



## RISK & INNOVATION

# How Predictive Analytics Is Transforming Risk Management

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## OVERVIEW

Tarot cards, fortune cookies, and crystal balls. All promise a glimpse into the future. But as we know, the unexpected is to be expected – somewhat. The rise of big data has brought unprecedented power – and the more information we have, the more accurate predictions can become based on historical patterns. With over 50 billion devices expected to be connected to the Internet by 2020, the amount of data will only increase – bringing the promise of even more information to help predict some of the unpredictable.

Take the weather, a classic “chaotic system.” No organization can control the weather, even though storms – both small and large-scale – can pose serious financial consequences. Similarly, susceptibility to terrorism – especially in this age of “soft target” terrorism – is seemingly becoming more random. Traditionally, commercial risk from such unpredictable disruptions as weather or terrorism has only been mitigated to a limited extent. With more data and the rise of predictive analytics, this is beginning to change.

According to Aon Benfield's 2016 Global Insurance Market Opportunities report, data and analytics can stimulate a new wave of innovation for the insurance industry. The development of analytics that address underinsured risks such as cyber, damage to brand and reputation, and terrorism, present significant growth opportunities for the insurance industry over the next 10 years. Data and analytics has the potential to radically change how companies plan, budget, and mitigate these risks to increase their resilience in a much more effective way.



## IN DEPTH

Take a moment to see the world from the point of view of a risk manager. Their priorities lie in effectively – and proactively – identifying and mitigating potential threats. All of which face constant change.

In today's interconnected world, an organization doesn't have to have been directly in the path of a hurricane or located in a high-risk city. For example, a simple rainy day on a holiday weekend can severely hit retail revenues, or can even determine the sales of specific products. "Organizations are impacted by weather in a variety of ways," says Kurt Cripps, Managing Director, Head of Weather Risk, Aon Benfield. "From supply chain disruption to revenue losses and reduced productivity, weather events can cause immense challenges."

Likewise, some airline shares and traveler numbers dropped after recent terrorist attacks on Brussels and Istanbul airports. These events carried the domino effect on the wider tourism and hospitality industry, as tourists stayed away and locals decided to go out to restaurants less frequently. Similar falls in visitor numbers have been seen in France and Egypt following terrorist attacks there.

All this means that minimizing the potential negative impact of such unpredictable and uncontrollable events is a top priority – not just for the businesses directly affected, but for the economy as a whole. By using a much richer dataset than was previously possible, analysts are able to offer organizations a tailored assessment of the risks they face from disruptions such as terrorism and weather. Combining this data with complex algorithms and human expertise has led to the rise of increasingly sophisticated predictive analytics to help companies better understand – and mitigate – complex risks like weather and terrorism.

James Platt, Chief Analytics Officer, Aon Risk Solutions and CEO, Aon Inpoint, notes "the challenge isn't in conducting the predictive analytics themselves, but in making them accessible, accepted and relevant enough to address challenges and opportunities alike."

### **Working With The Weather**

Weather-related risks are inherently faultless. If a bar sells less beer because of a rainy week or a charter plane makes fewer flights because of a stormy month, it is typically understood that nobody in the company could have done anything about it, with companies possibly having a more resigned attitude towards weather risk.

However, "a scan of investor relations pages will tell you that the weather remains high on bosses' list of problems," says Cripps. "Three years ago, the weather was blamed by major food brands on for a fall in customer numbers, but the same month ice cream sales shot up by up to 300 percent. Retailers struggled to fill shelves quickly enough to meet demand."

But companies no longer need to resort to expensive and complex weather-based derivatives to hedge against loss of earnings from unfortunate weather, Cripps says. What has changed is that it is now possible to gather temperature and other meteorological information that is granular enough for insurance companies to predict and price more weather risk than ever. As Cripps explains, "historical climate analysis can be overlaid against trading data to produce a real time review of how and why the weather influenced a company's sales over time."

All this means that insurance firms now have more and better information – which means they can insure against a widening range of weather-related risks. Here are just three examples:

### **1) Agriculture: The Data Farm**

Agribusinesses are increasingly moving towards using more connected machinery. This can feed back better measurement of soil conditions and fertilizer use, which in turn enables them to maximize crop yields and predict and improve their results. Taken together, the improved information on weather, soil conditions, and fertilizer offers insurance companies an unprecedented opportunity to predict future yield – and so estimate the cost of bad weather, and insure against likely future losses.

### **2) Breweries: Something For A Rainy Day**

Like any business, breweries need to estimate their future sales. Unlike any business, their sales vary greatly depending on how many days of sunshine there are. Their revenue predictions depend on the weather. Satellite weather station information can provide weather records down to a few square meters, which enables the risk to be much more accurately predicted and priced. With more sophisticated weather forecasting, breweries can take out tailored insurance products which protect their revenue forecasts from the risk of loss of earnings due to an unusually wet summer.

