

Modern Resilience

**Furniture maker Knoll
manages risk—with style**

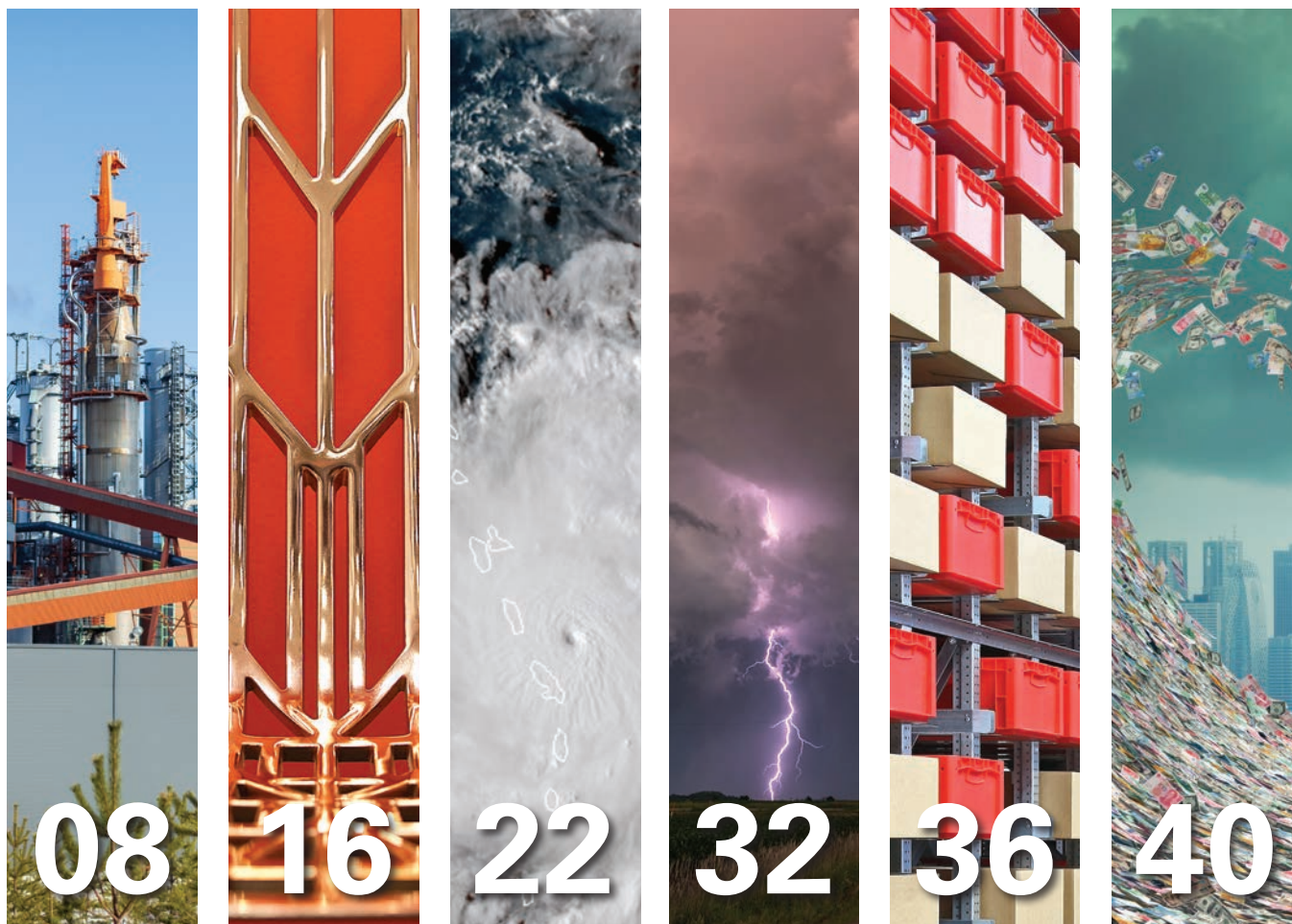


SUFFER A DISASTER **OR** REPLICATE ONE?

The FM Global Research Campus, the only facility of its kind in the world, can simulate real-world disasters, from fires to Category 5 hurricanes, so clients can outsmart them.

RESILIENCE IS A CHOICE.





FEATURE ARTICLES

08 Doing What Comes Naturally

An innate risk management approach has helped Stora Enso become Europe's leading paper manufacturer.

16 Sitting Pretty

A dust fire has led high-end furniture manufacturer Knoll on a seven-year journey to drive down risk.

22 Eye of the Storm

Mylan Pharmaceuticals' facility in Puerto Rico survived Hurricane Maria thanks to a 15-year effort to make the plant more resistant to hurricane-force winds.

30 Cyber Risk Assessment

The 70-question online survey gives clients greater insight into their cyber exposures.

NOTEWORTHY

06 São Paulo Fire Service Commander Earns Advocacy Award

06 Fight Fire with...Sprinklers

07 Let's Get Real

07 Brion Callori Named to NFPA Board

07 Caterpillar's David T. Walton Elected to FM Global's Board of Directors

IDEA

32 Why We Ride Out Life-Threatening Storms and Do Other Crazy Things

36 Protect Your Warehouse from Emerging Fire Risks

40 Disaster Resilience Varies in Asia

32 Why We Ride Out Life-Threatening Storms and Do Other Crazy Things



By Malcolm Roberts, FM Global
executive vice president

36 Protect Your Warehouse from Emerging Fire Risks



By Weston Baker Jr.,
FM Global vice president, senior
engineering technical specialist,
engineering standards group

40 Disaster Resilience Varies in Asia



By Chris Johnson, FM Global
executive vice president

REASON

MANAGING EDITOR Steve Turgeon
stephen.turgeon@fmgglobal.com

ART DIRECTOR Liz Picillo
liz.picillo@fmgglobal.com

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.

EDITORIAL

EDITORS Amy Carbone, Judy Downey,
John Larson, John Rufo
TECHNICAL EDITOR John C. Harrington

ART

CREATIVE DIRECTOR Rebecca Marino
CONTRIBUTING DESIGNERS James Ferguson,
Michaela LaParle, Rebecca Marino
CONTRIBUTING PHOTOGRAPHERS Lou Bopp, Devlo Media,
Rob Zambrano

PRODUCTION

PRODUCTION MANAGER Kim Wachter

CUSTOMER SERVICE AND SUBSCRIPTIONS

270 Central Ave., P.O. Box 7500, Johnston, RI 02919 USA
fax: +1 (1)401 477 7010, phone: +1 (1)401 477 7744
(1)877 364 6726 (toll-free in Canada and United States)
email: customerservices@fmgglobal.com

REPRINTS

Address inquiries to:
Sandra Johnson, intellectual property and localization
phone: +1 (1)401 275 3000, ext. 1963
email: sandra.johnson@fmgglobal.com

CORRESPONDENCE

Send to *Reason*, FM Global Communications
270 Central Avenue, P.O. Box 7500, Johnston, RI 02919 USA
fax: +1 (1)401 464 9031, phone: +1 (1)401 275 3000,
ext. 1926

ASIA PACIFIC

Australia Bangladesh Brunei Cambodia China
Hong Kong India Indonesia Japan Laos Macau
Malaysia New Zealand Pakistan Philippines
Singapore South Korea Sri Lanka Taiwan
Thailand Vietnam

EUROPE, MIDDLE EAST AND AFRICA

Albania Algeria Angola Armenia Austria
Azerbaijan Bahrain Belgium Bosnia-Herzegovina
Botswana Bulgaria Burkina Faso Cameroon Croatia
Cyprus Czech Republic Denmark Egypt Estonia
Finland France Gabon Georgia Germany Ghana
Greece Hungary Iceland Ireland Israel Italy
Jordan Kazakhstan Kenya Kuwait Kyrgyzstan
Latvia Lebanon Liechtenstein Lithuania
Luxembourg Macedonia Madagascar Malta
Montenegro Morocco Mozambique Namibia
Netherlands Norway Oman Poland Portugal
Qatar Romania Russia Saudi Arabia Senegal
Serbia Slovakia Slovenia South Africa Spain
Sweden Switzerland Tanzania Tunisia Turkey
Ukraine United Arab Emirates United Kingdom

NORTH AMERICA

Bahamas Barbados Canada Costa Rica Dominican
Republic El Salvador Guatemala Honduras
Jamaica Mexico Nicaragua Panama United States

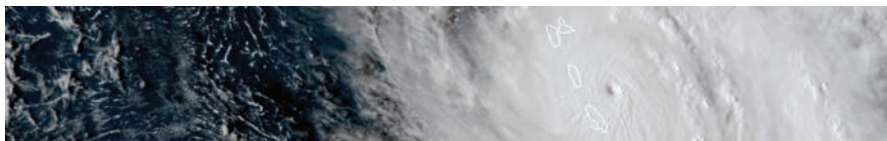
SOUTH AMERICA

Argentina Bolivia Brazil Chile Colombia Ecuador
Paraguay Peru Trinidad and Tobago Uruguay
Venezuela

TO REACH THE FM GLOBAL OFFICE NEAREST YOU,
VISIT FMGLOBAL.COM/CONTACT.

