provided four reasons as to why people take these unusual attitudes to risk: risk underestimation; procrastination of risk prevention (especially when investing time and money); short-term focus; and hyperbolic discounting (people place more emphasis on things that happen immediately).

These inherent attitudes to risk are magnified when they are coupled with the emphasis placed on c-suite executives to deliver results on a quarterly basis, often meaning that businesses make fast growth and profit a priority, rather than looking at ways to protect their assets. These pressures will often make c-suite executives hesitant to invest in comprehensive preparation for a natural disaster, believing it to be too expensive. The reality is that the overall costs incurred from a natural disaster are far greater when the loss of business, drop in share price and damaged reputation are taken into account.

Risk managers are faced with a great "challenge" in obtaining buy-in from c-suite executives, and it is often perceived that there is a glass ceiling for risk managers trying to get their message into the boardroom. Part of the problem is that some c-suite executives view insurance alone as the all-encompassing solution to managing risk, rather than loss mitigation programs, which are generally perceived as too costly and surplus to requirements. Insurance on its own doesn't take into account reputation, market share and share price, and cannot fully protect an organization from the effects of business interruption following natural catastrophes. Risk managers must approach the c-suite with relevant loss prevention strategies to potential disasters and clearly define the competitive advantage that could be gained.

One action risk managers can take is to change the language they use when communicating with the c-suite by presenting risk relevant to the lifetime of a property, rather than on a year-by-year basis. Statistics of risk presented in the context of a building's lifetime are far more compelling and more likely to make c-suite executives sit up and take note of them. Furthermore, presenting statistics like this will help the c-suite consider physical risk as a future reality rather than just a probability.

Risk can also be discussed in a more positive framework. Instead of approaching the boardroom with downside risk and stories of doom and gloom, risk managers should present the upside of risk and how becoming more resilient can help build competitive advantage. Rather than focusing on potential losses, risk managers could focus the conversation on the importance of preparedness and prevention for ensuring retention of sustained growth and financial long-term sustainability.

It is interesting to note that companies are very good at quantifying business opportunities with exact figures of potential profits. However, some are less competent at understanding and accurately quantifying the damage that a natural catastrophe could cause in terms of business operations and reputational losses.

C-suite executives have a crucial role to play when it comes to developing an approach to loss prevention. They should work alongside risk managers to ensure that across their organizations, risk management is not viewed as a box-ticking exercise, but is embedded into all business decision-making and becomes a key part of corporate strategy. To improve the resilience of their organizations, c-suite executives must work closely with risk managers to build a strong corporate culture that embraces the critical importance of business continuity and focuses on sustainable success.

Stefano Tranquillo is vice president, operations manager for FM Global's Northern Europe operations.

Asking the Tough Questions

In the wake of Superstorm Sandy, Shivan Subramaniam, chairman and CEO, discusses why even a solid insurance policy isn't enough to restore a damaged reputation or loss of market share

With New York (USA) Governor Cuomo's announced plan to ask the federal government for more than US$30 billion in disaster aid, the public debate is filled with a vast array of schemes to protect vulnerable areas of New York from ever again being exposed to the violence and destruction of a superstorm such as Sandy.

Current estimates of US$62 billion in damage now place it as the nation's second-costliest natural disaster after Hurricane Katrina.

For businesses, it is critical that this public debate, as important as it is, does not distract attention from what they need to do today to reestablish operations and ensure adequate business continuity in the future. As they contemplate the potential impact of Sandy on the busiest retail season of the year, companies also need to plan for the long term.

Some advocates of sweeping protection have pointed to the Dutch, who, after a series of devastating floods in the 1950s, invested in a flood management system damming all of the river mouths and sea inlets along their coast. It was a 20-year undertaking.

Others have created similarly imaginative and expensive defenses. For example, the Thames Barrier, located just downstream of London, was built to prevent that city from being flooded by high tides and storm surge; the billion-dollar barrier has been raised 119 times in the past 30 years.

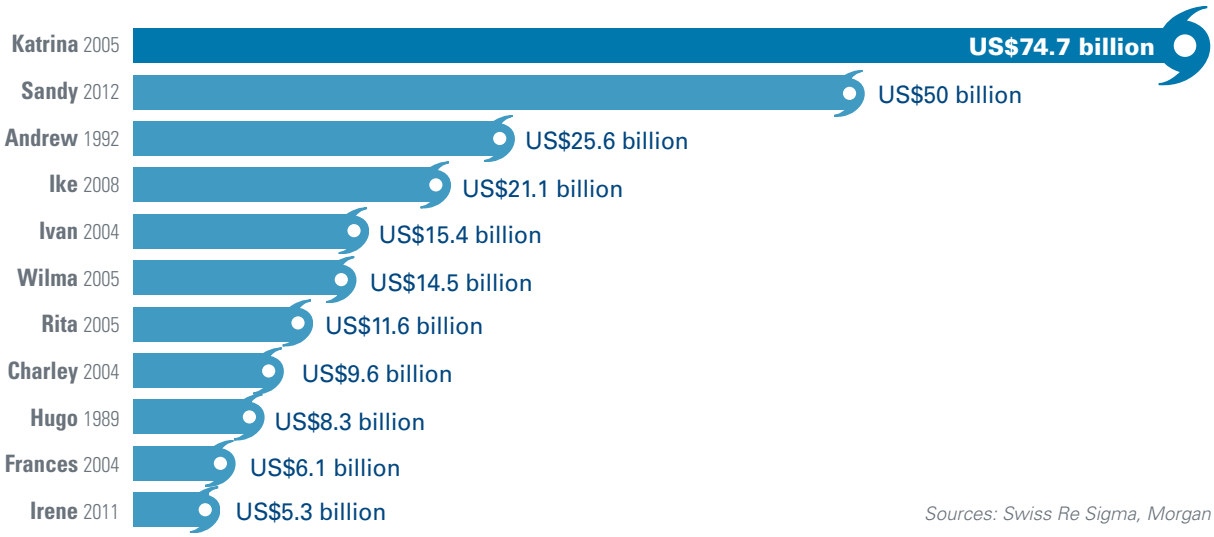
On the other side of the argument are the policy pragmatists, who concede that changes must be made. But they shake their head at the fantasy that there is either the financial capacity or public will for such ambitious solutions. Indeed, as Mayor Bloomberg observed recently with respect to costs for New York, the Thames is a single river and the New York area has an immense coastline and tidal harbor to protect.

For businesses, however, the issue should not be about a showdown between flood-protection absolutists and policy defeatists. "How much protection do we need?" and "How much protection can we afford?" are the wrong questions.

Ten for the Money

The 10 most expensive U.S. hurricanes for insurance companies since 1970.

(The amount insurers pay out to policyholders is typically a fraction of the overall economic cost.)



Sources: Swiss Re Sigma, Morgan Stanley research

The first questions businesses need to ask themselves are: Do my facilities, currently in vulnerable areas, truly need to be there? Is there a purpose for my buildings being on or near the water? These are critical questions even for well-insured businesses. Business owners and leaders who have been affected by natural disasters know all too well that an insurance policy is not enough to make an organization economically whole, nor will it adequately protect them against things such as a damaged reputation or loss of market share.

The question is, of course, a different one for public infrastructure. The Holland Tunnel can only do what it does in its current location—and it needs to be fortified for its essential task. So do subway lines that must run under both ground and water. But what about the several hundred buildings in Lower Manhattan owned by major corporations that are still uninhabitable? The debate over how to rebuild for businesses will be an empty echo chamber until we start to ask not only how to "harden" our facilities to resist the water when they absolutely must be near water, but also how to reshape our footprint to avoid a storm's predictable path.

What is clear is this: Sandy was not an outlier. Nine out of the 10 costliest hurricanes in U.S. history have occurred in the past decade. New Yorkers may have felt insulated from these kinds of disasters before Sandy, but now there is no denying what has always been true: This grand metropolis lies in a flood zone, and the water levels around it are rising each year. Until we grapple with the question of what belongs where, we are only prolonging the denial that brought us to our present predicament and inviting future risk.

We have faith in the resilience of Americans to bounce back from catastrophe. But we believe resilience is also the wisdom to know how best to prepare for the next disaster and where best to place the resources to do so.

Shivan S. Subramaniam is chairman and CEO of FM Global. This piece first appeared on CFO.com.

Truth Wins Out

A groundbreaking report from the U.K. reveals at last the real environmental impact of fire in sprinklered and unsprinklered buildings

The local evening news story about a warehouse going up in flames tells us intuitively that fire damages the environment; the thick noxious smoke plume emanating from the burning goods, the fire water runoff, the demolition and disposal of the charred remains ... there is a clear case to safeguard ourselves and our businesses from fire as much as possible. Yet, historically, there has been little research into the impact fire sprinkler systems may have on the environment. The absence of information linking fire safety to sustainability poses a challenge to the greater adoption of sprinklers worldwide. Before regulators can consider change, they rightly need to address the current state and whether their greater use would provide a positive net benefit.

Loss prevention is an integral component of sustainability. It is also fundamental to FM Global's way of doing business. The company's international codes and standards group (ICSG) reaches out to regulators, standards committees and businesses around the world seeking to strengthen those organizations' fire protection policies. By informing the debate over the future of building regulations, through recognition of the efficacy and benefits that fire sprinklers bring, the ICSG strives to make sure properties are better protected, more sustainable and more resilient as a result.

