Collecting
information
is one thing;
gaining
insights
from it is
everything

PUTTING

BIG

DATA

TO WORK

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Humankind has a significant advantage over the rest of the natural world. We have highly developed brains, build powerful tools and, perhaps most importantly, as Carl Sagan put it, we long ago created an intellectual time machine: writing and books. Whatever insights we gain over millennia, we write down, disseminate, retain and pass from generation to generation. We never unlearn.

Now the cost of retaining hard-won knowledge has plummeted—dramatically. A teenager with a cellphone carries vastly more memory power in one hand than the Gemini astronauts carried into space and at a tiny fraction of the cost: IBM's contract to build that first onboard space-capsule computer came to more than USD190 million in today's dollars. Smartphones today are comparatively free.

The arc of technological change has brought with it two major shifts: We retain virtually everything, valuable or not, and we share it in real time, anywhere and with anyone in the world. Only a few years ago, engineers talked about storing the printed works of the Library of Congress. Now that seems quaint. After all, it's just 10 terabytes.

Data scientists instead talk today in exotic figures such as "zettabytes," 42 of which could transmit every word ever spoken by humans in history. Global data, by one measure, equaled 2.7 zettabytes in 2012. Shockingly, that total was up 48 percent from just the year before. And it will only continue to grow.

Cheap storage and global connectivity have resulted, predictably, in a business buzzword: big data. Nearly everyone working today is creating data as part of his or her job, from the CEO in the corner office to coffee-shop road warriors and delivery truck drivers, all the way down to multitudes of robots and sensors on high-tech manufacturing floors. Big data simply means recognizing that fact and doing something about it.

For instance, we now know exactly how fast prices are rising, that is, the real-time rate of inflation. The government currently relies on surveys to gauge inflation, but MIT's Billion Prices Project is already tracking online purchases in real time over dozens of countries at once.

In health, sequencing the human genome originally took 10 years and cost billions, but thanks to advances in big data technology private companies now offer sequencing in a day for USD1,000.

Meanwhile, global retail giant Walmart is consolidating its websites into one huge petabyte cluster for big data analysis. The company is considering rolling in data from its stores for comparison and study, as well as linking to social media sites such as Facebook, greatly increasing the data flow.

BIG DATA = BIG INSIGHTS

If you mine big data sources effectively, you can find out a lot of things about your own market and about what your customers and competitors are saying about you, says Nigel Turner, vice president for information management strategy at Trillium Software, a division of direct marketing firm Harte-Hanks.

People talk about you in social media, and there are marketing opportunities that can be derived from that, Turner says. "Coca-Cola has 57 million followers on Facebook. But there's an awful lot of noise in that. And it has to be exploited for a purpose," he explains. "The mistake organizations make is to start collecting it and even paying for it, but you have to have a purpose in looking at it. And then you have the challenge in integrating it into your existing data. Otherwise you get swamped by it."

In fact, data goes far beyond the Internet as we know it. The next phase, already under way, is the "Internet of things," where miniscule radio devices attached to goods automatically update databases in real time and GPS follows vehicles and machines nonstop.

Health care is a flood of information in real time. Shipping, telecommunications, transportation, finance and so on—every sector of the economy autonomously and unceasingly buzzes with data.

"People have been talking about big data, but they've been talking about the plumbing: SQL [structured query language] databases, for instance. For the business person, that's not so attractive. Until you get to the analytics part," says Bruno Aziza, marketing chief for SiSense, a data analytics company in Redwood Shores, Calif.

It's not about storing data but about using it, says Aziza. He says tools are needed that anyone can use to analyze data at scales such as terabytes. "We have a customer who wants to do forecasting—let's say, 'How many boxes of soup do I have to produce?'—but also [interested in] seasonality and analyzing like Walmart."

Global consultant McKinsey & Co. foresees increased productivity and reduced waste and production costs as big data becomes the norm.

Aon's Big Data Toolbox

Globally, Aon works nonstop gathering data from thousands of clients covering millions of individuals and businesses. As the world's largest insurance broker, Aon uses big data tools and practices to stay ahead of the information generated:

Aon Global Risk Insight Platform (GRIP): The world's leading global repository of insurance placements information. Provides fact-based insights into Aon's USD80 billion in global premium flow, helping clients identify the best placement option regardless of size, industry, coverage line or geography. Accessible over the web, the data available from Aon GRIP helps brokers evaluate which markets to approach with a placement and which carriers may provide the best value for clients.