This publication is made available for informational purposes only in support of the insurance relationship between FM Global and its clients. This information does not change or supplement policy terms or conditions. The liability of FM Global is limited to that contained in its insurance policies.

W00349 © 2018 FM Global. All rights reserved.
FM Insurance Company Limited, 1 Windsor Dials,
Windsor, Berkshire, SL4 1RS. Authorized by the
Prudential Regulation Authority and regulated by
the Financial Conduct Authority and the Prudential
Regulation Authority



Hurricanes, dust fires and drones (oh my)

Just like Dorothy in *The Wizard of Oz*, our clients are constantly faced with obstacles on their journey to safety and security.

It would be nice if we could all just click our heels together and be whisked off to a safer place. But the road to resilience is a long one. As a mutual company, we have the luxury of looking past the next quarter or even the next year. And because of that, we have always been able to make long-term commitments to our clients and long-term investments in our research and engineering.

Those commitments and investments sometimes take time to develop into tangible business results, but we think it's worth the wait. In this issue, you'll meet three of our clients who have paved the way to success by taking the long view.

You'll read about Mylan Pharmaceuticals and how its facility in Caguas, Puerto Rico, survived Hurricane Maria. The plant's success was the result of a 15-year effort to fortify the facility and FM Global's research into hurricanes dating back to the 1990s.

You'll read about high-end furniture manufacturer and designer Knoll and how a dust fire started the company on a seven-year journey to be more resilient. That journey has led Knoll to take advantage of more than 70 value-added services FM Global has to offer.

You'll also read about Stora Enso, Europe's leading paper manufacturer, and how investments in innovative technology like drones are helping reduce fire risks at its mill in Imatra, Finland.

Taking the long view isn't always easy. Immediate demands on resources and capital can shorten any long-term plan. But at FM Global, the long view has kept us in business for more than 180 years. And with average client tenure of more than 19 years, many of our clients feel there is no place like FM Global.

The Reason Magazine Team



A COMMENDATION FOR THE COLONEL

Lieutenant Colonel Rodrigo de Lima Dib (CENTER), of the São Paulo State Fire Service, accepts the 2017 International Codes and Standards Advocacy Award on behalf of retired Colonel Cássio Roberto Armani, the first recipient of the new FM Global Award. FM Global's Brion Callori (LEFT), senior vice president, engineering and research, and Christopher Wieczorek (RIGHT), vice president, manager international codes and standards, presented the award.

São Paulo fire service commander earns advocacy award

International codes and standards honors
Colonel Cássio Roberto Armani

Colonel Cássio Roberto Armani, the newly retired commander of the São Paulo State Fire Service, has battled fire on many fronts.

At the scene: check.

Academically: check.

Legislatively: check that too.

In every arena, he has been an agent for positive change.

All of that constitutes the right stuff to be the first recipient of FM Global's annual International Codes and Standards (IC&S) Advocacy Award.

The award is presented to an individual (or organization) that goes above and beyond to educate and advocate for the adoption and increased use of automatic fire sprinklers.

The colonel has fought ardently for wider use of automatic sprinklers in building and fire codes in Brazil. Today, the country is moving along at a faster clip toward a national model code, thanks to the groundwork done by Col. Armani and others.

"Cássio has always been a strong proponent of the need for better fire data in Brazil," says Marcelo Lima, FM Global assistant vice president and senior codes and standards consultant. "He's also a long-time champion for the use of better quality products in the São Paulo Fire Code. I believe Brazil is on the cusp of major changes, and I wouldn't be able to say that if it weren't for Col. Armani's participation."

Fight fire with...sprinklers

Online training available on fighting fires in buildings
with sprinklers

Does the local fire service protecting your facility understand how to fight fires in buildings with sprinklers?

Municipal firefighters and private fire brigades can now easily get the specialized training they need to maximize their firefighting skills in buildings equipped with sprinkler systems through an FM Global online training program.

Available at no cost to firefighters, the interactive, self-paced "Fighting Fire in Sprinklered Buildings" program is available at fmglobalfireserviceresources.com. The course trains participants on:

- The design, function and limits of sprinkler systems
- Why sprinklered buildings burn
- How to combat fires most effectively with sprinklers in operation
- How to create pre-incident plans with owners of sprinklered buildings

"In some situations, firefighters can unintentionally make a fire worse at the scene by closing sprinkler valves and turning off electrical power prematurely," says Michael Spaziani, assistant vice president, senior staff engineering specialist, FM Global. "Even the most experienced firefighter can benefit from this specialized training."





Let's get real

Sharpen your hazard identification skills with new virtual reality course

Thanks to a new FM Global online training course, you can improve your hazard identification skills right from your desktop.

The free training, available only to FM Global clients, allows you to explore a simulated manufacturing facility in search of opportunities to minimize loss. It will help you identify real-world steps you can take at your own facilities.

In a highly realistic online environment, the Hazard Identification course allows you to explore electrical and ignitable liquid rooms, offices, a fire pump room, a warehouse and other areas.

Throughout the course, you'll make decisions to reduce loss from fire, explosions, flood and earthquakes. Because different actions can be selected for different results, you can retake this course to challenge your skills and improve your score.

This and other training is available at training.fmglobal.com.

Brion Callori named to NFPA board



Brion Callori, senior vice president, engineering and research at FM Global, has been elected to the board of directors of the National Fire Protection Association (NFPA). Founded in 1896, NFPA is a global, nonprofit organization devoted to eliminating death, injury, and property and economic loss due to fire, electrical and related hazards. FM Global and the NFPA have benefited from a close work-

ing relationship for more than 100 years.

Callori, who joined FM Global in 1979, is responsible for corporate engineering and research activities, FM Approvals, and overseeing a global staff of more than 450. He is a graduate of the New Jersey Institute of Technology, where he received a bachelor's degree in engineering science. He also holds a master's degree in business from Montclair State University and an Associate in Risk Management (ARM) designation.

Callori is also past chairman of the Spencer Educational Foundation, which supports the education of risk management students.

Caterpillar's David T. Walton elected to FM Global's Board of Directors



David T. Walton, president and chief executive officer of Caterpillar Financial Services Corporation (Cat Financial), the financial products division of Caterpillar Inc., has been elected to FM Global's board of directors.

The 12-member board comprises executives from the world's most influential companies.

"Dave brings a broad background in international operations and finance to FM Global's board," says Tom Lawson, chairman and chief executive officer. "We look forward to benefiting from his wisdom and leadership and appreciate his commitment to FM Global's continued success."

Walton joined Cat Financial in 1989 and has served in a variety of risk management, sales and business unit leadership positions, including vice president of Cat Financial's Asia-Pacific and global mining finance operations and vice president of North America sales. Walton was named Cat Financial's president in April 2017 and is also a vice president of Caterpillar Inc.

FM Global Board of Directors

Thomas A. Lawson, chairman and chief executive officer, FM Global

Frank T. Connor, executive vice president and chief financial officer, Textron Inc.

Colin Day, retired chief executive, Essentra plc

Michel Giannuzzi, chairman and chief executive officer, Verallia Packaging S.A.S.

Daniel L. Knotts, president and chief executive officer, RR Donnelley

Glenn R. Landau, former senior vice president and chief financial officer, International Paper

John A. Luke Jr., chairman, WestRock Company

Gracia C. Martore, retired president and chief executive officer, TEGNA Inc.

Christine M. McCarthy, senior executive vice president and chief financial officer, The Walt Disney Company

Stuart B. Parker, chief executive officer, USAA

Israel Ruiz, executive vice president and treasurer, Massachusetts Institute of Technology

David T. Walton, president and chief executive officer, Caterpillar Financial Services

Doing what comes naturally

As the world moves away from environmentally harmful packaging products, renewable materials company Stora Enso faces risk with confidence and ease



RISK ASSESSMENT

Sami Silvennoinen, head of risk management, Helsinki, Finland



LOSS PREVENTION

Lars Andersen, technical risk manager, Skutskär, Sweden



**INSURANCE PROCUREMENT
AND CLAIMS MANAGEMENT**

Elina Rosenfeld, risk and insurance specialist,
Helsinki, Finland



On a cold January morning in the Finnish town of Imatra, anniversary bells ring amid rumblings of industrial equipment and incoming log-shipping trains. Today, pulp and paper manufacturer Stora Enso and FM Global celebrate their first year of partnership.

Four months later and 15 degrees warmer and *Reason* is at Imatra Mills learning how the company combats risk while producing its specialty product—liquid packaging board for food and beverage containers.

A three-person team headed by Sami Silvennoinen (center) oversees Stora Enso's Consumer Board, Biomaterials, Packaging Solutions, Wood Products and other divisions. They credit an innate risk management approach as key to the company's success as a world-leading provider of renewable materials.

Here, Silvennoinen, Lars Andersen (left) and Elina Rosenfeld (right) share five pieces of risk management wisdom that have strengthened their strategy for sustainable, profitable growth.