### **3) Airlines: Reducing Turbulence**

Airlines' face high fixed costs with low margins, so the decision to ground an airplane due to bad weather can be costly. In markets where regulators give consumers a right to claim back the cost of tickets if they are left waiting on the runway, the cost is even greater. When bad weather occurs, it is the airline making the decision of whether or not to fly. In basic terms, this decision would be the event which triggers an insurance payout. But no insurance company can insure a risk where the client themselves chooses the trigger, as it creates a perverse incentive. For this reason, insuring airlines against weather-related loss of earnings presents a thorny problem.

But there are signs of new thinking. One possibility is for airlines to designate a certain number of cancellations they expect – such as ten days of snowfall over a defined period of winter. Then, if they have to cancel more flights than that number in the defined period, the insurance trigger is activated. The trigger would have to depend on the specific circumstances of the airline, but insurance solutions are possible and creative thinking is starting to come up with them.

### **Reducing The Impact Of Terrorism With Predictive Analytics**

While predictive analytics is already being used by security agencies to identify potential terrorists through analysis of social media activity and other behavioral factors, other forms of data analysis can also help businesses reduce their terrorism risk. This means that analysts can now price a much wider range of commercial risks than ever before, which in turn offers risk managers many more options.

“While terrorism modeling is a relatively new field in catastrophe modeling, it has grown more prominent in the wake of a number of large market losses stemming from terrorism” says Mark Lynch, Head of Political Risk Model Development, Aon Benfield. This type of modeling requires a “completely different approach to address the risk, compared to natural hazards,” with “greater emphasis on the validity of expert input, flexibility, and qualitative analysis.”

One application of predictive analytics to the understanding and pricing of terrorism risk is “blast analytics,” which deals with analyzing the likely consequences of explosions.

Traditional models of blast analytics are relatively crude. They draw concentric circles around the location of the blast, and assume that the closer to the blast the greater the effects and the further from it, the less. They then assume that the further away from the blast, the cheaper the damage is to fix.

But this is not how blasts affect buildings in reality. In practice, certain surfaces are more susceptible to the force from a blast than others. The effects of a blast channel their way down streets, so go further in certain directions than others. They reflect off buildings of certain surface types more than others. And they depend on the height of the area which is to be insured. The effects also vary with the scale of the device and the precise nature of the blast.

Using detailed scanning and plans of buildings and environments, analysts are able to predict the likely damage from a bomb blast with more accuracy than ever before, based on analysis of the effects of previous blasts plugged into Computational Fluid Dynamics (CFD) software. Developed in conjunction with the US military, this new predictive analytical technology enables a more granular assessment of the real risks to buildings and so enables more accurate pricing of insurance risk from terrorism.

### **The Continuing Rise Of Analytics**

The potential of big data analytics to revolutionize business models and approaches has been talked about for years, but is now truly beginning to become a reality. The key is to creatively think about its applications to best impact the bottom line.

Shops can now use predictive analytics from local weather stations, postcodes and satellite data so that if the temperature is out of line with expectations, stock can be adjusted – bringing in more umbrellas ahead of a rainy day, for example.

But while predictive data-driven approaches to supply chain management like this are becoming the norm, it is still early days for adoption in insurance pricing. “It doesn’t come under a typical general insurance buying pattern,” says Cripps.

As more proof of the value of predictive analytics continues to emerge, and more insurers begin to offer plans for a wider range of risks than previously possible, the potential for organizations to improve their resilience to such unpredictable risks as weather and terrorism is becoming greater than ever.



## **TALKING POINTS**

“Catastrophe models are indispensable tools for the insurance industry. While originally developed to quantify portfolio-level loss profiles for risk transfer, they are now widely used by product managers, pricing actuaries, and underwriters to support rate making and individual-risk underwriting. Using catastrophe models to align premium with risk is particularly valuable for companies seeking profitable growth opportunities with emerging perils such as flood.” – Aon Benfield’s 2016 Global Insurance Market Opportunities report

“Organizations are competing on analytics not just because they can—business today is awash in data and data crunchers—but also because they should. At a time when firms in many industries offer similar products and use comparable technologies, business processes are among the last remaining points of differentiation. And analytics competitors wring every last drop of value from those processes.” – The Harvard Business Review

“Airports and airlines alike can benefit from more efficient flight operations. Since weather is the leading influence of flight delays, including airport operational impact due to weather in your decision making can improve operational efficiency. From fuel loads to the deicing queue, time and money can be saved by accurately predicting future operational conditions. When you can plan a full 12 hours out using reliable predictive analytics, your entire operational behavior changes in terms of staff, processes and severe weather preparedness.” – Mark Miller, SVP and GM, Decision Support



## **FURTHER READING**

- Predictive Analytics, Big Data, And How To Make Them Work For You – PCMag, July 12, 2016
- Machine Learning: Of Prediction And Policy – The Economist, August 20, 2016
- Why Weather Around The World Can Affect Your Business – Zurich Insurance, July 12, 2016

- Protecting Facilities From Terrorist Threat – Premises & Facilities Management Online, August 22, 2016
- How Retailers Are Being Forced To Adapt To Weather Risk Scenarios – Aon report
- Terrorism and Political Violence Risk Map 2016 – Aon