Impact Forecasting Catastrophe Analysis and Reporting: Impact Forecasting is a catastrophe modeling development center of excellence within Aon Benfield whose seismologists, meteorologists, hydrologists, engineers, mathematicians, and geographic information system experts, along with finance, risk management and insurance professionals, analyze the financial implications of natural and man-made catastrophes. In addition, throughout the year, Impact Forecasting provides real-time information on catastrophic events through Cat Alerts, Weekly and Monthly Cat Recaps, and the Annual Global Climate and Catastrophe Report. Using proprietary loss calculation software for catastrophe modeling, Aon gathers and analyzes exposure data at both aggregated and individual classifications using primary insurance policy conditions at coverage, location and policy levels—in addition to reinsurance conditions.

Aon Risk Maturity Index: The Aon Risk Maturity Index is an innovative tool designed to capture and assess an organization's risk management practices and provide participants with immediate feedback in the form of a Risk Maturity Rating, along with comments for improvement. The Aon Risk Maturity Index combines the experience and knowledge of Aon Risk Solutions, Aon Global Risk Consulting and Aon Hewitt into an easy-to-understand questionnaire on risk management processes, corporate governance and risk understanding.
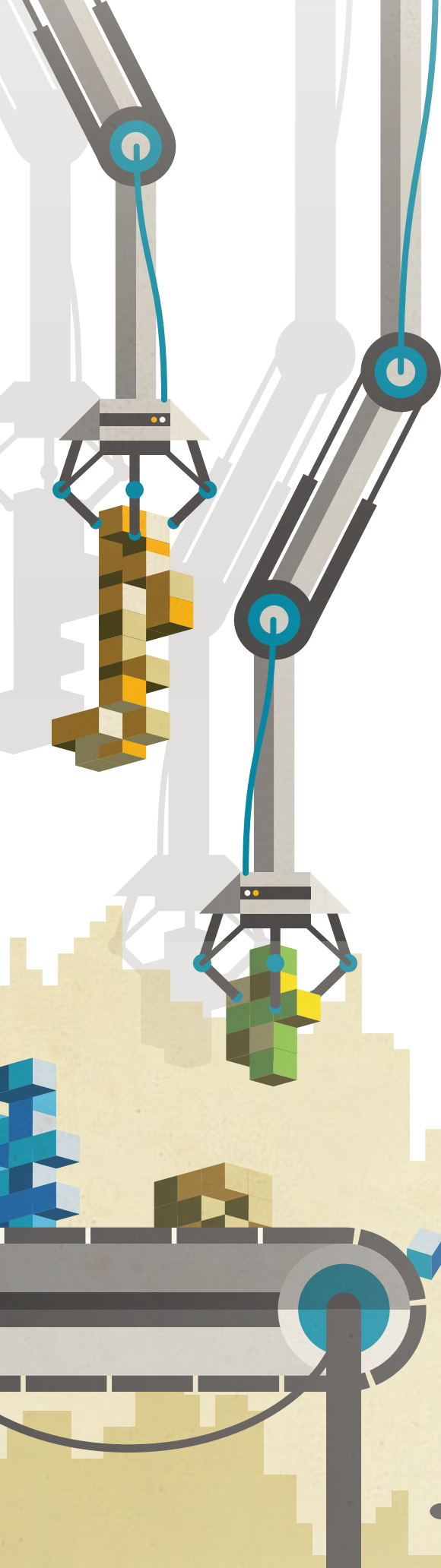
Retailers have a chance to improve operating margins by 60 percent, McKinsey projects. Just-in-time delivery of goods means less lag as shelves are emptied, while data analysis can pinpoint where to send specific products by geography and price point. The promise is a real-world shopping experience as lean and efficient as the online model.

In fact, big-box retailer Target recently announced it would match Amazon.com in prices year-round, quite a boast considering Target still has to run stores and pay employees to man them. McKinsey, meanwhile, sees the need for 1.5 million new U.S. managers adept at working effectively with big data.

Having data-ready employees will be important. "The point is not he who stores the most data wins. You have to be able to do something with the information," says author and technology consultant Phil Simon, whose new book, *Too Big to Ignore: The Business Case for Big Data* (John Wiley & Sons), came out this year. "The data is just a means to an end. You can have petabytes of information, but unless you have the culture, unless people are going to embrace it, you can't use it."

BIG DATA IN INSURANCE

The global insurance business swims in data. Premiums paid reached USD4.6 trillion in 2011, the latest full year of data available, according to Insurance Information Institute's *International Insurance Fact Book 2013*.