1 Know your risks

At Stora Enso, Silvennoinen, Andersen and Rosenfeld watch their business environment to understand its threats, opportunities and capabilities. Here are the top risks they keep tabs on:

ASSET AND SUPPLY CHAIN VULNERABILITIES

With operations in more than 35 countries, Stora Enso considers the exposures associated with the production and transportation of goods worldwide.

CYBER THREATS

The business needs to prevent attacks that may cause a loss or impact its products and assets to the point of business interruption.

EXTREME WEATHER EVENTS

As a global organization, Stora Enso expects to see more extreme weather events in the future, particularly in the Nordics.

GLOBAL WARMING

Packaging buyers are turning away from plastic, aluminum and glass products, which presents the opportunity for Stora Enso to offer alternatives.

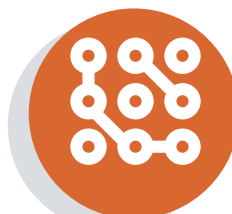
2 Make an impact

The trio names these four activities as ways to make a mark in risk management at your organization:



SELL IN

Spread your risk management approach and philosophy to operations personnel, all the way up to senior management and your board of directors.



EMBRACE TECHNOLOGY

Use robust systems to assess risk, manage incidents, investigate losses and understand their financial impact.



IMPLEMENT AN ENTERPRISE-WIDE PROCESS

Have a structured way of assessing, reporting and monitoring risks.



LEARN FROM LOSSES

Take what you've experienced and adjust or modify your risk management activities.

3 Stick to the basics

The team's four-part risk management model emphasizes fundamental functions to guide their practice.

RISK ASSESSMENT



"We need innovative, clever tools that allow us to predict risk and **minimize uncertainty**."

SAMI SILVENNOINEN

RISK TRANSFER



"Our risks are very **well-defined**. This helps us understand what we can carry on our own and where we need help from an insurance partner."

ELINA ROSENFELD

RISK PREVENTION



"FM Global's engineers are **well-trained**, spend a lot of time analyzing our risks, and speak the local language at our mills. This makes a big difference when preventing loss all over the world."

LARS ANDERSEN

RISK RECOVERY



"By working directly with FM Global, we keep everything in our own hands and have a **direct line of communication** with the company's underwriters, risk engineers and claims people."

ELINA ROSENFELD

4 Engineer risk out

According to Andersen, preventing boiler and machinery loss is not an option—it's a must. "In our industry, every piece of equipment is connected," he says. "If any one piece fails, it will affect production across the entire site. As part of our risk management strategy, we utilize FM Global's boiler and machinery engineering expertise to minimize our equipment vulnerabilities and prevent breakdown. We do this so we don't experience a substantial loss that costs us time and money."





**BLACK LIQUOR
RECOVERY BOILERS**

TURBINE BUILDING

BARK CONVEYOR

BEYOND THE TREES

The equipment at Stora Enso's 890-acre (360-hectare) Imatra Mills spans six miles (9.66 kilometers) of Lake Saimaa's southern shoreline in Imatra, Finland, a city east of Helsinki. The strengths and weaknesses of each piece of equipment are of prime focus for Silvennoinen and his team's overall risk assessment.

5 Innovate fearlessly

Innovating in risk management is second nature to Imatra Mills Fire Chief Mikko Parikka. When speaking to him about the benefits of drones, for example, his excitement is undeniable.

Parikka leads experiments at the site, saying automated drone technology will make the mill much stronger against risk.

IN FLIGHT, OUT OF SIGHT

Created in cooperation with a local technology company, Imatra Mills' drone utilizes externally purchased hardware and in-house programming to locate fires and deliver live video to firefighters.

In the future, the drone may also be used to:

- Detect broken equipment
- Follow and map gas leaks
- Estimate the number of wood chips or amount of dust in a wood chip conveyor

- Surveil the property and monitor the condition of surrounding fences
- Reach high and other inaccessible places
- Suppress fire (with the addition of a fire-extinguishing apparatus)

NO WARMTH, NO PROBLEM

The drone is designed to operate in any weather condition.

Although it sometimes struggles against strong winds, cold temperatures do not affect it. The drone will even work in the Finnish winter, which can be as cold as minus 20°C (minus 4°F).

GOVERNMENT-APPROVED

Finnish legislators have taken a very positive attitude to the development of drone technology, giving Stora Enso the courage to be innovative. Imatra Mills is now set up as a no-fly zone so its drone can work undisturbed.



HOW IT WORKS

- 1 The drone is stored inside a fully automated and heated docking station on the roof of Imatra Mills' fire department.
- 2 When an alarm sounds, it sends location coordinates and instructions to the drone. Site maps, altitudes and known dangers and obstacles are saved in its programming.
- 3 The docking station opens and a battery is inserted.
- 4 When ready, the drone departs for the given location and sends video footage and other data back to the fire department.

“

Automated drones can significantly improve fire safety, speed up problem solving and shorten production interruptions. We hope insurance companies and inspection bodies will react positively to this innovation.

MIKKO PARIKKA
IMATRA MILLS FIRE CHIEF, STORA ENSO

”



RESILIENCE WITH STYLE

FROM LEFT: Kenson Silverthorne, Knoll vice president of environmental, health and safety; Jane Dwyer, Knoll senior director, strategic projects and business risk management; Diego Palacios, FM Global assistant vice president, senior business risk consultant; Jon Gutkind, FM Global account engineer; Fred Taber, FM Global senior account manager and Bill Barnett, Marsh managing director, client executive, have teamed up to improve risk at the high-end furniture manufacturer.





Sitting Pretty

Furniture manufacturer Knoll uses more than 70 FM Global services to reduce risk

For Jane Dwyer, Knoll senior director of strategic projects and business risk management, watching TV often complements her work.

Invariably she finds herself scanning the background, looking for Knoll's iconic designs. "Look, there's one of ours," she often announces to her family.



It's an occupational pride at a company that has been creating inspiring interiors for businesses and residences for more than 80 years. If you look closely, Knoll furniture can be spotted on TV sets, in movies and throughout the offices and in the boardrooms of Fortune 100 companies.

For Knoll, reputation is everything. Customers expect timelessness, quality materials and on-time performance.

A few years ago, Knoll manufacturing got a taste of what a business interruption could do to that reputation. A fire at one of its facilities in Canada pushed risk improvement to the forefront of the company. The interruption put the overall resilience of its manufacturing infrastructure under the microscope. It also has led Knoll to take advantage of just about every service FM Global has to offer in its quest for continuous improvement.

"Our focus has always been on continuously improving our service performance and it was really a matter of aligning our risk management philosophy with our strategic objective," says Dwyer. "A single delay in one of our manufacturing sites can jeopardize our ability to deliver an order on

time and we just can't afford that. So, we started being proactive, so we could prevent any disruption from occurring."

Don't get burned twice

The alignment of the risk management philosophy and strategic objectives began soon after a dust fire at Knoll's wood production facility in Toronto, Ontario, Canada. The risk mitigation systems did their job, and the fire was contained to the dust collection area outside the main facility. But the fire raised concerns among Knoll's senior management.

"Any manufacturer that is making wood products is going to have a dust exposure and the systems in place worked exactly as they were designed," says

“Our focus has always been on continuously improving our service performance and it was really a matter of aligning our risk management philosophy with our strategic objective.”

JANE DWYER
KNOLL SENIOR DIRECTOR,
STRATEGIC PROJECTS AND
BUSINESS RISK MANAGEMENT





DESIGNED FOR EXCELLENCE

FROM LEFT: Fred Taber, FM Global senior account manager and Eric Crouthamel, Knoll vice president of manufacturing, East Greenville discuss fire safety at East Greenville, Pennsylvania, USA, production facility.

FM Global's Jon Gutkind, Knoll account engineer. "But Knoll came to us and said they never wanted to have a dust loss again. So, we brought in a dust specialist, did some testing and made some recommendations on how to mitigate the risk. That's when they really started focusing on risk improvement."

Although the fire was contained, it was still a few weeks before the facility was back at full capacity. The water used to put out the fire backed up into the duct system and forced some crucial pieces of equipment off line.

That business interruption, although brief, highlighted the impact that even a small disruption could have on Knoll's overall business. Knoll's senior management made a commitment to improve its resiliency across the entire organization.

Moving the needle

"Our risk profile has improved by an entire quartile," explains Kenson Silverthorne, Knoll's vice president of environmental, health and safety. "It's because we really started paying attention to our risks and

FM Global is now an integral part of the Knoll risk management team, helping Knoll understand the overall risk at each of its manufacturing locations.

looking at what we could do to drive those risks down."

Silverthorne adds that the risk improvements have all been done without expanding Knoll's risk management team.

"We were able to reduce risk without adding headcount," he says, "because we started using all of the FM Global resources available to us."

Knoll has always benefited from FM Global's engineering visits, its recommendations and its fire protection expertise. But with the company's renewed focus on risk improvement, Knoll wanted more. It began to look at outside vendors to supplement its efforts. Knoll soon realized that it didn't need to go any further than its own property insurer.