In the United Kingdom, this belief and sense of common purpose led to the formation of the Business Sprinkler Alliance (BSA) in 2009. The BSA was established to achieve greater business resilience by enhancing protection against fire through the increased acceptance and use of fire

sprinklers in industrial and commercial buildings. The BSA's members are the Chief Fire Officers Association (CFOA), the European and National Fire Sprinkler Networks, the British Automatic Fire Sprinkler Association (BAFSA) and FM Global. The BSA's objectives are to highlight the true cost of fire to U.K. businesses, raise awareness of the business benefits sprinklers bring and gain support for a more proactive regulatory approach that recognizes their efficacy and provides greater incentives for their installation.

The BSA has made a significant impact on the debate in the U.K. It understood that, in order to close the education gap on the environmental and societal benefits of sprinklers, and for stakeholders and decision-makers to recognize their sustainable benefits, it needed to produce a credible and groundbreaking report that would withstand scientific scrutiny.

The BSA commissioned the environmental research group, Bureau Veritas, in 2010 to investigate the environmental impact of fire in sprinklered and unsprinklered commercial and industrial buildings. The final report released in 2011, *Assessing the Role for Fire Sprinklers*, was the first of its kind. It revealed a number of astonishing conclusions on the environmental and community impact of fire in sprinklered and unsprinklered single-story commercial and industrial premises.

The report results showed that installing sprinklers into commercial and industrial facilities across England and Wales would save an estimated 2.4 billion gallons (9 billion liters) of water every year (presently used to fight fires)—the equivalent of five times the U.K.'s entire annual bottled water consumption.

The Bureau Veritas research found that buildings fitted with sprinklers often use **only 0.2 percent of water to extinguish a fire compared with a building with no sprinklers.**

Water is an increasingly precious resource, and there is a growing need for business to use it wisely. The Bureau Veritas research found that buildings fitted with sprinklers often use only 0.2 percent of water to extinguish a fire compared with a building with no sprinklers.

Another fundamental conclusion the report found was that fires in industrial and commercial buildings without sprinklers needlessly emit as much as 386,000 tons (350,000 metric tons) of carbon dioxide each year. This is the equivalent to the annual emissions of more than 140,000 European cars. The report confirmed the clear net carbon benefit of installing sprinkler systems in all buildings over 54,000 square feet (5,000 square meters) over a 30-year life span.

These conclusions were backed up by contemporary case studies that highlight the hugely damaging environmental and disruptive effects on local communities, including air pollution, road closures, job losses and the evacuation of schools and residential areas to prevent health problems. The Wessex Foods fire in Lowestoft, U.K., in 2010, caused major disruption for the local community. Neighboring houses were visited by the police, who advised residents to stay indoors with the windows closed to prevent smoke inhalation. Some, who were downwind of the fire, were evacuated until the smoke plumes had reduced in size. Ultimately, and in addition to this environmental impact, this 30-year-old successful local business never recovered, with the plant closing resulting in a permanent loss of employment for more than 150 people.

The report's findings have had an impact on governmental thinking. On its publication, the then-minister of building regulations at the Department for Communities and Local Government (CLG) Andrew Stunnell recognized the robustness of the report. He confirmed its findings would be considered alongside life safety in the next revision of the Approved Document B of Building Regulations in 2013.

In addition, not only do 15 members of Parliament, comprising a cross section of the U.K.'s political parties, approve of the report's findings, but also they support the BSA's advocacy campaign.

The report was also used to inform the Department for Environment, Food and Rural Affairs on the benefits fire sprinklers can bring to water conservation. The department endorsed the report and will use its findings in the draft revisions to its current guidance on fire.

As shown in the report, fire sprinklers provide multiple benefits, where they are important elements not only in "green" buildings, but also in the fact that their contribution to fire protection allows fire damage to be mitigated quickly, thereby limiting economic and property loss and disruption and making for better environmental protection.

Brendan MacGrath is manager, international codes and standards group, at FM Global.

We major in chemistry

The "Working Together" video series spotlights partnerships

Throughout the year *Reason* produces video highlighting successful client partnerships. Each short film focuses on a specific aspect of a well-aligned client/insured relationship and how that alignment results in a great outcome. The latest "Working Together" video features USG, a global leader in building materials, and their brush with a 500-year flood.

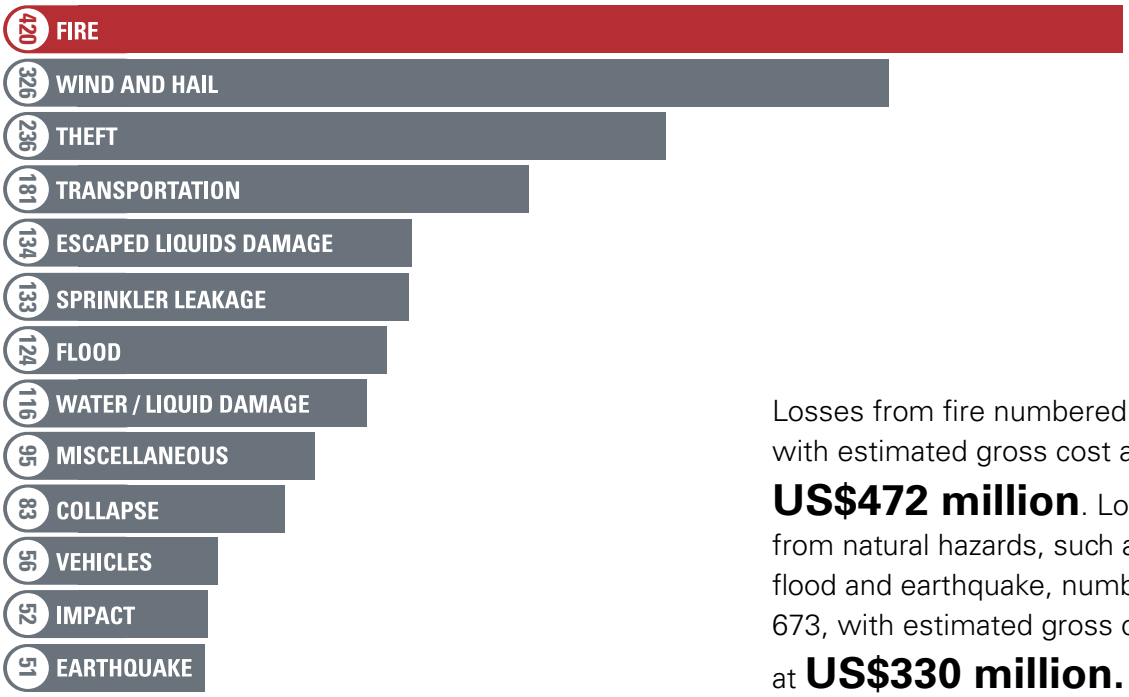
Viewable at fmglobal.com/reason

Insurance Evolved FM Global®

Warehousing by the Numbers

A revealing look at third-party storage facilities and a sprinkler protection comparison

Top 13 Causes of Client-Reported Losses at Third-Party Storage Occupancies (1990 – 2011)

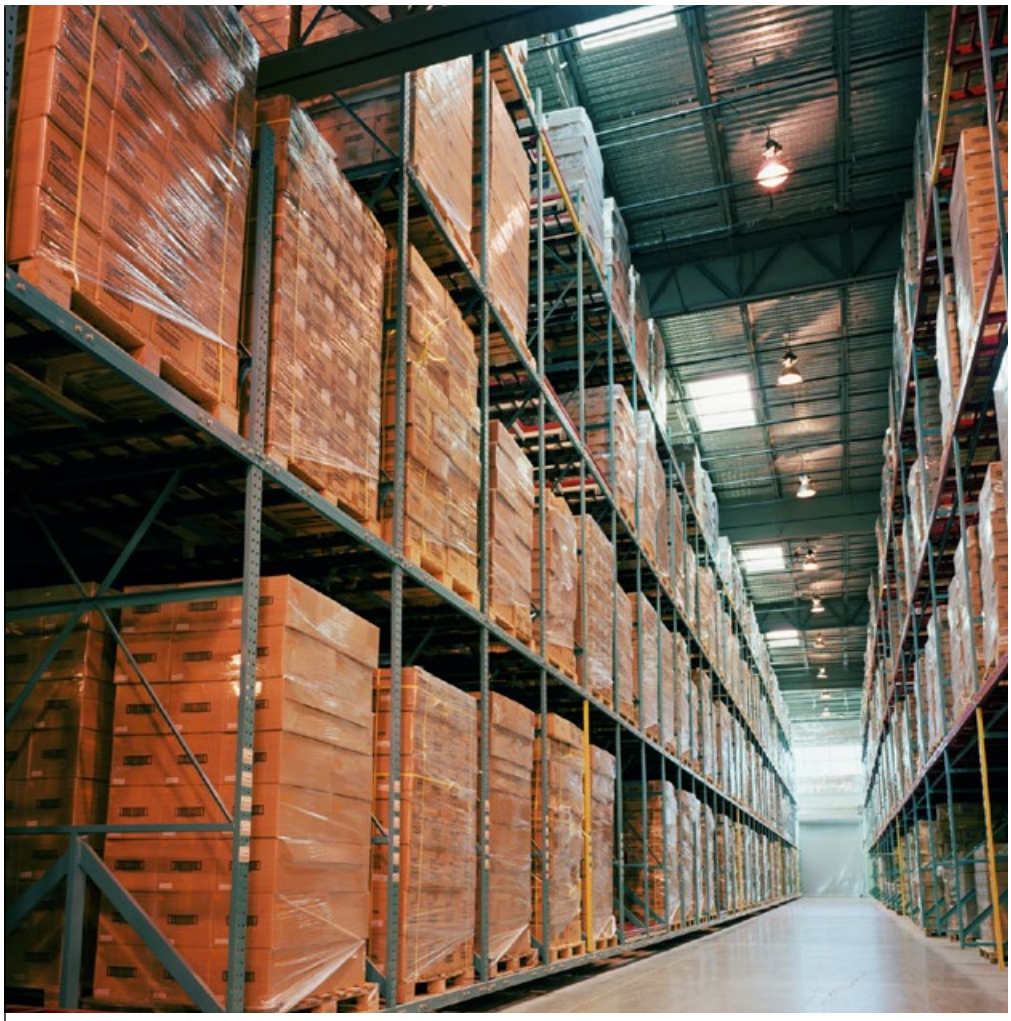


Losses from fire numbered 420, with estimated gross cost at **US$472 million**. Losses from natural hazards, such as wind, flood and earthquake, numbered 673, with estimated gross cost at **US$330 million.**