Life and nonlife premiums accounted for 6.6 percent of world gross domestic product in 2011. The top 10 insurance companies' combined revenues equaled USD1.14 trillion in 2011, while net premiums for reinsurance totaled USD110.3 billion in 2010. The top 10 brokers earned USD35.2 billion in 2011.

The industry, meanwhile, faces huge costs. In 2012, the top five natural disasters as measured by cost of insured losses

totaled USD50 billion, led by Superstorm Sandy on the U.S. East Coast at USD28.2 billion alone, according to Impact Forecasting. In comparison, Hurricane Katrina cost the industry nearly USD66.9 billion all told, the Japan earthquake and tsunami USD35 billion, and 1992's Hurricane Andrew in South Florida USD25.5 billion.

Aon itself has long been in the business of gathering and managing data on a global level in an effort to quantify its exposures and to be precise in its offerings, says Stephen Cross, CEO, Aon GRIP Solutions, and chairman, Aon Centre for Innovation and Analytics.

"You want to talk big data, we've got it. Literally, every day the volume in our system increases. The quality, the robustness of the data increases every day."

The No. 1 area where Aon has invested in data so far has been the Global Risk Insight Platform, Cross says. "We started to develop this in 2009. Essentially, we're trapping all of the placement data by region, by line of business, around the world. The outcome we tried to achieve is to align our carriers' appetites with our clients' appetites so that we get a lot of precision."

Putting numbers on it, that's USD55 trillion worth of insurance limits across 237 major cities in 169 countries. "We're tracking 1,047 industries and 1,291 carriers and 52 different lines of business," says Cross. "You want to talk big data, we've got it. Literally, every day the volume in our system increases. The quality, the robustness of the data increases every day."

The speed of data is a huge change, Cross says. "The tsunami in Japan—we all watched that live on TV. Everything now is on a 24-second news cycle. So how are we looking at our clients' risk?" he says. "Things we used to consider years ago an operational risk, a fire for instance, is now a reputational risk. If I'm seeing a tsunami roll in, I'm calling another supplier immediately, whether I know they're wiped out or not."

Constantin Beier stands at the peak of the data mountain, trying to bring data power to insurance brokerage—and to evangelize for smarter use of it. As CEO of the 3-year-old Aon Centre for Innovation and Analytics in Dublin, Beier oversees a team of more than 90 charged with gathering and collecting data from sources around the world and turning it into insights and analytics.

Data gathering and actuarial analytics has always been a high priority for insurance carriers and brokers, he says, but the rising volume and complexity of big data as well as the increasing power of client analytics means new opportunities that not all industry players have recognized or embraced.

"What you hear is that the industry isn't that sophisticated compared to, say, retail or car manufacturing, even though the capability is there and so is the data," Beier explains. "On the insurer side, you saw this capacity more, but on the brokerage side it was more about knowing your industry but not necessarily about the data. It was more about trusting the broker."

Beier sees the brokerage business changing profoundly. "Data will lead us more from a relationship, intuition-based industry to one that is applying very hard facts and data," he predicts. "That's a cultural shift."

BIGGER BY THE DECADE

A major change to come is using big data to better understand risks and how to get ahead of them, says Theresa Bourdon, group managing director, Aon Global Risk Consulting.

For several years, Aon has engaged companies with a 125-question survey about risk management practices. The results are known as the Aon Risk Maturity Index. Companies voluntarily take it online to benchmark their own risk management policies. "Big data actually allows us to predict who will have a strong financial performance," says Bourdon. "Through our huge amount of data and research, we found a distinct correlation between a firm's risk preparedness and their financial performance, specifically in terms of stock price."

It's helpful to be able to benchmark company performance and costs, but for Bourdon the really important feature is the predictive qualities of data—being able to clearly measure risk beforehand and help the client take action before the winds blow. "Say I go to Pottery Barn online and buy some nice candles. Right away, they show me six other things people like me also bought. And right away, boom, I buy it. That's where we're going with predictive analytics. Not just at the individual claim level but broader behaviors."

That kind of insight doesn't happen by accident. It has been part of Bourdon's experience for more than a decade. The first instance was medical malpractice claims. Aon started gathering that data to get a grip on an explosion in nursing home litigation, Bourdon says. "Nobody understood what was going on," she says.

Data collected and analyzed soon helped pinpoint Florida as an epicenter of nursing home lawsuits. It turned out to be a loophole in the legislation, which was being exploited. Aon worked with clients to urge a change in the law.