"When they decided they wanted to bolster their risk management program, they reached out to us and asked what we had to offer," says FM Global's Fred Taber,

senior account manager. "We sat down with them for a whole day and talked about all the added value services we have at no additional cost."

All FM Global has to offer

Knoll now uses more than 70 FM Global resources and services. On the engineering side alone, FM Global provides Knoll with:

- Due diligence/pre-acquisition visits
- Project management services
- Project planning (design specifications, site surveys, onsite visits, acceptance testing)
- Plan review
- Impairment services
- Site risk analysis
- Location-based engineering
- Risk service testing (ignitable liquids, dust and plastic components testing)
- Quarterly engineering updates

“We are constantly working with FM Global to understand what’s going to change and what controls we have in place to mitigate any new risks.”

KENSON SILVERTHORNE
KNOLL VICE PRESIDENT OF
ENVIRONMENTAL, HEALTH AND SAFETY



Other services include online and onsite training, analytics tools, pre-loss planning and cyber risk assessments. FM Global is now an integral part of the Knoll risk management team, helping Knoll understand the overall risk at each of its manufacturing locations. FM Global also helps deliver compelling information to Knoll’s board of directors in support of capital improvements.

“FM Global has been a fantastic partner,” says Knoll’s Charles Rayfield, senior vice president, chief financial officer. “We really hadn’t spent enough time on risk management and our goal was to minimize the risk to our business as much as possible. The people at FM Global have been right there with us to lead us in the right direction.”

Learning your ABCs with a BIA

For Knoll, one of the most valuable of those services came from FM Global’s Business Risk Consulting group. The group’s Business Impact Analysis (BIA) uses business modeling and financial analysis to understand and quantify risk. This helps companies like Knoll develop resilience and business continuity strategies. It also helps companies prioritize capital expenditures and actions for mitigating and surviving a business interruption.

“The analysis showed us where the critical risks were, not just financially, but the impact a business interruption would have on the whole business,” Dwyer says. “It was quite compelling and helped us provide direction on budget priorities and engaging senior management.”

The Knoll BIA revealed that a substantial portion of Knoll’s revenue was tied to the Knoll Office business segment. A disruption at any of the facilities producing office furniture could greatly impact Knoll’s client relationships.

“If any one component was unavailable, it would impact our customers,” Dwyer continues. “You can’t do a boardroom installation without the table. Knoll Office is 60 percent of our business. Knowing the interdependencies helps quantify our exposure and justify our long-term risk mitigation investments.”

The BIA also identified additional risks in Knoll’s supply base. The BIA identified supply chains that are at risk and suggested supplier management strategies to mitigate the risk.

Not just “the sprinkler guys”

Knoll has also shifted to “Centers of Excellence” for its wood processing and metal fabrication, concentrating production at one location. The Centers of Excellence model helps drive efficiencies and quality, allow-

ing for focused investment in equipment and training. But it also changes the risk characteristics of the entire organization.

“We’ve moved to a Centers of Excellence model over the last six years, but doing so reduces redundancies in our factories,” says Eric Crouthamel, Knoll’s vice president of manufacturing, East Greenville, Pennsylvania, USA. “So, it’s very important that we have a process in place to understand and mitigate those risks.”

And Knoll’s risks are constantly changing. Each year, there are new trends and new designs. Knoll is always introducing new fabrics, new manufacturing processes, new techniques and new hazards.

“We are constantly working with FM Global to understand what’s going to change and what controls we have in place to mitigate any new risks,” Silverthorne says. “We might have to review our flammable storage or increase the number of sprinklers. It’s all part of our review process.”

“Everyone here used to call the FM Global engineers ‘the sprinkler guys,’” Silverthorne adds. “Today we work together to understand what the most effective way is to mitigate risk. It might be sprinklers, or flue spacing in the racks, or increased inspections or more frequent cleaning of the machinery. It’s so much more than sprinklers.” ■



YOU'VE GOT THE LOOK

LEFT AND BELOW: Threads and fabrics used in Knoll's distinctive styles.
BELOW LEFT: Knoll's iconic tulip table.





EYE OF THE STORM



Years of planning and preparation positioned Mylan facility to weather devastating Hurricane Maria

Follow the bulldozer.

That's essentially how Frank Rodriguez got to work after Hurricane Maria.

Rodriguez was trying to get to Mylan's pharmaceutical manufacturing facility in Caguas, Puerto Rico. But the worst hurricane to hit the island in decades had made the 19-mile (31 km) journey south of San Juan nearly impossible.

Maria's 150-mile-an-hour (241 km) winds seemed to destroy just about everything on the island. Power and communications were out. Roads and bridges were in shambles and trees and utility poles were scattered like toothpicks spilled from an open box.

Rodriguez, Mylan's head of site operations in Puerto Rico, had already checked that his family was safe and was now worried about his employees and the plant they operate. He couldn't reach the crew at the facility and feared the worst as he followed the bulldozer that was methodically clearing debris from the roadway.

Eventually the production facility came into view. Rodriguez couldn't quite believe what he saw. Despite the devastation all around, the building looked virtually untouched. The wind had knocked over a truck in the parking lot and tossed a large dumpster through the perimeter fence, but there was no visible damage to the facility.

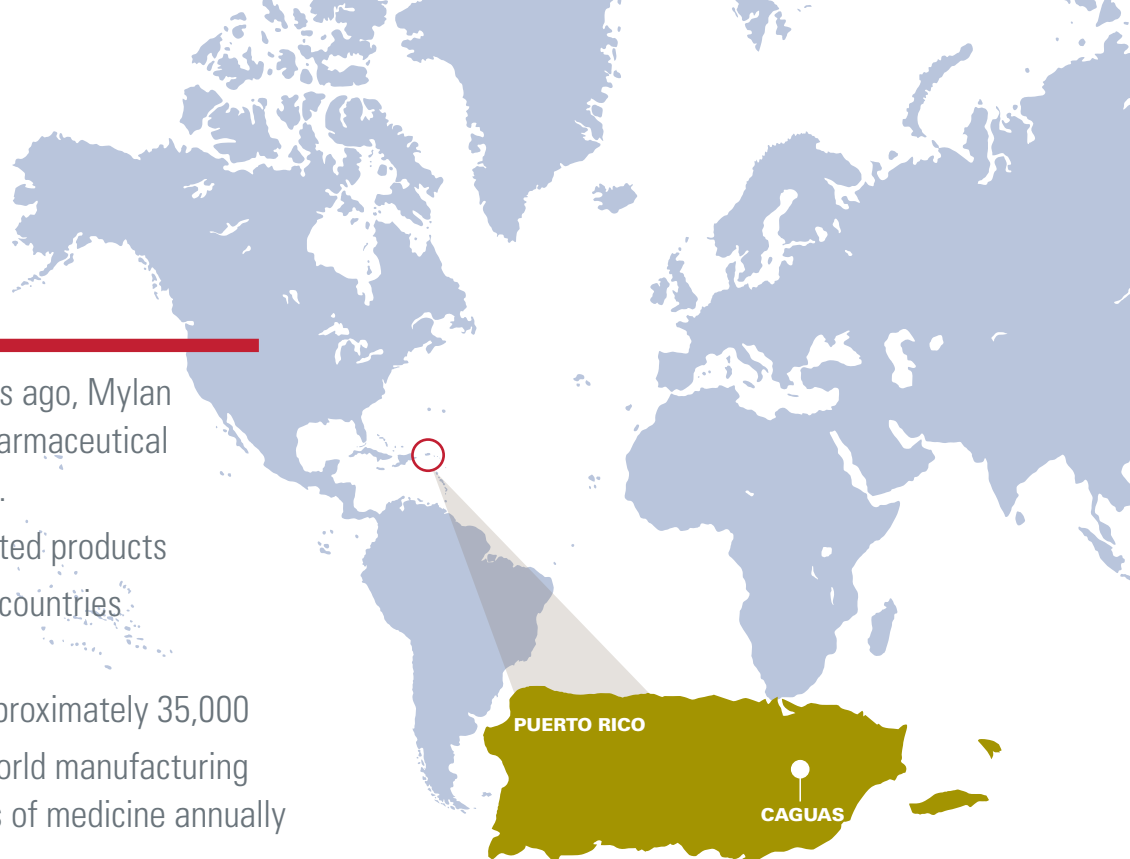
Mylan's Caguas facility had survived the storm.

"A small part of the roof peeled back and some things inside got a little wet, but there wasn't too much damage," Rodriguez reports. "We were ready to resume operations in a couple of weeks."



ABOUT MYLAN

- Founded nearly 60 years ago, Mylan is one of the largest pharmaceutical companies in the world.
- More than 7,500 marketed products
- Serving more than 165 countries and territories
- Global workforce of approximately 35,000
- 47 plants around the world manufacturing tens of billions of doses of medicine annually



“

Mylan is very committed to protecting its properties against risks, including threats from weather. They worked hard to make Caguas a well-protected facility, and it proved to be just that.

DIANA VAN METER
ASSISTANT VICE PRESIDENT,
SENIOR ACCOUNT MANAGER

”



RAISE THE ROOF

A 15-year effort and a whole lot of fasteners helped keep the roof on Mylan's Caguas facility during Hurricane Maria's 150-mile-an-hour winds.