2001 – 2010 FM Global Warehouse Occupancy
Sprinkler Protection Comparison

SPRINKLERS EFFECTIVE
60 Losses: Average loss ***US$422,401***

SPRINKLERS NEEDED/DEFICIENT
96 Losses: Average loss ***US$3,788,569***



PUT THE FIRE OUT

A sprinkler system upgrade saves the day

This client established a storage and distribution center in a leased building that was formerly a manufacturing facility. The client intended to use the facility for rack storage of cartoned plastics, and, being unaware of the hazards associated with plastic storage, thought that the existing automatic sprinkler system would be adequate. When FM Global recommended that the sprinkler system be upgraded to compensate for the increased risk, the client stated, "The building already has sprinklers!"

FM Global worked with the client on a number of levels to explain the increased hazard of plastic storage. With the help of relevant Understanding the Hazard brochures, as well as videos showing the hazards of storage and the benefits of adequate sprinkler systems, FM Global was able to help the client fully understand the increased risk exposure. The client eventually agreed and spent US$120,000 retrofitting the building with an automatic sprinkler system capable of dealing with the increased risk.

Not a moment too soon

When an open fluorescent lighting tube malfunctioned and overheated, it ignited a wooden pallet in the storage facility. A single sprinkler activated and was able to contain and extinguish the fire. When the public fire department arrived, fire personnel found that the fire was already out and that no one had been injured.

Had the sprinkler system not been upgraded to handle the new plastic storage, the fire would likely have consumed the entire building, with an estimated loss of US$24 million. Instead, one sprinkler extinguished the fire, no one was injured, damage was limited and the business was back in operation by the next day.

NOTHING BUT STATIC

A small spark ignites hot burning plastic

What Happened

This facility manufactures expanded polystyrene foam food containers and unexpanded polystyrene and polyethylene cups. During the process, extruded polystyrene sheeting is wound into large rolls measuring 5 ft. (1.5 m) in diameter, 4 ft. (1.2 m) wide and weighing 600 lbs. (272 kg). These rolls are stored up to three levels high and cured in a warehouse for use later in the manufacturing process.

During the process of relocating one of these rolls into the warehouse, a static spark was created between the forklift prong and the plastic roll. Several adjacent rolls also became involved in the quick-burning fire. Fortunately, the warehouse was equipped with both automatic ceiling sprinklers and in-rack sprinklers supplied by a 2,500-gpm (9,464-Lpm) fire pump. Three in-rack sprinkler heads and two ceiling sprinkler heads operated and controlled the fire, which was extinguished by the fire department after approximately two hours.

While there are several methods to attempt to minimize static discharge, some buildup of static energy is inevitable with the process. The importance of automatic sprinkler protection in this loss cannot be overstated. Plastic presents a significantly higher fire hazard than ordinary combustible material. Fortunately, as was the case in this incident, properly designed automatic sprinkler protection can control these types of fires, minimizing property damage and business interruption.

Positive Factors

- The plant emergency organization responded promptly and called the fire department.
- Automatic sprinklers and in-rack sprinklers were installed and operated as designed, as did the fire pump.

Negative Factors

As the plastic sheeting is wound into rolls at the end of the extruder lines, static electricity builds up within the rolls.

Business Impact

Plant operations continued with very little interruption. Some cleanup was necessary due to the high level of smoke generated by the burning plastic.

What Could Have Minimized the Loss?

Once the fire began, the automatic sprinklers minimized this loss. If this area had not been sprinklered, the burning plastic fire would have quickly advanced throughout the warehouse and into the adjacent manufacturing areas. This would have drastically increased the fire and smoke damage to the building and its contents, and would also have resulted in an operations shutdown.

THE CHOICE IS YOURS

Considering more effective options for ceiling-level sprinkler systems

If ceiling sprinkler protection at a storage facility is inadequate, the likelihood of a fire growing out of control is very high, says Wes Baker, assistant vice president, senior engineering technical specialist at FM Global. And he should know. He's practically written the book on this topic.

Well, not exactly a book, but rather a technical paper titled "Storage Sprinkler Design Criteria," which garnered him the 2011 William M. Carey award from the Fire Protection Research Foundation (FPRF), an affiliate of the National Fire Protection Association (NFPA). Baker is a recognized expert on ceiling sprinkler protection in storage facilities, and he says most occupancies contain a sufficient amount of combustible material to warrant the need for automatic sprinkler protection. Such occupancies can prove to be a challenge to a ceiling-level sprinkler system depending on the type of combustible material present, the ceiling height of the affected area, as well as any shielding of direct water application that might be caused by the nature of the occupancy.

"This is particularly true of storage occupancies due to the amount of combustible material typically present, the vertical heights to which they can be placed and the shielding effect commodity loads can create when maintained in storage racks," said Baker. "If a ceiling-level sprinkler system is unable to discharge a sufficient volume of water to the base of a fire in a timely fashion, it can be easily overwhelmed and result in an uncontrolled fire scenario."

Fortunately, today's ceiling-level sprinkler technology offers more options to building owners than ever before, whether looking to install ceiling-level protection at a new facility or retrofitting protection at an existing location that has inadequate protection.

"Many facility managers believe that, because automatic sprinklers are installed in their facility, all is well; this is not always the case," said Baker. Not all sprinkler systems are the same. Depending on the specifics of the sprinkler system in combination with the available supporting water supply, an automatic sprinkler system may or may not be able to prevent a fire from becoming uncontrolled. "For an automatic sprinkler system to function properly, it must be able to respond to a fire in a timely fashion and then discharge a sufficient amount of water to the fire area."

To succeed, a ceiling-level sprinkler system must achieve three performance criteria. It must limit the ceiling-level temperature during a fire so that only those sprinklers over and adjacent to the fire area operate; it must limit the temperature of any exposed structural steel so that the integrity of the building, which supports the sprinkler system, is not compromised; and it must sufficiently wet down combustible material adjacent to the point of fire origin in order to prevent excessive horizontal fire spread.

"These three criteria are interrelated," Baker explained. "If any one of them is not met, the result may be that none are met. In that case, the fire could become uncon-

trolled, destroying the contents of the building and the building itself, creating significant interruption to operations."

There are many ways a given storage arrangement, a commodity hazard or the structural elements of a building can render a ceiling-level sprinkler system ineffective. The timely response of the ceiling sprinkler system to a fire event can be negatively impacted by various items including heat/smoke vents, air-handling ventilation systems, the slope of the ceiling, and the channels created by ceiling structural supports. The inability to provide a sufficient amount of discharged water to the base of the fire can be affected by the presence of obstructing objects at ceiling level, the lack of adequate flue spaces within storage arrays, the provision of solid shelves in a rack storage structure, and/or the heat-release rate of a burning commodity hazard that is higher than what the ceiling was designed to handle.

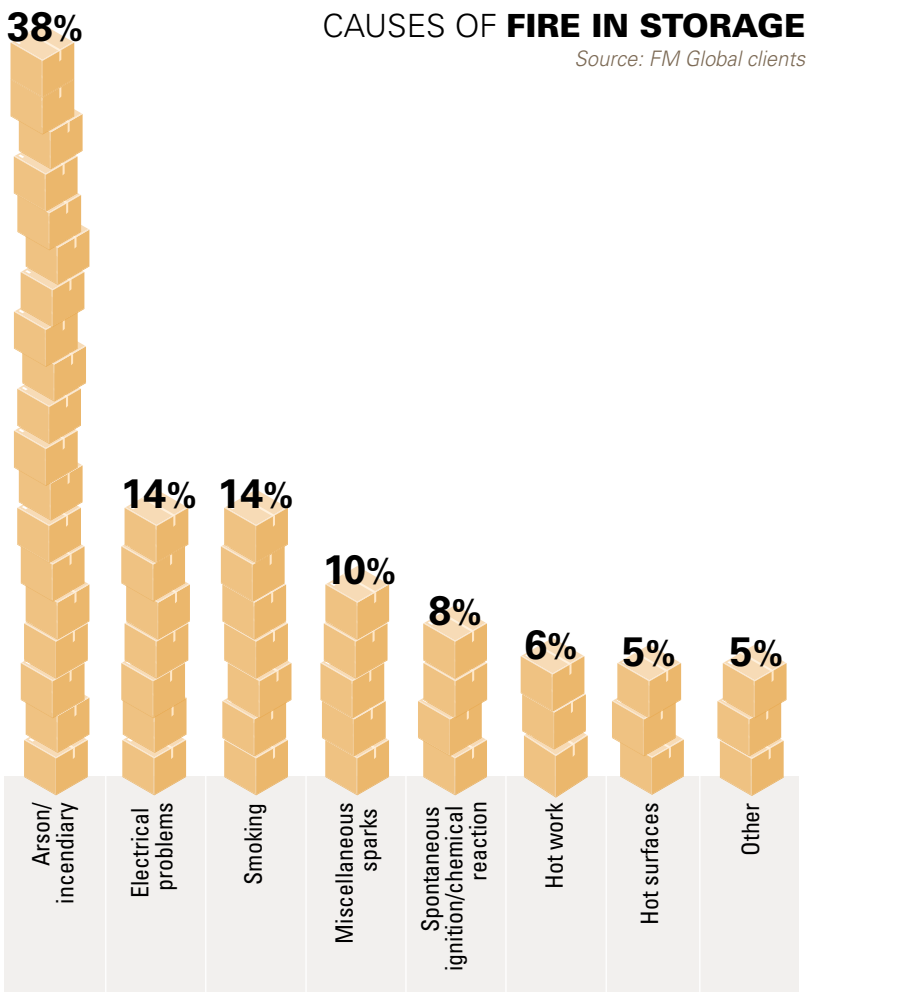
"If a ceiling-level sprinkler system is unable to discharge a sufficient volume of water to the base of a fire in a timely fashion, it can be easily overwhelmed and result in an uncontrolled fire scenario."