Data and the Management of People

On the human resources side, Aon thought leaders see a big upside to the firm's massive, 25 million-person employee database.

It's scattered across many clients, but such a large agglomeration of health care, benefits and retirement data is a boon to big data applications, says Brad Anderson, executive vice president, Outsourcing, Aon Hewitt.

Take benchmarking investing habits: If a given employee has especially conservative retirement fund choices, Aon could provide a tool that shows how other workers the same age are investing their 401(k) funds.

"This is something we've delivered today and are looking for ways to improve and take to the next level," Anderson says. "Right now we're trying to come up with what are the additional questions we'd like to ask, and then we'd go to the data to find out what we can offer. We're also looking at ways of leveraging that with the health plans and the carriers."

For example, as health care reform begins in earnest, we could see a significant shift away from company-provided coverage and toward patient-driven choices. Companies might contribute cash on an annual basis to a health plan, much like matching a 401(k), known as a "direct contribution" model.

"The company would just give you USD5,000 and you go buy your own insurance on Aon Hewitt's Corporate Exchange," Anderson says. "It gets employers out of the plan design business so they don't have the obligation of 5 percent to 7 percent annual increases in health care costs."

Data is a huge advantage for Aon Hewitt, says Joanne Dahm, co-president, Performance, Reward and Talent, Aon Hewitt.

"For example, using the data we have across Aon Hewitt can help our clients make fact-based decisions that actually improve the productivity of their workforce. That's a big claim but achievable. Gaining insight from data allows clients to understand positive and negative drivers of workforce performance and retention, and change their practices to get better outcomes [such as retaining top talent or using total rewards more effectively]. There is a competitive advantage for clients who are willing to use data for real insight, but it does require change in how they operate and make decisions."

REAL DATA, REAL RISK

A major piece of the big data puzzle for insurers is catastrophe, or cat, modeling. Cat modeling uses data about natural disasters and widespread dangers, such as terrorism or pandemics, to build models that attempt to estimate the potential damage when such events occur.

Cat modeling came into its own for the industry in the late 1980s and early 1990s, the time of Hurricane Andrew and the Northridge earthquake in California. These major events motivated the industry to develop the technology and collect the data needed to measure their impact, says Stephen Mildenhall, CEO, Aon Benfield Analytics.

Brokers today model for hurricanes, earthquakes, flooding in riverine and coastal areas, brush fires, tornadoes, hail, winter storms, terrorism, and pandemics such as the avian flu outbreaks, Mildenhall explains.

The detail of the work can be extensive: For buildings, information gathered includes square footage, age, number of stories, roof geometry, occupancy, construction, and complex building codes.

That level of scrutiny turns into big numbers quickly. Aon Benfield might look at 100,000 simulated events across 1 million properties, Mildenhall says. That adds up to 100 billion individual observations, not something you would try to model on a typical desktop PC. Some Aon clients need models that run at rates several times higher than that, he says.

One of the things that Hurricane Andrew achieved, however, was to start a revolution for these high-impact, low-frequency events in terms of determining cost. "The single most important change in insurance over the last 20 years has been cat modeling. It provides a common language for the insurers, the reinsurers and the capital markets," he says. Using cat models, costs can be estimated at a granular, policy-by-policy level, including an allowance for the cost of risk capital.

THE UNDERWRITING ADVANTAGE

Big data can be a powerful underwriting tool, says Neil Harrison, group managing director, Aon Global Risk Consulting.

"Data has always been important in the underwriting process, but now the depth and breadth of available data has led to a dramatic increase in focus. The quality of data can be a key factor in securing coverage, in obtaining the best possible terms and conditions, and in setting equitable premiums. On behalf of our clients, we collect and collate data that we then present to insurance markets and use as a negotiating tool. In this process, we are also greatly reducing the risk of coverage denials when a claim arises—our goals are contract clarity and certainty. On the property side, there is a tremendous focus on geographic coordinates, on flood zones, on earthquake potential and on wind models," says Harrison.

The data revolution is quite advanced in some areas, says Bryon Ehrhart, chief strategy officer, Aon Benfield, and chairman, Aon Benfield Analytics and Aon Benfield's Investment Banking Group.

Rather than estimate risk, insurers increasingly have the actual data within reach to assess a given client accurately, he says, including everything that requires a licensing, a purchase or a sale. "It's never been a more exciting time to be an actuary because you've never had so much data to work with," he explains. "Today it's possible to think about insuring people without taking an application because there's so much data." **AON**

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