15-year effort

While Rodriguez was surprised, the facility's good condition was no accident. It was the result of 15 years of improvement, Mylan's commitment to keeping its facilities resilient and FM Global's continuous efforts to understand what it takes to withstand hurricane-force winds.

"Several of the pharmaceuticals we produce in Puerto Rico are life-saving products," explains Dale Stemple, Mylan's head of environmental health & safety, North America & Europe. "When you have facilities in places that are exposed to natural hazards, keeping those facilities resilient is part of doing business. We must be able to continue to deliver products to the people who depend on us. That's what makes FM Global such a great partner because we both have the same risk management philosophy."

The FM Global and Mylan partnership began in 2002. FM Global recognized that it had significant wind exposure in Puerto Rico and launched a major initiative in the early 2000s to fortify its clients on the island. FM Global's research showed that the Caguas facility could only sustain winds up to 100 miles per hour (160 km), the strength of a Category 2 hurricane. By 2009, Mylan's Puerto Rico plant had been fortified to sustain winds of 140 miles per hour (225 km), the strength of a Category 4.

Fasteners and more fasteners

"We joke around here that we really don't have a roof anymore," Stemple says. "It's really just a bunch of fasteners at this point."

But the storm-hardening work didn't stop there. As FM Global continued to study the destructive power of hurricanes, it determined that even the 140-mile-per-hour (225 km) level was not enough. It recommended that Mylan do additional work, so the facility could survive even higher winds, like those from Hurricane Maria.



TEAM EFFORT

Frank Rodriguez (LEFT), Mylan's head of site operations in Puerto Rico and FM Global's Matthew Tomasheski, assistant vice president and senior account engineer, have been part of the ongoing effort to protect Mylan's Puerto Rico facility from hurricanes.

"It can be frustrating for clients because they do everything we recommend and then as we learn more and get smarter, we ask them to take even more action," says FM Global's Matthew Tomasheski, assistant vice president and senior account engineer. "But Mylan understands that and did everything it needed to increase the resilience of the facility. Surviving a hurricane like Maria means it was all worth it."

Mylan's storm-hardening efforts went well beyond the roof. It limited roof-mounted equipment and fortified the equipment that couldn't be moved off the roof. As it expanded and renovated the facility, Mylan followed FM Global's latest recommendations for wall construction, dock doors and windows. It reinforced its sprinkler system and added natural gas shutoffs to limit fire exposure in the aftermath of hurricanes and earthquakes.

"It took a lot of dedication from the whole team, but it was well worth it," says FM Global's Diana Van Meter, assistant vice president, senior account manager. "Mylan is very committed to protecting its

properties against risks, including threats from weather. They worked hard to make Caguas a well-protected facility, and it proved to be just that."

Mylan was not alone in facing significant wind exposure on the island. While direct hits like that delivered by Maria are rare, the island is impacted by tropical storms and hurricanes almost every hurricane season. Just two weeks before Maria, Hurricane Irma skirted the island before doing significant damage in the state of Florida.

"We get a lot of practice with our emergency plan," Rodriguez adds.

Mylan does extensive hurricane pre-planning and was ready when Maria hit. It rented backup generators and moved finished products and some raw materials off the island ahead of the storm. It ended production early and moved vital equipment to safer places within the plant. A small crew stayed behind to safeguard the facility. They were instrumental in securing a loading door that gave way during the storm.



STORM TEAM

FROM LEFT: Matthew Tomasheski; Frank Rodriguez; Dale Stemple, Mylan's head of environmental health & safety, North America & Europe; and Diana Van Meter have helped make Mylan's Caguas facility "a fortress."

The modeling showed a potential loss of US\$1.2 billion for all of FM Global insured facilities impacted by Maria. Actual losses were less than US\$500 million.

Big pharma, big exposure

Mylan is one of 49 pharmaceutical companies on the island according to official government statistics. Tax incentives offered by the Puerto Rican government in the 1990s made the island an attractive place to set up shop. But as pharmaceutical companies flocked to the island, FM Global raised concerns about the ability of these facilities to survive major hurricanes.

"It became a big concern in our organization with how much exposure was sitting on one small island," explains Neal Bear, now operations senior vice president in California who led the storm-hardening effort in Puerto Rico. "We had a team on the island to evaluate the risk and to see if we could mitigate some of those exposures."

It didn't take long for Bear and his team to realize how significant the wind exposure was on the island.

"We started doing full roof testing on locations we insured and every single one of those roofs failed, some of them on the very initial pressure," he says.

Bear explains that weather conditions in Puerto Rico make installing roofs difficult. Ever-present humidity and rain can cause the roof covering to delaminate (separate from the decking below) during installation. This significantly impairs the roof's integrity, especially when faced with strong winds.

"We worked with the local government and our clients to make them aware of the exposure and what a big loss could look like in the event of a major hurricane," Bear adds. "We felt we had a real opportunity to impact the resilience of the whole island by installing robust roofing systems that would be able to withstand very high wind speeds."

But, Bear explains, some of the products FM Global recommended weren't readily available on the island. So, FM Global partnered with manufacturers, roof installers and its own FM Approvals to get the right products to the island. It also worked to promote installation techniques that limited the effects of humidity and rain.

Lessons from Andrew

Much of what FM Global learned about how to protect Puerto Rico from hurricanes came from extensive research it did following Hurricane Andrew in 1992. Andrew ripped through the Bahamas and Florida and at the time was the most devastating hurricane on record.

"1992 was a turning point in our approach to wind," says Tomasheski, who was part of the field engineering response following Andrew. "The findings from Andrew helped us better understand the wind exposure and led to new classifications and many of our recommendations for retrofitting roofs."

That effort paid off on Puerto Rico. While not every FM Global insured facility escaped damage, their losses were significantly less than natural disaster modeling predicted. The modeling showed a potential loss of US\$1.2 billion for all FM Global insured facilities impacted by Maria.

Actual losses were less than US\$500 million.

The resiliency of the Caguas facility proved vital, not just for Mylan, but for the local community. Mylan opened its doors to its employees and those in the surrounding community to provide food, water and other assistance from the site.

"I'm blessed to have a leadership team that prepared and reacted as quickly as they did before, during and after the hurricane," recalls Rodriguez. "The leadership above me, all the way to the very top, did not hesitate in offering assistance in any way they could – a true sign of our commitment to our people."

TAKE THAT TO THE BANK



Are hurricane protections worth the investment?

You can bank on it.

Every US\$1 a business spends on hurricane protection reduces loss exposure by an average of US\$105, a new FM Global study shows.

The study looked at more than 10,000 wind- and flood-related investments and their associated reduction in property loss and business disruption exposure for 1,800 clients around the world from 2008 to 2017. The return on investment estimate was based on actual losses that have occurred at tens of thousands of properties insured by FM Global.


"Businesses often wonder if they are getting a good return when they invest in preventing hurricane-related wind and flood damage," said Brion Callori, FM Global senior vice president, engineering and research manager.

"This analysis has yielded a pretty convincing answer. And the 1-to-105 ratio doesn't even reflect the business repercussions of a major hurricane loss such as damage to reputation, market share and shareholder value."


COMPANIES NOT "COMPLETELY PREPARED" FOR LAST YEAR'S HURRICANES

Senior financial executives at some of the largest U.S.-based companies said they were not completely prepared for last year's hurricane season, according to an FM Global study.

Following hurricane season, FM Global commissioned a survey of 101 senior financial executives at Fortune 1000-size organizations with operations in Texas, Florida and Puerto Rico. Most of these executives said they were not completely prepared for the effects of the hurricanes and that they would be making changes to their risk management strategy going forward.

 Nearly **two-thirds (64 percent)** of the respondents said the 2017 hurricane season had an adverse impact on their operations.

 Of those impacted, **62 percent** admitted they were "not completely prepared" to deal with the effects of the hurricanes.

 Nearly **7 in 10 (68 percent)** of all respondents said they will make changes to their risk management strategy going forward.

Following the storm, Mylan flew 36,000 pounds (136,000 kg) of essential items needed by local residents and Mylan employees, including meals, generators, fuel and chainsaws. Mylan provided meals to area police and the national guard, donated diesel to Caguas Children's Hospital and provided medicines through various international relief organizations.

"Everyone I've ever met at Mylan is very committed to their mission statement of helping deliver better health for a better world," Van Meter adds. "What they did in the local community and the efforts they put into making all their key facilities resilient is a result of that mission statement."