Wes Baker
ASSISTANT VICE PRESIDENT
SENIOR ENGINEERING TECHNICAL SPECIALIST

When a ceiling-level sprinkler system is determined to be unable to provide an acceptable level of protection, there are several options to consider in order to remedy the situation. Replacing existing older-style ceiling-level sprinklers with newer versions may be one option to upgrade the ceiling-level sprinkler system. In some situations, reinforcing a sprinkler system, adding in-rack sprinklers and/or adding a fire pump to the existing water supply may all be ways to upgrade the existing protection so that it is capable of providing adequate protection.

In 2010, FM Global introduced a completely revised version of its FM Global Property Loss Prevention Data Sheet 8-9, *Storage of Class 1, 2, 3, 4 and Plastic Commodities*. The major revisions to the data sheet included the elimination of certain sprinkler terminology in which the performance of the sprinkler was assumed. With newer-technology sprinklers now available, FM Global was seeing fire scenarios where the fire was being suppressed by control-mode type sprinklers. In other tests, FM Global was finding conditions in which suppression-mode sprinklers were not able to suppress the fire, however they were able to control the fire. "FM Global will once again release a revised version of this data sheet, which will include a revision to the way in-rack sprinklers are designed and installed, and will allow clients to take advantage of new technology to reduce the number of installed in-rack sprinklers."

"The exact method of economically and effectively upgrading an existing sprinkler system is dependent on the specific details of each system and the available water supply. The local FM Global engineer can help a client weigh the pros and cons of potential protection system upgrade options, while a qualified sprinkler designer can help determine which options may be the most practical and economical for the given location."



DRASTIC MEASURE

Field engineers are now equipped with a tool to define the pressure wave of an explosion, along with the devastation it could cause

Insuring chemical plants is all about understanding the hazards and risk. What chemicals are used, how they are used, what is produced, chemical storage conditions, and transfer operations all greatly impact the possibility for loss. And because of the potential severity of such losses, an accurate estimate of the maximum foreseeable loss is a significant underwriting factor.

FM Global field engineers now have an important tool in their chemical plant risk-assessment arsenal. The new BlastCalc tool allows field engineers to more accurately predict damage from one of the most devastating and destructive loss scenarios: a outdoor vapor-cloud explosion.

These explosions result from a gas or vapor chemical leak that creates a large cloud at the leak's source. The chemical mixes with air, creating a highly combustible cloud that, if ignited, unleashes a massive amount of energy in a violent explosion.

Understanding the energy release and its destructive power are key to understanding the loss potential. The BlastCalc tool, which took years to develop, permits FM Global field engineers to more accurately and efficiently calculate the potential damage of a vapor-cloud explosion than previously available methods.

"When we look at a chemical plant, we are trying to determine the maximum foresee-

able loss," explained Pat Lee, assistant vice president, principal engineer, chemical and pharmaceutical. "If we don't evaluate the exposure correctly, we fail to help our clients determine the right policy limits to protect their business interests as well as our own interests. The BlastCalc tool and its underlying flame acceleration methodology provides us with a very clear, repeatable way to calculate the exposure."

> "There have been a number of classic vapor-cloud events over the years. If you compare the damage predicted by BlastCalc, it compares very favorably to the damage that actually happened. It is better than any other methodology out there right now."
>
> **Pat Lee**
> ASSISTANT VICE PRESIDENT, PRINCIPAL ENGINEER, CHEMICAL AND PHARMACEUTICAL

BlastCalc was developed by Dr. Sergey Dorofeev, research area director, fire hazards and protection, at FM Global. The tool calculates not only the damage from the explosion, but also that of the pressure wave it creates.

The initial energy released from a vapor-cloud explosion is massive. Destruction at the point of ignition is complete and usually followed by fire. But the pressure wave produced by a vapor-cloud explosion, also known as the blast wave, extends the damage of a vapor-cloud explosion far beyond the ignition site. The pressure wave may have the ability to inflict damage for miles around.

Historically, vapor-cloud explosion calculations were done using the trinitrotoluene (TNT) equivalency method, calculating the damage done by an estimated equivalent amount of TNT. While the TNT equivalency method had the advantage of being relatively simple to use, the use of efficiency factors and differences in overpressure development resulted in damage being over-predicted in some cases and under-predicted in others.

Models that take into account the force of the pressure wave using flame acceleration calculations are now available. While these models more accurately predict the damage of a vapor cloud explosion, they also have drawbacks. The BlastCalc tool provides results comparable to other more sophisticated models, but faster and more cost effectively.

"Our old software used the TNT equivalency method, which is technically less accurate," Dorofeev explained. "There are other methods that take into account flame acceleration, but they are very expensive and take up a lot of computer time. BlastCalc gives our field engineers a practical tool they can use that takes into account flame speed, wave acceleration and the geometry of the site."

Some historic vapor-cloud explosions provide valuable insight into just how powerful these explosions are.

In 1974, a vapor-cloud explosion at a Flixborough, North Lincolnshire, U.K., chemical plant, killed 28 people. The U.K. Health and Safety Executive (HSE) determined that a ruptured temporary bypass pipe was the likely source of the chemical leak. The explosion damaged around 1,800 buildings within a one-mile (1.6- kilometer) radius and caused structural damage three miles (4.8 kilometers) away. The resulting fires burned for 10 days.

"The pressure wave can move buildings off their foundations," Dorofeev added. "There is a lot of fuel around, which can result in a very big fire."

In 1989, at a petrochemical plant in Texas, USA, a vapor-cloud explosion set off a series of devastating explosions, blew apart buildings, damaged or destroyed 50 chemical storage tanks, and killed 23 people and injured 314 more. The initial blast registered 3.5 on the Richter scale, and the conflagration took 10 hours to bring under control.

In 2005, a vapor cloud exploded at the Hertfordshire Oil Storage Terminal in Buncefield, Hertfordshire, U.K. The explosion measured 2.4 on the Richter scale and could be heard 125 miles (201 kilometers) away. The explosion knocked a wall out of a warehouse half a mile (0.8 kilometers) away and blew out windows five miles (eight kilometers) away. Following the explosion, six buildings needed to be demolished and 30 were in need of repair.

"There have been a number of classic vapor-cloud events over the years," Lee said. "If you compare the damage predicted by BlastCalc, it compares very favorably with the damage that actually happened. It is better than any other methodology out there right now."

The BlastCalc tool allows engineers to plot blast wave damage zones as one moves away from the ignition point. Those rings can be laid over a map of the facility, giving FM Global an accurate assessment of the potential damage of a vapor-cloud explosion. It provides field engineers with an important tool in assessing risk.

"This tool is user-friendly thanks to the expertise of Senior Research Scientist Regis Bauwens, who programmed the tool. Our field engineers can easily and quickly compare different scenarios, different fuels, different structures and different locations," Dorofeev said. "It give us a much better understanding of maximum loss."

"With BlastCalc we've really moved to the cutting edge of science and technology," Lee concluded. "From a business perspective, we have a methodology that gives us and our clients a level of confidence that we are setting our lines correctly. The damage predicted by BlastCalc compares very favorably to the damage observed in the actual event. It is demonstrably more accurate than any other methodology out there right now."

GETTING A HANDLE ON SPILLS

The Drainage tool assesses the ability of a facility to deal adequately with a spill or accident

FM Global is constantly looking to technology to improve processes, streamline procedures and provide consistent service to its clients.

Tools like BlastCalc (see page 34) and FM Global's new Drainage tool have helped make the lives of field engineers a little easier, providing them with a consistent methodology.

The Drainage tool has been developed to help field engineers accurately assess drainage capabilities in chemical plants and other industrial settings. The drainage systems are part of the risk mitigation and safety programs in these facilities, allowing ignitable liquid and water discharged by the sprinkler system to be quickly removed to a safe area in the event of a spill or accident.

FM Global field engineers can now use the new Drainage tool to calculate the maximum capacity of a drainage system and assess it to determine if it is adequate to handle any potential spill.

"Usually you're not just looking at the spilled liquid," explained Amy Brown, staff engineering specialist, engineering standards, who sponsored the development of the tool. "You have to consider scenarios where sprinklers are activated. We have to look at the type of sprinkler, the flow of water and the number of sprinklers activated. Then we have to determine if the installed drains, trenches and piping can adequately discharge the liquid to a safe location."

At the Hydraulics Lab at FM Global's Research Campus, a series of experiments were run using a broad range of drain sizes and discharge pipes to measure water-flow rates. The experiments tested a wide range of flow rates, making the Drainage tool applicable for almost any scenario.

