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THOUGHT LEADERSHIP

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Extreme-Weather-Related Risk Management

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Recent extreme weather events have had profound social and economic impacts in the United States. In 2017 alone, the National Oceanic and Atmospheric Administration (NOAA) estimated the losses from Hurricane Harvey, Hurricane Irma, and the California wildfires at over $193 billion. While the growing frequency of extreme weather event occurrence is debatable, experts agree[1] that climate change will only compound the already increasing severity of tropical cyclones, coastal flooding, and wildfires. It is important for corporations and government entities alike to consider a changing, non-stationary set of conditions when assessing and mitigating the risk of infrastructure destruction, business interruption, and consequences of chemical releases that can be caused by extreme weather events.

Vulnerabilities to multiple sectors, including the energy sector[2], continue to increase. In response, companies typically adopt one of three approaches to extreme-weather-related risk mitigation. One approach builds reactive response plans based on static or stationary data. Over-reliance or sole reliance on historical flood maps and information from past events are examples of what is probably the most common, current approach.[3] While flood maps can provide valuable historical insight, they do not account for the rises in sea level and associated increases in the severity of storm surges that are expected over the next thirty years. A more progressive risk management approach leverages dynamic sets of data that account for both the changing environment and the accelerated pace of the availability of data. Dynamic data sets include information on rising sea levels, rising ocean surface water temperatures, increasing severity of storms, increasing forces on facilities, and changes in the land and habitat. Entities who follow this second approach to risk management leverage dynamic data sets to improve their weather-related response plans. The third and most proactive form of extreme-weather-related risk management focuses on using non-stationary data in a longer-term planning horizon. Companies who subscribe to this approach plan for weather-related occurrences with an agreed-upon risk tolerance and leverage probabilistic predictions to build risk mitigation and resiliency around their facilities. This proactive assessment and mitigation approach can help inform not only the risk management of existing facilities, but also the location of new and future facilities, design specifications, and the degree of resiliency that should be built into the design.

Companies wishing to more rigorously assess and mitigate extreme-weather-related risk can benefit from an approach wherein detailed weather, engineering, environmental, and health analyses are integrated into a systematic methodology. Sometimes companies don't realize that sole reliance on information from past occurrences and use of historical data sets can inadvertently result in plans that are ill equipped to withstand the future environment. We suggest that leveraging dynamic data sets instead, which account for future changes, can greatly improve risk management outcomes. This improvement is especially enhanced when proactive engineering analyses that examine failure modes resulting from extreme weather forces

[1] https://www.ncdc.noaa.gov/billions/
[2] U.S. Department of Energy,(2013) "U. S. Energy Sector Vulnerabilities to Climate Change and Extreme Weather, July 2013
[3] U.S. Department of Homeland Security, Office of Inspector General, (2017) "FEMA Needs to Improve Management of Its Flood Mapping Programs," OIG-17-110

are coupled to assessments of environmental and health risks and consequences of potential chemical releases. To underscore this point, ninety percent of infrastructure failures caused by extreme weather events lead to chemical releases and billions of dollars of loss[1]. One post-Hurricane Harvey settlement alone cost a crude oil facility $400 million in damages from oil leakage into residences and drinking water.

Companies, municipalities, and other stakeholders often turn to third parties to help them build strategies for extreme-weather-related risk management. Exponent's multidisciplinary team of scientists, engineers, and statisticians provide engineering and environmental analyses based on five decades of failure analysis experience. Exponent conducts rigorous hazard, infrastructure, and chemical release evaluations that can both inform current response efforts and help prevent future failures and financial loss. Exponent has also recently partnered with Jupiter Intelligence,[4] an organization uniquely positioned to provide probabilistic distributions of weather-related forces at a highly localized level. This partnership allows Exponent to take an even more localized approach to determining facility-level asset vulnerabilities, quantifying potential impacts, identifying risk management actions, and implementing risk transfer strategies.

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[4] https://jupiterintel.com/

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