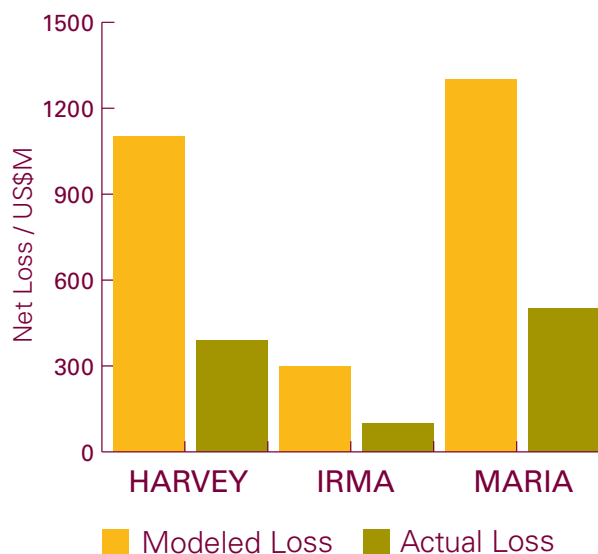
And Mylan isn't stopping there. The damage to the power grid in Puerto Rico

extended the time the Caguas facility was offline. Mylan has brought in large generators to mitigate the power issues in the short term and is building its own power generation plant at the facility to further improve its long-term resilience.

"The place is like a fortress," Rodriguez concludes. "If we ever get another hurricane like Maria, I'm coming here." ■

NUMBERS DON'T LIE

Over several weeks in 2017, ferocious wind and invasive floods tore into parts of Texas and Florida, USA, and ravaged the island of Puerto Rico. The impact from Hurricanes Harvey, Irma and Maria was devastating. We knew our clients were at risk, and recommended solutions to help them withstand storms of such magnitude.



Hurricane Harvey, Texas



Hurricane Irma, Florida



Hurricane Maria, Puerto Rico



WHAT DO *YOU* THINK?

In our continued efforts to improve *Reason* magazine, we'd like to hear from you, our readers.

In the coming weeks, you will receive an email with a link to a brief (*we promise*) survey.

So watch your inbox and please take a few minutes to provide your feedback.



CYBER

risk assessment

FM Global's cyber risk assessment, available to clients, is a 70-question online survey that gives you greater insight into your cyber exposure at both the location and enterprise levels.

The questions cover [six broad categories](#) and help measure your cyber risk posture and overall cybersecurity reliance. The assessment takes into account inherent cyber risk, mitigating security controls and your ability to respond to and recover from a cyber incident.

Upon completion, you will receive an overall score in [four categories](#), identifying each as a [low](#), [medium](#) or [high risk](#) to the organization.



Governance

Ability of executive management to provide strategic direction, align information security with the organization and ensure that cyber risk is managed appropriately.



IT Security

Ability to protect against, detect and mitigate technology threats to the organization.



Insider Threat

Ability to protect against, detect and mitigate internal human threats to the organization.



Response and Recover

Ability to respond to a cyber event in a timely and organized fashion and minimize the time to return to normal business operations.

The survey immediately provides feedback. A more detailed report, provided later, identifies gaps and offers recommendations to address those gaps. For more information on the cyber risk assessment, contact your FM Global account team. ■



CYBER DAMAGED **OR** CYBER SECURE?

Cybersecurity can only do so much to prevent attacks. Fight back with a full suite of cyber insurance products designed to help prevent loss and aid in recovery.

RESILIENCE IS A CHOICE.



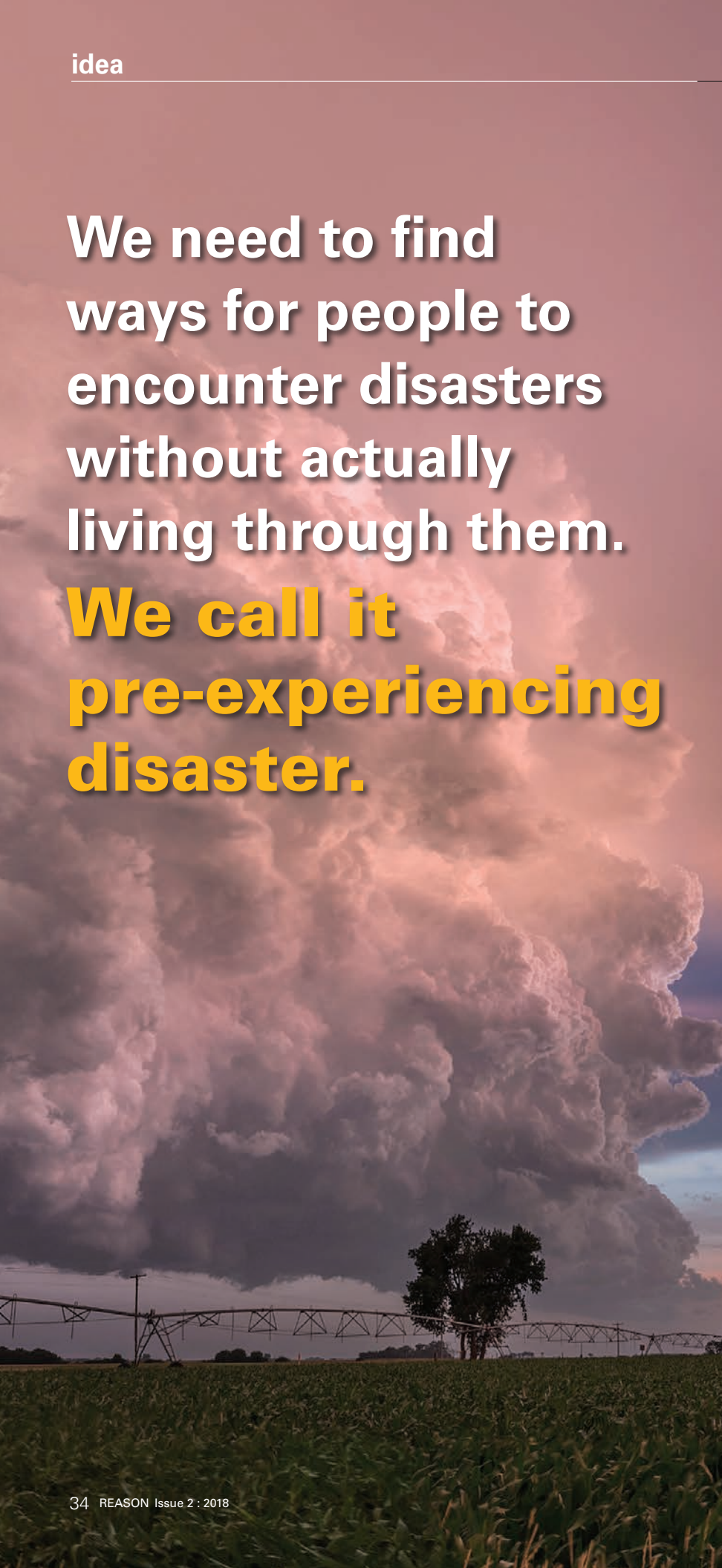
WHY WE RIDE OUT LIFE-THREATENING STORMS

AND DO OTHER CRAZY THINGS

It's called denial. And denial is hope on steroids.



By Malcolm Roberts, FM Global executive vice president
Originally published at [nytimes.com](https://www.nytimes.com)



**We need to find
ways for people to
encounter disasters
without actually
living through them.**

**We call it
pre-experiencing
disaster.**

I've been wrestling with a chronic problem we in the insurance industry haven't been able to crack for centuries. It's called denial.

I'm referring to the seemingly innate refusal of the human mind to appreciate the gravity of a potential disaster before actually experiencing one. As humans, our bias toward denial tempts us to roll the dice, buy scratch tickets, drive fast, jump off cliffs, eat fatty food, ignore our retirement funds and generally take too many chances.

We let smoke detector batteries die. We build homes in the same flood plains where our last ones were destroyed. When a monster hurricane like Michael is bearing down, some of us ignore evacuation orders thinking our grit will enable us to ride it out. It happens every time.

You see denial on the macro level, too. Global companies rely on risky partners only to see their supply chains snap. Power blackouts endure for weeks because no one bothered to build a resilient infrastructure. Skyscrapers go up in flames because they have flammable cladding yet no automatic sprinklers.

Generally, people don't respect the power of potential disasters, and they don't adequately plan for them.

My colleagues did some research on denial a while back. Ninety-six percent of the financial executives we surveyed said their operations were exposed to natural catastrophes like hurricanes, floods and earthquakes. Yet fewer than 20 percent said their organizations were "very concerned" about such disasters hurting their bottom line.

Let's face it. Denial is hope on steroids.

In a report we published in 2010, *Flirting with Natural Disasters*, we described, for instance, the Gambler's Fallacy — the misconception that what has recently occurred will affect what occurs next even if the two events are unrelated. For example, if flipping a coin nine times results in nine instances of “heads,” probability still applies: There's a 50 percent chance the tenth flip will be heads. By the same reasoning, there's no objective basis to think that the Carolinas won't see another Florence-class storm this year, or next year.

We also outlined some other facets of denial: A person can worry about only so many things, so seemingly remote possibilities like natural disasters often fail to make the cut. Short-term pleasure is more appealing to consider than long-term consequences. It's easy, but wrong, to conflate the inevitability of a natural disaster with the supposed inevitability of life and property loss. People think insurance makes you whole. (If you think that, ask a disrupted business that lost its market share to resilient competitors if it was made whole.) And: Most people are followers, thus institutionalizing the practice of denial.