"The Drainage tool helps our field engineers perform complex calculations much more rapidly," said Franco Tamanini, consulting research scientist at FM Global who helped create the Drainage tool software program. "It improves efficiency and consistency in the way we arrive at conclusions and make recommendations to our clients."

Michelle Blanchet, senior staff engineer at FM Global, helped assess the tool, which was then beta tested in the field before being rolled out. "Using the tool, field engineers can accurately assess any drainage capability by inputting information on the number of drains, their size and location, and the size of discharge pipes. They can also test how additional drains or different size discharge pipes would affect the overall system," Blanchet explained.

"We're not out to turn our field engineers into drainage designers, but this tool gives them an easy way of evaluating the capacity of a drainage system," Brown added. "This certainly has applications beyond the chemical industry. Ignitable liquids are an integral part of a lot of manufacturing."

"The Drainage tool helps our field engineers perform complex calculations much more rapidly. It improves efficiency and consistency in the way we arrive at conclusions and make recommendations to our clients."

Franco Tamanini
CONSULTING RESEARCH SCIENTIST

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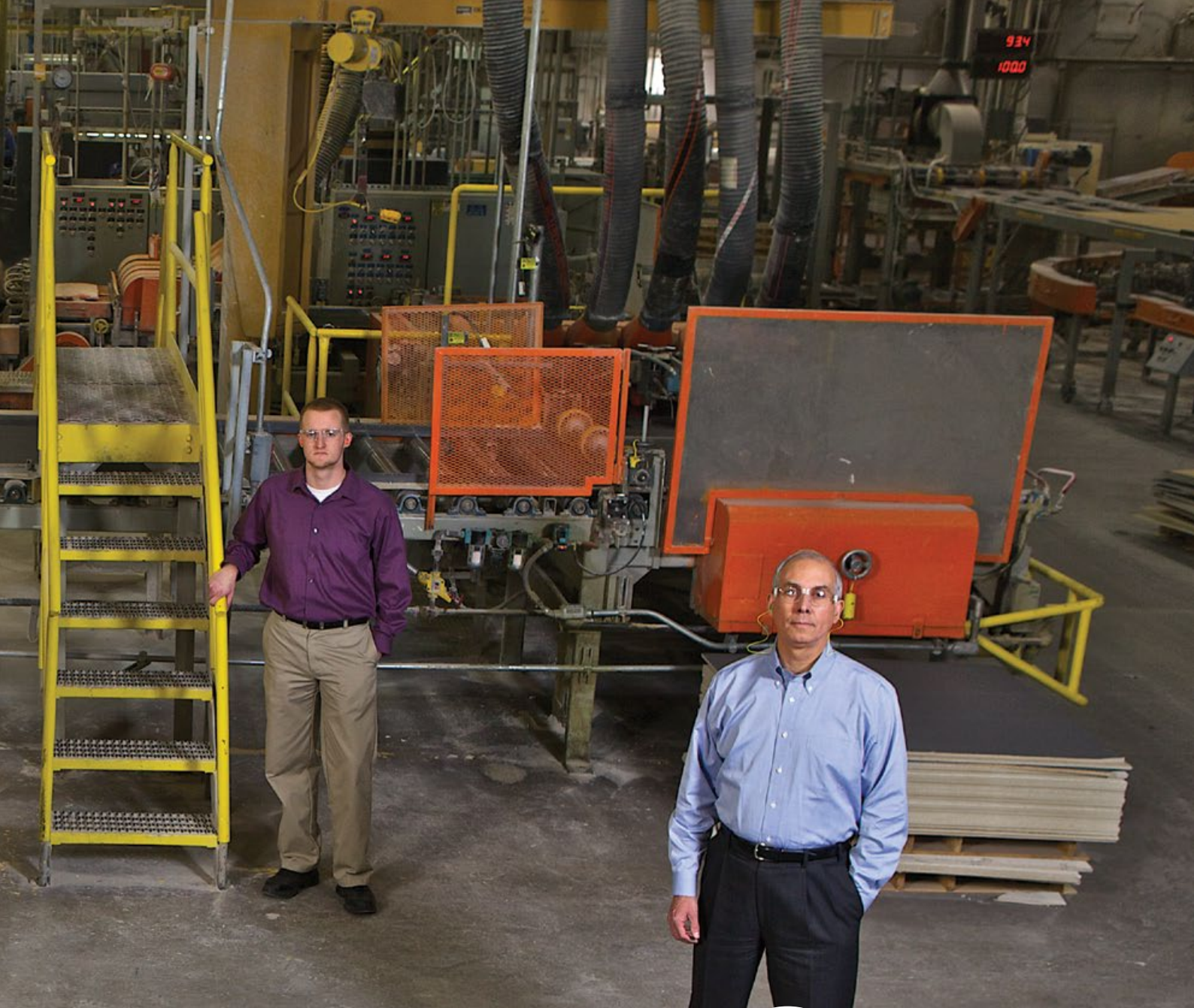
From left: Chris Rokke, *plant engineer, USG;* **Chad Lykins,** *account manager, FM Global;* **Bill Schmitt,** *plant manager, USG;* **Bob Steinbach,** *senior account engineer, FM Global;* **Troy Gist,** *field engineer, FM Global; and* **Jim Bencomo,** *director of risk management, USG*



A BEST-LAID PLAN

Thanks to tremendous foresight and a tireless commitment to safety, USG, a pioneering building products giant, beats back a 500-year flood, preserving a vital business unit and saving millions of dollars.

Going on 110 years now, Chicago, Ill., USA-based USG Corporation has been a leader in producing innovative products and systems to build the environments in which we live, work and play. As the inventor of wallboard and mineral wool ceiling tile, USG essentially created North America's building materials industry.

USG is North America's leading producer of gypsum wallboard, joint compound and a vast array of related products for the commercial, residential and repair and remodeling industries. It is a global leader in the manufacturing of ceiling suspension systems and is recognized as a premier acoustical panel and specialty ceiling innovator. Its flagship brands include SHEETROCK® gypsum panels, DUROCK® cement board, and MARS™ and RADAR™ ceiling panels. USG has more than 9,000 employees worldwide, and its 2011 sales topped US$3 billion.

In 2012, its plant in Cloquet, Minn., USA, was hit with the worst flood in the history of the St. Louis River. The flood caused more than US$80 million in damage to nearby Duluth. But the USG Cloquet plant suffered only minor damage. Working together, FM Global and USG had implemented flood mitigation measures in 2011 that helped prevent more than US$25 million in flood-related damage.

Without the flood mitigation repairs, we would have had a pretty drawn-out business interruption. Our entire electrical infrastructure would have been compromised. Without the flood gates, flood water would have filled the basement to the ceiling. We would have been down for months.

Chris Rokke
Cloquet Plant Engineer, USG

On June 19, 2012, the St. Louis River watershed received anywhere from 6 to 12 inches (15 to 30 centimeters) of rain in about eight hours. The storm dumped so much water in the St. Louis River basin, in such a short amount of time, that it overwhelmed the region's flood control.

The normal flow of the river is 1,000 to 2,000 cubic feet per second [305 to 610 meters per second]. At the peak of the flood, it was running at 50,000 cubic feet per second [15,240 meters per second]. You could see that kind of change on a small river, but it's unheard of on a river of this size. We have a gauge we use to measure the river. Normally it runs below zero. The last time we were able to get to the gauge, it was at almost nine feet (three meters) and that was well before the peak.

In our flood emergency response plan, we have certain actions we take at each milestone. The water rose so quickly, it blew past all our milestones. Almost immediately, we were at full implementation. The water from this flood was one foot (0.3 meters) over the record peak of the river. It really was a 500-year-plus event.

In Scanlon (where the official measurements were kept), the water level went from 6 feet to 16 feet (2 meters to 5 meters) in less than 24 hours. In Thompson, downstream from the Cloquet plant, the hydro plant was overwhelmed. The flood destroyed the retaining pond, and it is still not operational. Jay Cooke State Park, which sits along the river, was closed all summer. Highway 210 in Thompson was washed out and six months later it was still closed. In some places, the water washed out so much of the road bed it's still uncertain how or if it can be repaired.

But thanks to the flood protection work we did six months earlier at the recommendation of FM Global, we had virtually no damage at the Cloquet plant. In fact, we were up and running five days later.

FM Global had identified the potential for flood risk and recommended we make improvements to prevent water from entering the facility during a flood. We made sustainable repairs to the north wall of the facility (the wall on the river side). The facility is almost 100 years old, so there were a lot of openings to the basement that no longer served a purpose. We filled in a lot of old pipes, replaced and cemented over some old windows and filled in abandoned tunnels. We repaired anything that was below flood level. We also installed flood gates at the loading dock and at three main doors.

The plant had been flooded twice before—once in the 1950s and once in the '70s. But Minnesota Power now has two dams on the river above the plant and several more below the plant. So the flow of the whole river is controlled and we thought the likelihood of a flood was pretty low. But the watershed was hit with such a large amount of rain in such a short period of time and the volume rose so fast, it couldn't be controlled.

Without the flood mitigation repairs, we would have had a long, drawn-out business interruption. Our entire electrical infrastructure would have been compromised. Without the flood gates, flood water would have filled the basement to the ceiling. We would have been down for months.

Bill Schmitt
Cloquet Plant Manager, USG

This is a very large facility. We have more than one million square feet (93,000 square meters) under roof. We make two kinds of mineral fiber acoustic ceiling tiles here, mostly for use in commercial buildings. We ship all over the world. The majority of our production lines run 24 hours a day, five days a week, with one running seven days a week.

We have a five-year plan that we work toward internally for all roofs and infrastructure at the plant. We get recommendations from FM Global and merge them together with our five-year spending plan. We are always making modifications to the plant to improve efficiency and safety.

If the basement were flooded, the losses were expected to be between US$20 million and US$25 million, and we would have been down for up to 20 weeks. That would result in millions of dollars in lost production and inconvenienced customers.

FM Global has been a good partner. We always rely on them to provide guidance any time we build or make improvements. We do a lot of roof replacement and always follow FM Global guidelines. Whenever we do building or electrical work, we strive to be compliant with FM Global recommendations and, in many cases, we go beyond those recommendations.

Per FM Global's recommendations, we invested about US$500,000 in flood prevention work over the past year. We were looking at an increase in premium (without the flood improvements) so there was an economic reason for it but, honestly, none of us thought that there was much of a likelihood of a flood.

But we did have a pretty good idea of what it would take to get back in operation if we were flooded. Even though a flood was unlikely, we identified flood prevention as critical to our business. We are constrained for space so we keep a lot of vital equipment in the basement (below flood level) because there is nowhere else to put it. If the basement were to flood, the losses were expected to be roughly US$20 million or as high as US$25 million, and we would have been down for up to 20 weeks. That would result in millions of dollars in lost production and inconvenienced customers.

It is very important that this plant stay open. Cloquet and the ceilings products we produce are integral to the success of our ceilings business. If we're down, we would be unable to meet customer demand. It would have an extreme negative impact on USG from a reputation standpoint and our ability to take care of our customers. If our clients have to go someplace else to get the product, we might not get them back. The tiles we produce are also very important to USG as a whole. Despite the downturn in the economy, this product line has continued to be a strong performer.

The flood was devastating. There were a lot of areas that were completely submerged, but we came though this relatively unscathed. Thanks to the flood prevention work we did, we were current with all orders 10 days after the flood hit. We had trucks loaded with product driving through one foot (0.3 meter) of water to get out.

Jim Bencomo
Director of Risk Management, USG

For me, there are two key aspects to risk management. One is financial, using risk management and insurance programs to manage the exposure that your balance sheet faces when bad things happen. Events will happen. When they do, you might end up paying out of pocket, getting an insurance recovery for the premium you paid, or avoiding losses all together due to investments in loss prevention. Having the right mix in place is an important part of USG's overall financial strategy.

Possibly even more important is operational risk—the risk to your ability to operate safely and to reliably serve your customers. The first and foremost precaution we take is to make sure we operate safely. USG's emphasis on safety includes programs to manage exposure to combustible material, electrical hazards and natural catastrophes. We want to make sure we have good, safe, effective production of the products our customers are looking for. FM Global is very involved providing recommendations and in partnering with USG to find practical, effective solutions to operational risk.

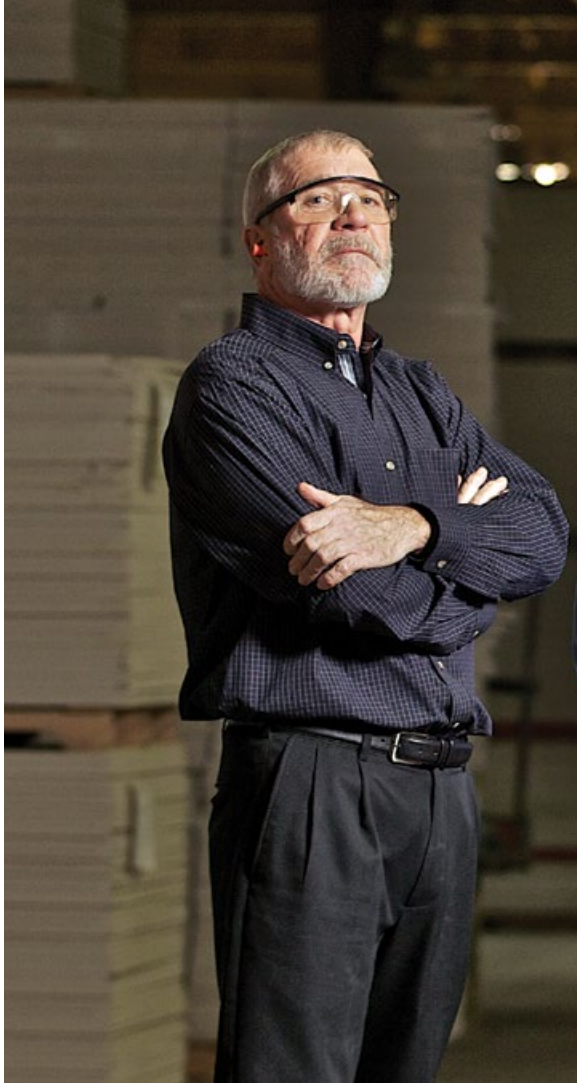
USG has always had a very strong safety culture, and we have won more awards in the safety category than any other company our size. We are a founding member

From left: **Bill Schmitt** and **Jim Bencomo**

of the National Safety Council, which was established in 1914. As a further testament to the company's safety focus, a number of our facilities have achieved OSHA's (Occupational Safety and Health Administration) VPP (Voluntary Protection Program) Star certification. Safety is one of our core values and we've always put a tremendous amount of emphasis on that.

We are planning a major expansion here and we don't want our exposure to flood to take all that away. FM Global has really worked with us to help us understand the exposure to our business.

Serving the customer is everyone's job at USG. For risk management an important part of that job is helping manage the possibility of a business interruption at a facility. This is a special concern at the Cloquet plant, where the ceiling tiles made here are a very specific product. Many of the ceiling products shipped from Cloquet are specified for use in individual projects with tight installation deadlines. Delays or substitutions are simply not acceptable. The ceiling tile business has been one of our strongest performers and that contribution to USG's overall profitability is another reason to dedicate resources to the Cloquet facility. We are planning a major expansion here and we don't want our flood exposure to wash that away. The identification and assessment of the flood risk at Cloquet that FM Global provided was invaluable in helping USG meet its commitments to its customers when the flood hit.



Bob Steinbach
Senior Account Engineer
FM Global

USG has been with us since 1985, and I've been on the account for 25 years. We look at all their existing sites and work with risk management to provide recommendations on where they should invest from a risk management standpoint. We provide them with a top-10 list from all their facilities. Basically, we show them where they can get the most bang for their buck as they budget for capital improvement over time. USG has always been excellent about investing in their infrastructure. Even during the economic downturn, they were implementing a lot of our recommendations.

We put a major emphasis on flood emergency response plans, particularly at the Cloquet location. Basically, we want the plant to have a plan in place in the event of a flood, so they can be ready to go if it happens. They are in a flood plain, and there was going to be a significant but necessary reinsurance cost if they didn't take steps to mitigate the flood risk.

We come to the Cloquet plant for annual field engineering visits. We send the loss prevention reports and request a response so we can keep track of every recommendation we make. We prioritize so we can address the exposures with the highest loss expectancy. We had the potential to lose the whole site in the event of a flood. USG can't produce the product at another site and could lose customers and market share. That's why we made flood mitigation a priority.

This site is unique. There is a lot of old infrastructure. There were a lot of old pipe holes and doors and windows that made the basement vulnerable. Mostly, they were easy fixes. The biggest expense was moving some electrical transformers out of the basement and out of the flood zone. Ideally, you would want to move everything out of the flood plain, but space is at such a premium at this location that there is just no place to put everything. That's why the flood plan is so important, knowing what to do and what critical pieces have to be moved in the event of a flood. We also made recommendations to keep water out of the basement. The investments they made in fixing the walls and installing flood gates prevented an estimated US$25-million loss.

Chad Lykins
Account Manager, FM Global

I utilize the information that Troy Gist reports during his location visits and, working with Bob, use that information to underwrite the business. We're always focused on risk improvement efforts and premium savings for our customers. For Cloquet, we had several recommendations preventing the plant from being considered a highly protected risk, and there were significant savings for USG associated with the completion of those recommendations.

A lot of it comes down to loss expectancy. We had always recognized there was a flood exposure at the Cloquet facility, and our standards allow us to provide a certain amount of capacity for flood. The loss estimates in the event of a flood were getting so high we really needed to mitigate some of that loss potential.

Risk mitigation can lead to significant premium savings and it certainly can be used as a tool to aid the customer as to where to invest their money. I think a real partnership has developed over the last 30 years with USG. They are not the type of client to buy insurance as a commodity; they take seriously our counsel and advice.

Our recommendations involved moving a lot of critical components from the basement and above the floodplain. And if it couldn't be relocated out of the basement, they needed to take additional steps to keep the water out in the event of a flood. That's what they did. By working with us and focusing on mitigating this very real exposure, USG was able to avoid a US$25-million loss. It was a win for all parties.

We had the potential to lose the whole site in the event of a flood. USG can't produce the product at another site and could lose customers and market share. That's why we made flood mitigation a priority.

From left: **Bob Steinbach**, **Chad Lykins** and **Troy Gist**

Troy Gist
Field Engineer, FM Global

As a field engineer, I've been visiting the Cloquet site for a long time, and my job is to help them keep the ball moving on facility improvements. Ideally, we work on the greatest exposures to USG. Our client service team and our risk management team identified flood risk as a priority, and there was a significant impact on premium. USG thought it was highly unlikely that a flood event would occur, but they agreed with us about the need for risk mitigation.

At our recommendation, they got a third party to survey the whole property and then we helped them interpret those results. That's when the dialogue really started. The survey information helped us make recommendations for improvements against potential flood. We recommended installing flood gates and eliminating any way that water could get into the basement.