To try to snap people out of their denial, my insurance colleagues and I share real-life tales with anyone who will listen. And we try to recast the notion of probability like this: A hundred-year flood doesn't happen every 100 years; rather, it has a 1 percent chance of happening every year.

So, are you worried now? Probably not. Thus, humans continue to take chances. And when they get away with them, they take more chances. Conversely, when they lose, they learn. Unfortunately, they usually learn only when they lose.

Given this conundrum, I propose that we in the insurance/disaster management world try something new. We need to find ways for people to encounter disasters without actually living through them. We call it pre-experiencing disaster.

We're trying this at my workplace for clients and would-be clients. We create six-story controlled warehouse fires and trigger actual explosions. We simulate hurricanes, floods and cyberattacks. We have a platform that mimics the motion of an earthquake and shows how violently and unpredictably a building will move, and even rotate, when the ground shakes.

Our visitors feel the heat from the fire. They cringe as a two-by-four hurtles across a room in a simulated hurricane. Their bodies absorb the concussion of an explosion. When they leave, they seem converted.

We need to do this kind of education in a broader way that reaches people and businesses in vulnerable communities, places that face threats from hurricanes, tornadoes, earthquakes, flooding and wildfires.

A hundred-year flood doesn't happen every 100 years; rather, it has a 1 percent chance of happening every year.

In schools, we need to weave disaster and denial stories into classes on physics, earth science, psychology, engineering, finance, statistics and the building trades. We need to find ways to tell the stories of people who suffered because of their denial, and who survived because they took the right precautions and built in the proper safeguards.

Communities at potential risk should bring in engineers and emergency workers to point out what could fail, wash away, freeze, rot, short-circuit, explode, shatter, cave in or burn up.

“See these wedding photos?,” they might say. “Might as well toss them in the creek.” Or: “Your classic car? It will be a boat that doesn't float.” Or, to a utility

executive: “Your power plant? Heaven forbid a storm surge comes your way.”

And governments and insurance companies should share more widely the eerily precise predictions we're getting from big data. At my company, we can, for example, pinpoint the single data center in a global company that is most likely to be underwater when a flood strikes.

In other words, we should unleash the power of predictive analytics and bring it to the doorsteps of people who live in harm's way, even though they deny it.

All of this education—this pre-experiencing disaster—would underscore the critical need to focus on prevention and building resilience against threats that are easier for people simply to deny.

Those who have experienced a real-life disaster already understand how

disruptive it can be to their lives, communities and businesses. They discover that the turmoil is usually worse than people imagine and lasts longer than they expect. They come to realize that vulnerability is a choice, as is building resilience against potential threats. Once enlightened, they choose to identify the risks they face and address them head-on.

For others, the standard warnings may fall on deaf ears. But if they could pre-experience a catastrophe, perhaps they would listen up and take some precautions. ■

PROTECT YOUR WAREHOUSE FROM EMERGING



How to arrange your warehouse to
suppress flames and save money



By Weston Baker Jr., FM Global vice president,
senior engineering technical specialist, engineering standards group

Originally published in *Industry Week*

A robotic material handling unit (i.e., a robot) zips through a global toy manufacturer's six-story distribution center. As the unit retrieves an open-top plastic container filled with freshly molded toy planes from an automatic storage and retrieval system (ASRS), sparks from a frayed electrical cable on the robot fly everywhere, igniting both the toy planes and the plastic container in which they are stored.

Due to the high concentration of combustibles, flames quickly spread through the rack, involving more plastic and cardboard containers filled with toys that kids dream about.

Ceiling sprinklers activate, but by then the fire has spread across aisles arranged as narrowly as possible to maximize storage space. The ASRS's steel racking structure that holds tens of thousands of toys starts to warp and buckle from the heat. That framework, by the way, was supporting the roof...

Scenarios like these worry risk managers and warehouse managers alike as the risk of fire in automated warehouses grows. First, more warehouses are automating—using robots instead of humans to pick and pack orders for shipping. Second, automation is enabling warehouses to go higher and store goods more densely.

Not only do risk managers fear that a fire will destroy their inventory and interrupt their business, perhaps critically, they may also have more routine concerns:

- A lack of guidance on what they need for fire protection of these automatic storage arrangements
- They don't want to overspend on new fire protection
- They especially don't want to decrease their storage capacities—unless absolutely necessary

Finding answers

NFPA 13, Standard for the Installation of Sprinkler Systems, which is typically risk managers' go-to source for fire protection guidelines, hasn't weighed in yet on fire protection for automated warehouses. Protection options for open-top containers are outside the scope of NFPA 13. Our team of researchers and engineers, however, has studied the fire protection challenge of automatic storage and retrieval systems for five years, and spent millions conducting large-scale fire tests, computer simulations and more than 200 water-flow tests.

The result? Evidence-based recommendations that help businesses to create optimal fire protection, and at a lower cost than previous recommendations for ASRS arrangements.

Understanding automated warehouses

Let's look at how automated warehouses pose new risks.

In automated warehouses, while the containers may sometimes be cardboard or metal, goods are more often stored in plastic containers about the size of a household recycling bin. These containers burn much more severely than cardboard or wooden containers.

The containers themselves, no matter what material they're made of, can also create problems with water flow down through the rack where the sprinkler water is needed. When they're open-topped, as they often are, they collect sprinkler water and prevent it from cascading to lower tiers of burning product in a timely manner.

The rack structure itself can create a problem with water flow as well. Angle irons, which often hold the containers in place, can divert precious water away from the fire area.

Robots are more agile than people driving forklifts, so automated warehouses tend to optimize storage space by reducing the size of aisles—typically to 4 feet (1.2 meters) or less—as well as by minimizing the spaces between container loads, both horizontally and vertically.

While this arrangement increases storage efficiency, it also increases the ease with which fire can spread horizontally, not only within the rack of fire origin, but also to adjacent racks due to the narrow aisle widths.

Get the answers

Taking all this into consideration, the new guidelines in FM Global Property Loss Prevention Data Sheet 8-34.

RACK 'EM UP

THIS PAGE: Example of mini-load ASRS storage arrangement with open-top cellulosic and unexpanded plastic containers. NEXT PAGE: Example of one potential in-rack sprinkler arrangement for modular protection.

Protection for Automatic Storage and Retrieval Systems (ASRS) can help risk managers and warehouse managers:

1. Determine how fire protection in automated warehouses can be optimized based on the type of storage racks and containers chosen
2. Feel at ease that their fire protection systems will mitigate fire, water and smoke damage in the event of a fire
3. Keep fire protection systems as affordable as possible.

Think modular

Traditional sprinkler protection that includes in-rack sprinklers accounts for both the in-rack sprinklers and the ceiling-level sprinklers operating simultaneously to control a fire. Our testing demonstrated that our approach creates an in-rack sprinkler

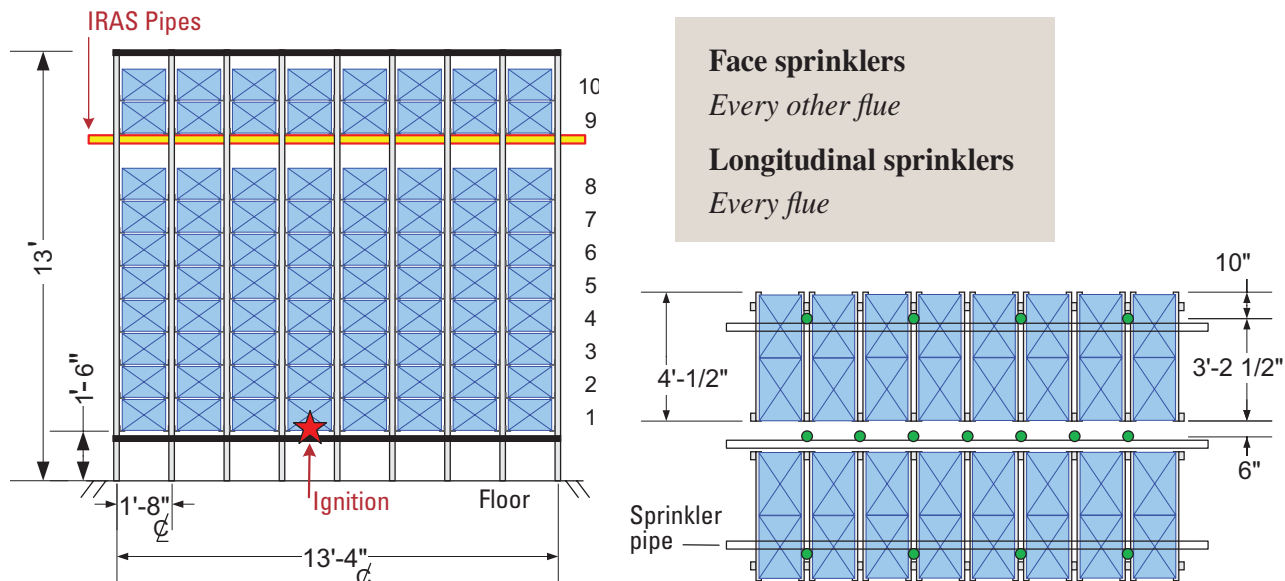
arrangement that stops a fire dead in its tracks by the in-rack sprinklers located closest to the fire. This approach eliminates the chance of fire spreading too far vertically through the rack and triggering additional sprinklers at upper levels in the rack or at the ceiling. Fire spread will be limited to a single “module” of in-rack sprinklers and the amount of fire, water and smoke damage incurred may be substantially reduced. This level of fire protection is achieved without the need for horizontal barriers, helping reduce the cost of its installation.