USG is really proactive and they put a lot of stock in what we recommend. I think a lot of companies are trying to do more with less. We know a lot about losses and loss prevention, and instead of having their own personnel responsible for it, a lot of clients defer to our expertise. Clients tell me that they'll walk by something every day and not notice a potential risk, but I'll be there for a day and spot it as a risk right away. FM Global engineers can bring a lot to the table.

From my perspective, it's great working with a local company like USG. I grew up just downriver and I had two grandparents who worked at this facility. USG is not just interested in doing the minimum. Our recommendation on flood mitigation is to build to the 500-year flood level plus two feet (0.6 meters). In a lot of cases, USG went to 500 plus three feet (0.9 meters), which ended up being the difference during this flood.

CONVINCING

FUNDING RISK IMPROVEMENT, GETTING A RETURN ON THAT INVESTMENT, AND HOW MAKING GOOD BUSINESS DECISIONS CREATE AN ENDURING ENTERPRISE

ARGUMENTS

About this important study

The purpose of the research that produced this study was to learn from successful clients how they typically gain commitment to risk improvement within their organizations. Armed with this valuable new insight, FM Global could share more broadly with its clients to help them achieve greater resilience at their facilities. The research involved conducting in-person interviews with a total of 17 clients—seven in Europe and 10 in North America—and their respective client service teams. The tenure of these clients ranged from at least six years to more than 20. This is a major indicator that risk improvement takes time to sell and time to implement. The staff of these risk management departments ranged from one to 10 people; FM Global client service teams and field engineers were viewed as extensions of their risk management function. There was a dichotomy in organizational structure. Almost all European clients interviewed had decentralized organizations, while most North American clients had centralized organizations. Risk managers in decentralized organizations must engage more people across the organization to gain risk improvement commitment, making the scope of the challenge significantly greater.

"You have to have a grassroots effort to build relationships across the organization—you cannot do it from behind your desk."

With globalization accelerating and an increased frequency of natural disasters, corporate resiliency is becoming more of a competitive advantage. In reviewing the natural disasters of 2010 and 2011, certain automotive manufacturers benefited in terms of gaining market share over the lack of their competitors' resilience in both owned and extended supply chain facilities. There was a significant shift between the two largest hard-disk manufacturers due to the Thailand floods—one of them had a significant decline in production due to disruption to their owned facilities and extended supply chains. The key to business continuity goes well beyond insurance: It is about preventing loss through protecting those critical physical assets that generate the revenue. It is within this context that those organizations most effective at gaining corporate commitment to enhancing resiliency will win the day.

Vision

As with any corporate initiative, the quest for risk improvement begins and ends with a clear and concise vision related to a measure of resiliency. In client interviews, that vision was typically articulated in the percentage of critical facilities attaining a highly protected risk status. While risk managers appreciate and desire that all recommendations are put on the table by FM Global, they will only undertake those that have the greatest impact on reducing their revenue exposures. As one client put it, it is about "making a conscious decision about whether to mitigate or accept the risk." This vision is an evergreen one because "business is dynamic, and you need to demonstrate your knowledge of the business on an ongoing basis."

Alignment

Once a vision is developed, motivating the organization to act on that vision is the next step. One client indicated, "You need to have everyone pulling in the same direction." The FM Global client service team and field engineers, as well as the client organization, with strong leadership from the risk manager, need to be on the same page in terms of how the vision needs to be realized. Every organization has a unique set of decision-makers responsible for relevant capital or operational budgets and implementing risk improvement. They range from a board of directors to operations management to local facility managers, depending on the scope of the risk improvement initiative. Several clients indicated that their CFO is a major decision-maker for capital improvement budgets, where significant risk improvement investments are being undertaken. If a broker is involved, that intermediary must be on the same page. Conversely, for smaller risk improvement initiatives, FM Global field engineers collaborate with local facility management to invest in and, in some cases, implement risk improvement. With supply chains, the client leverages the relationship it has with suppliers to get them to invest in risk improvement. In some instances, the clients indicated a joint investment with suppliers to improve resilience.

Timeliness

Another component to alignment is ensuring the timely and effective implementation of risk improvement. This requires

HOW CAN RISK IMPROVEMENT BE ACCOMPLISHED?

"You need patience. The effort and investment are long-term."

"Partnership, transparency and trust."

"Be persistent at all levels. You need to repeat the message."

collaboration among the FM Global client service team, field engineering, local facility personnel and contractors/equipment vendor/installers. Many facilities operate 24 hours/365 days a year and have infrequent planned halts in production. The key finding is that there is significant planning that takes place well in advance of the stoppage. In some instances, the FM Global client service team, field engineering and the client collaborate to identify creative solutions for implementation while the facility remains in operation.

What are the implications?

One client told us that selling risk improvement "is about making a long-term commitment to facilities, staff and education. It will pay off in the long run." The research clearly demonstrates that gaining risk improvement commitments is about the risk manager conveying a clear vision of resiliency and how they want to accomplish it within their organization. To achieve the vision, the corporate environment needs to have certain inherent performance characteristics. It is also about determining how to implement risk improvement on a timely basis. FM Global's role is as a consultant—partnering with the client to provide all the technical recommendations and helping risk management prioritize these recommendations on a periodic basis.

Finally, risk managers face ongoing obstacles to attaining their vision—strategic decisions, organizational changes, financial constraints and technology changes. The key to success is partnership, with both the client and the insurer embracing these challenges. With the help of FM Global, the client must identify and develop the right relationships on the corporate side, maintain existing ones and, when conveying critical risk management issues, be assertive and confident. As one client stated, "It is a journey."

CHALLENGES TO IMPLEMENTING RISK IMPROVEMENT

The path to resiliency does not always go as planned. Clients indicated a number of significant obstacles in their quest to achieve a vision of their risk management ideals. However, those obstacles do not deter them from their vision. Below are some of the common themes that were identified:

Personnel Roadblocks

A number of clients indicated that there were key influencers who would not accept any risk improvement initiatives proposed, no matter the business case. In one instance, the risk manager was able to circumvent the roadblock by developing relationships with those who have a strong relationship with that person; in essence, isolating the obstacle.

Turnover

Risk improvement initiatives may not always be attainable due to turnovers in staffing, on both the client and the insurer side.

Mergers and acquisitions

This meant that the new company acquired typically was of a lower risk quality, while dealing with a new set of decision-makers. However, that did not stop risk managers from identifying and forging new relationships in a short period of time.

New technologies

With new technologies there are new hazards that, in some instances, mean a change in risk quality for key facilities. The critical step here is to manage expectations by gaining a thorough understanding of the emerging hazard.

Geographic expansion

Language and local culture can impede the investment and implementation of risk improvement.

Product availability

The inaccessibility or high cost of quality construction material in emerging markets makes gaining commitment to risk improvement even more challenging. Finding alternative local solutions was noted as a critical step to overcoming this obstacle.

BIGGER BANG FOR THE BUCK

by Bret Ahnell, senior vice president and Western division manager

MAKING GREAT BUSINESS DECISIONS WITH YOUR RISK IMPROVEMENT CAPITAL

"It may be impossible to eradicate all risk, but it is possible to manage it."

It goes without saying that the last several years have been challenging for most organizations. Challenges like the recession, currency and sovereign debt have hit most multinational companies, as have issues with supply chain and compliance. Any one of these hurdles is daunting. Taken together, the issues can be overwhelming, and they certainly put intense pressure on capital expenditure budgets.

With fewer dollars to spend—but the same needs to address—how does one go about making decisions concerning where the money should go? And, of that capital expenditure budget, where does money for risk improvement fit in? The answer can be elusive. With so many "mouths to feed," why should even a small fraction of that budget be set aside for risk improvement?

Well, despite what risk managers might hear from some corners of the company, there are many reasons why, such as the following:

If a company has been in the unfortunate position of having had a loss, investments in risk improvement are easy to sell. After having a loss, who wants another?

Whether they've had a loss or not, companies cannot afford to experience a significant interruption in production or product flow. From a high level, risk management is about making good business decisions, and the key to making a decision to expend capital is to base that decision on real business needs. That means either developing new income or preserving existing income.

If there is an interest in loss prevention at any level in an organization, then there's an awareness that bad things can happen. That's something we're reminded of every time there's a major event, whether it's a fire or any major natural hazard event. If risk improvement has become part of the culture at an organization, then it's making strides toward investing smartly in worthwhile mitigation projects.

However, when it comes to investment of capital, decisions need to be made on the basis of facts and defensible logic rooted in reliable and consistent analysis. FM Global's role is to assist in making these business decisions—to put the risk manager or the treasurer in a position where she can confidently articulate the logic and share the supporting data. It may be impossible to eradicate all risk, but it is possible to manage it. Our job as an insurer is to ensure that our client gets the biggest bang for their risk management buck.

This is sometimes framed in terms of "return on investment or ROI." However, true return on risk improvement investment is a tough concept to prove, especially when you consider that the "return" is essentially the avoidance of something. How do you determine the return on something that hopefully never happens? It is probably more helpful to think of a "return" in this context as a preservation of something, also known as revenue or profit. But we always need information to support the case for expenditure and, in the face of many capital demands, to assist us in prioritizing where to spend most effectively.