In-rack sprinkler arrangement

The type of storage rack (i.e., single-, double- or multiple-row) as well as the type of container will generally be the

driving factors for the in-rack sprinkler arrangement. As an example, for a typical double-row rack using solid-walled plastic containers, Data Sheet 8-34 would recommend the installation of three rows of in-rack sprinklers for approximately every 10 feet (3.0 meters) of vertical increment. The three rows of in-rack sprinklers would generally be arranged as follows:

1. At the face of each rack, in-rack sprinklers would be provided between every two containers (i.e., every other transverse flue space), and
2. Within the longitudinal flue space (the space separating the backs of each rack), in-rack sprinklers would be provided between every container (i.e., every transverse flue space).



Other considerations

- **Containers:** Containers and their contents that are arranged to allow water to escape from them, near the bottom of the container's sides perpendicular to the loading aisle, will allow for greater vertical distances between in-rack sprinklers. This would help decrease the cost of in-rack sprinkler installation and allow for greater storage capacity.
- **Racking structure:** Many ASRS racking structures use angle irons to support container storage within them. Testing has shown that angle irons can divert sprinkler water discharge from the transverse flue spaces where the water is needed. Using ASRS racking structures that do not divert water from the transverse flue spaces can also allow for an increase in the vertical distance between in-rack sprinklers, which would reduce the cost of in-rack sprinklers and increase storage capacity.
- **Ceiling sprinklers:** Even with the modular in-rack sprinkler approach, ceiling sprinklers are still needed. Testing has demonstrated that they can

protect up to a maximum of 10 feet (3.0 meters) of storage above the top in-rack sprinkler level.

- **Horizontal barriers between tiers:** Horizontal barriers, which are basically ceilings built within the storage racks constructed of either plywood or sheet metal, were previously recommended to limit fire spread as well as quickly activate in-rack sprinklers. With the new, enhanced fire protection, the costs and headaches associated with these barriers are eliminated as they are no longer required.
- **System independence:** Fortunately, you don't have to design ceiling and in-rack sprinkler systems to work in tandem. Independent sprinkler systems translate into reduced water flow requirements, which also translates into a reduction in cost for water supplies feeding the sprinkler systems.

Together, these recommendations help warehouse operators optimize their available storage capacity, reduce necessary water flow, and limit projected fire, smoke and water damage.

What this means to warehouse managers

Hopefully, our multimillion-dollar investment in research answers some of the vexing questions manufacturers are starting to ask. These questions only loom larger as more companies automate their warehouses, pack them more densely and stack products higher. Careful design and configuration can help ensure that fires are quickly suppressed and companies that do experience a fire stay in business and remain competitive.

Ultimately, the goal is to let robots, which in science fiction always seem to run amok, deliver the quiet efficiency they promise in the real world. ■

For more information: Download FM Global Property Loss Prevention Data Sheet 8-34: "Protecting Automatic Storage Retrieval Systems" at fmglobal.com.

DISASTER RESILIENCE VARIES IN ASIA



RISK MANAGERS MUST KNOW THE DIFFERENCE OR SUFFER THE CONSEQUENCES

As the Asia-Pacific region continues to position itself as the world's manufacturing hub, the riddle for risk managers is: "How do we adjust our mindset and expectations about risk management in one of the oldest parts of the world where the appreciation for risk can be vastly different from Western economies?"

According to the World Bank, Asia-Pacific countries are responsible for two-fifths of global economic growth. Yet, at the same time, 70 percent of the world's natural disasters happen in the region, including earthquakes, tsunamis and floods.

Still, despite the potential for severe disruption across business operations and global supply chains from a wide variety of factors, including political, economic and natural disasters, global companies continue to target the Asia-Pacific region for expansion. The region presents a considerable opportunity to lower input costs and access potentially lucrative markets.

The result is a challenge for risk managers who struggle when seeking Western-style risk management in a region that includes culturally, politically and economically diverse countries. The list includes China, India, Japan, Indonesia, Singapore, Korea, Vietnam, Malaysia, Thailand, Papua New Guinea, Myanmar, the Philippines and more.

There are no uniform building codes or standards, and the appetite for risk mitigation varies by country.

In fact, the FM Global Resilience Index, which ranks nearly 130 countries according to the resilience of their business environments to disruption, shows a wide disparity among the ranking of countries in the Asia-Pacific region. While Australia, Japan and New Zealand all rank highly for overall disaster resilience, others such as Myanmar, Thailand and Vietnam are not as resilient.

In many of these countries, natural hazard exposure is high, and manufacturing facilities and other key business operations continue to be built in areas more susceptible to wind and flood damage. Thailand, for example, has been hit with severe floods time after time and yet the landscape stays much the same.

The Philippines is repeatedly hit with cyclones in the same places and yet construction continues in these areas. Why do these practices continue? Why don't these countries simply put strict building codes and standards in place to ensure property is well protected?



By Chris Johnson, FM Global executive vice president

Originally published in *Risk & Insurance*

Given the disparate appetite for risk management in the Asia-Pacific region, insurance and risk management professionals may need to help their business partners understand and visualize just how bad things can get (in an effort to change behavior) and how the majority of loss can be prevented.

Culture diversity changes risk approach

To understand why some countries in the Asia-Pacific region are more receptive to risk management than others, one must acknowledge that those attitudes, in large part, are drawn from the unique culture and experiences of each country. Some are communist, some have a Buddhist philosophy, some are wealthy, many are not.

Some cultures believe natural disasters are beyond their ability to prevent and are going to happen no matter what. In other cases, if a country has limited economic means and its people have a short life span, one must understand they likely don't have the wealth to undertake certain risk management measures commonplace in other parts of the world.

Yet risk managers can and have learned a great deal about risk management best practices from the region as well. Singapore, as an island nation, is entirely reliant on electric power generation to drive its world-leading financial center. It has some of the most advanced risk management programs in place to make sure the lights stay on.

Japan, with a long history of earthquakes, has some of the most rigorous programs in place to ensure its buildings can withstand the shaking of the earth. The Forbidden City in China developed some of the earliest fire protection programs known to man.

Finding ways to promote disaster resilience

So in a region with vastly different experiences, how can risk managers bridge the gap of disaster resilience?

First, given the disparate appetite for risk management in the Asia-Pacific region, insurance and risk management professionals may need to help their business partners understand and visualize just how bad things can get (in an effort to change behavior) and how the majority of loss can be prevented. That's what my company is hoping to provide to visitors of the new Singapore-based learning center, the FM Global Centre, which is slated to open in 2019.

Second, especially in those cultures that believe disasters can't be prevented, the risk management community has an opportunity to help the less informed understand the ramifications of a disaster, ways to mitigate the impact and the benefits of disaster resilience. Sometimes the ramifications of risk beyond one's personal experience can be hard to imagine.

The bottom line is that these countries cannot be lumped together in terms of their proclivity or appetite for rigorous risk management programs that are more commonplace in the West.

The Asia-Pacific region is like a multicultural diamond. While some facets may be brighter than others, nonetheless it is a prized gem. Like diamonds, no two are alike and each has different qualities that need to be considered. ■



BE EXPOSED TO RISK **OR** ENGINEER IT OUT?

FM Global is a company of engineers, not actuaries. In fact, we have more loss prevention engineers than anyone in the world, building resilience into every corner of your business.

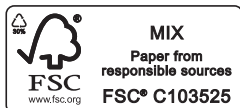
RESILIENCE IS A CHOICE.



FM Global Corporate Offices
P.O. Box 7500
Johnston, RI 02919-4923
USA

Change Service Requested

PRSRT STD
U.S. POSTAGE
PAID
PROVIDENCE, RI
PERMIT NO. 107



Reason is printed entirely on Forest Stewardship Council® (FSC®)-certified paper. If you no longer wish to receive *Reason*, please contact our customer service department by phone: +1 (1)401 477 7744, (1)877 364 6726 (toll-free in Canada and United States) or email: customerservices@fmglobal.com.

WHY FM GLOBAL?

100% coverage. Timely claims payouts. Unparalleled loss prevention engineering and guidance. These are just a few of the reasons why more than one-third of Fortune 1000 companies choose FM Global as their insurance partner.

Visit fmglobal.com

The image shows the FM Global logo, which consists of the letters "FM" in a large, bold, sans-serif font, followed by the word "Global" in a smaller, italicized, sans-serif font. The logo is set against a background of a large industrial facility with tall smokestacks and yellow safety railings. Two people wearing hard hats are standing on a platform, looking out over the facility. The sky is blue with some clouds.

FM Global