Some risk executives often go right to mitigation, but without properly identifying and assessing the business' greatest exposures to risk. How do you make a smart decision on mitigation alternatives? It helps to have a lot of data; the more that's available within the proper context, the better

ONE DIRECTION:

Good decisions begin with a clear, consistent understanding of risk

Risk Identification and Assessment

- RESEARCH AND TESTING
- REGULAR PLANT VISITS
- CLEAR UNDERSTANDING OF HAZARDS
- BUSINESS RISK ANALYSIS
- GLOBALLY CONSISTENT AND REGULARLY UPDATED STANDARDS

Risk Avoidance and Reduction

- PRACTICAL, PROVEN SOLUTIONS
- PREVENTION AND CONTROL OPTIONS
- HELP TO SELECT BEST OPTIONS
- EXECUTE DECISIONS
- TRAINING
- MANAGE CHANGE

Risk Acceptance and Transfer

- NO REWARD WITHOUT RISK
- CLEAR ASSESSMENT, BETTER DECISIONS
- FINANCIAL STRENGTH
- SUBSTANTIAL, RELIABLE CAPACITY COMMITMENT
- BROADEST COVERAGE
- WILLING TO PAY CLAIMS
- KEEPS PACE WITH YOUR NEEDS

the decisions. Identify and assess data that is factual, accurate and consistent.

Probably the most reliable underpinning for any risk improvement decision-making conversation is the basis for exposure evaluation itself.

Yes, it's an FM Global field engineer who walks the plant, explores the risk improvement options, develops the supporting data and writes the report. We have more than 1,600 engineering staff deployed throughout 100 countries. Their engineering knowledge comes through many years of applied scientific research, which is conducted at the FM Global Research Campus, the largest facility of its type, the results of which find their way into FM Global's *Property Loss Prevention Data Sheets*. And, all of our field engineers are rigorously trained, ensuring that every field engineer is equipped with a depth of knowledge and reliable supporting information to ensure a consistent conclusion and recommendation to any identified exposure.

Consistency is a key factor when risk managers, treasurers, CFOs and CEOs alike are trying to prioritize those exposures. It's essential to have a consistent approach.

When it comes to exposures to the business, a simple metric is an FM Global recommendation. By definition, it is an exposure, and it is quantified. That process isn't arbitrary; every FM Global engineer uses the same standards and rules of development for the exposure scenario, the solution and the loss expectancy (magnitude) before and after the event. For the treasurer, CFO and CEO, they can be assured that, within reason, the detail around an FM Global recommendation (and in particular, the exposure quantification) will be globally consistent.

For every recommendation by every engineer after every visit, the risk manager or treasurer can confidently show the simple magnitude of exposures for decision-making, and relate them to the relative cost-to-eliminate figure. So, how do you prioritize these recommendations?

Depending on the specifics of any client, you could decide a "low-cost" recommendation is one with a cost-to-complete of less than US$10,000. On that basis, you could instruct all sites to simply mitigate those exposures. Remember, the amount is for illustration purposes and could vary up or down. For that group, the debate is over—they're simple and cheap risk improvements.

Remember, the objective is to ensure that, by wisely and efficiently spending capital, risk is essentially being driven out of the organization.

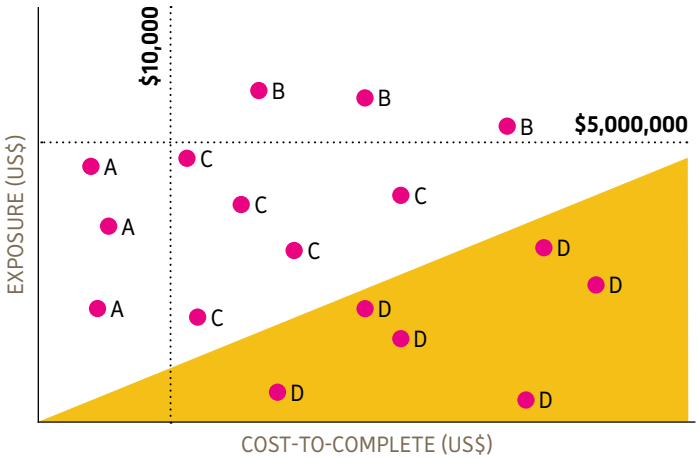
Some clients decide that any recommendation with an exposure greater than an unacceptable threshold is "high-exposure." While the loss expectancy may vary, it's at a threshold where everyone agrees that it's large. That is, we're talking about a level where there's no debate that it's a major exposure. In some cases, the clients use this as a trigger to say that local management should get quotes for the work and submit the capital request. These

EXPOSURE vs. COST-TO-COMPLETE

While there are many sophisticated options for analyzing data, here's one that's simple and effective:

Simply map your various exposures on the basis of magnitude (exposure) and cost-to-complete. A "low-cost" (A) recommendation is one with a cost-to-complete of less than US$10,000. A "high exposure" (B) recommendation is unacceptable. In some cases, this is a trigger for local management to get quotes for the work. These should be prioritized, across the enterprise, on a global basis.

This leaves two further categories: those exposures that fall into the area of "best risk-reduction-to-investment" ratio (C), and those with "lesser return" (D). In reality, only a few exposures typically land close to the agreed line and need further analysis to prioritize.



A – LOW-COST RECOMMENDATION

B – HIGH EXPOSURE RECOMMENDATION

C – BEST RISK-REDUCTION-TO-INVESTMENT RATIO

D – LESSER RETURN

can then be prioritized across the enterprise on a global risk management basis.

This leaves two further categories for discussion and further analysis: those that fall into the area of best risk-reduction-to-investment ratio and those with an even lesser "return." In reality, only a few exposures typically land close to the agreed line and need further analysis to prioritize. The global organization will want to add a broader risk context to the process. How do these exposures relate to the overall risk quality of the company's sites, and against the relative importance of each site to the company's overall business? For more complex product lines, further analysis can be conducted (with the FM Global account engineer and/or our business risk consulting arm) to more deeply qualify the exact magnitude.

This focuses the basic data on a location-by-location basis. It considers that all things are equal, that all locations in your portfolio are of identical and equal business importance. This concept for modeling ROI is easily extendable across your portfolio. It means that it remains for the client to "add context," based on market and business plans, relative site importance to the organization and so on, in order to prioritize an overall risk improvement budget.

However, there are additional tools that can add some context, though admittedly not all, to further refine the planning. FM Global's Risk*Mark*® is one such tool. Risk*Mark* represents the relative risk (for comparison/prioritization purposes) using a 1-to-100 scale. It compares different types of risks in all occupancies using a standard process and a consistent set of data within an algorithm. The algorithm was designed using the data representing the known factors that lead to losses.

This type of approach helps the global organization that wants to add a broader risk context to the process. How do these exposures relate to the overall risk quality of the sites? And how does it measure compared with the relative importance of each site to the overall business? Also, how do the sites relate to their peers in the company, in their industry? For more complex product lines, further analysis can be conducted to more deeply qualify the exact magnitude. But the result is the same: a clearer understanding of the large exposures to the business.

There are many methods and a variety of arguments to help determine where to focus your efforts. Here's a fundamental idea that uses the data simply and clearly. Why not marry two tools we use here? First, consult the aforementioned Risk*Mark* to determine which of your physical locations are most vulnerable to loss. Then conduct a business interruption analysis (BIA) to determine the biggest revenue drivers within your company. If there's an overlap in your organization between these two results, then you know exactly where you need to target your risk management budget.

Everything here revolves around data, information and tools. Some are intuitive, universal and standalone, while others are available through FM Global. However, if there is a "sales pitch" element to this whole thing, it's

to recommend using your FM Global client service team. They have access to the knowledge and tools that can assist you in preparing your risk improvement strategy, and in a way that allows it to be positioned such that it resonates with your organization's culture and senior management.

On a deeper level, FM Global's business risk consulting (BRC) team starts its business impact analysis service with a thorough understanding of the business. It identifies the critical areas of the business, leverages existing engineering data to understand the physical threats that exist, and then overlays detailed financial data to quantify the key business drivers identified. The result is a comprehensive understanding of the physical and financial risk involved, in specific monetary terms, and this allows our clients to know where the priorities need to be when developing risk mitigation strategies, deploying risk improvement and making other risk management decisions.

All of this works best when driven by the client. We observe that successful risk managers find a way to develop their own methodology and align their approach with whatever metrics they use to evaluate ROI in their own companies. But the requirements remain the same as in the original model.

With the confidence that the underlying data and assumptions are solid and consistent, subsequent decisions on expenditure can remain driven by the business plans of the organization.

We recognize that the approach to selling risk improvement will be different in every case, and FM Global's desire is to partner with our clients' risk managers to mobilize our services in a tailored way that allows them to make great business decisions on managing risk.

Part of the value we bring is that we have learned a great deal about loss during the past 177 years. As a mutual company, we pool and share the experience we obtain for the benefit of our clients. What we learn from these losses can help prevent our clients from experiencing the pain themselves.

SO, WHERE'S THE MONEY COMING FROM?

We know that every organization is different, and there is no formula for allocating funds to invest in risk improvement. At the very least, companies need to be creative. We can help establish the facts about exposures, including risk identification and business interruption costs. We can also help execute loss prevention measures. But you'll have to navigate your own organization to find the capital. Here are some ideas that have worked with our clients:

▶ *Find this exclusive video coverage on our magazine website,* **fmglobal.com/reason.**

Working Together

Watch how USG, a leading building-products manufacturer, successfully defended itself against a 500-year flood event and saved a core business unit in the process.

Introducing… Jenny Chao!

In our new series, explosion specialist Chao talks about her curious line of work.

Talking Points

Georgene Saliba, administrator for risk management and patient safety at Lehigh Valley Health Network, speaks on the challenges, worries and excitement of her role.

Sprinkler Protection

In this test video, watch how a single ceiling-level sprinkler suppresses a fire involving storage of cartoned unexpanded plastic.

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