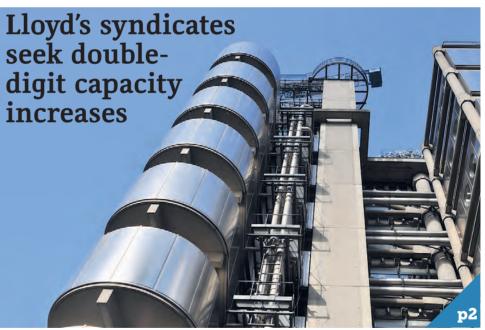# Florida braces for Hurricane Dorian

- Dorian hit 'will accelerate rate rises'
- South Florida landfall would cause 'sizeable' reinsurance loss: KBW
- Landfall location and duration of impacts key to loss bill

p3

Focus: Risk modelling

Rethinking the modelling of wildfire risk

p4-8

Lloyd's syndicates seek double-digit capacity increases

p2

NEWS

Lloyd's syndicates seek double-digit capacity increases

Hiscox proposes 21% capacity increase for syndicate 33, while Beazley seeks 132% hike for beta syndicate

Michael Faulkner
Editor

Lloyd's syndicates are seeking double-digit capacity increases for the 2020 year of account, with some proposing hikes of more than 50%.

Figures compiled by members' agent Argenta revealed many third-party capital-backed syndicates are proposing a significant increase in stamp capacity as they seek to take advantage of an improving rate environment in many lines of business.

But it remains to be seen how willing Lloyd's will be to agree to these proposals, given its focus on improving the market's profitability. Last year, the market's capacity was cut as Lloyd's cracked down on unprofitable lines of business and syndicates.

Hiscox is seeking a 21% increase in the stamp capacity of its flagship syndicate 33 to £1.7bn ($2.07bn) in 2020, while Tokio Marine Kiln has proposed a capacity of £1.3bn for its syndicate 510, an increase of 15% on the syndicate's capacity this year.

Atrium has proposed a 16% increase to £525m for syndicate 609 and Beazley is seeking a 13% hike to a stamp capacity of £414m for its syndicate 623.

In addition, Argenta syndicate 2121 is seeking approval for capacity of £425m in 2020, up 25% on this year's stamp.

The largest proposed increases are being sought by the smaller syndicates.

Tokio Marine Kiln syndicate 557, which writes a portfolio of US and international property catastrophe reinsurance, is seeking to increase its capacity by 50% to £52m.

Brit has proposed a 69% increase in capacity for its syndicate 2988 to £165m. Launched in 2017, the syndicate participates only on new and renewal business written by Brit's syndicate 2987 and in excess of that syndicate's appetite.

But the largest percentage increase is being sought by Beazley for its market tracking "beta" syndicate 5623. Beazley has proposed a 132% increase in the syndicate's stamp capacity to £147m.

Launched last year, syndicate 5623 writes facilities business at a reduced underwriting cost. Backed by third-party capital, including insurance-linked securities (ILS) funds, the syndicate had £22.5m of capacity in the business plan for 2018, which increased to £63m in 2019.

The group has big ambitions for the syndicate. Beazley's chief executive, Andrew Horton, told *Insurance Day* earlier this year he wished to expand syndicate 5623 to more than $1bn in premiums.

As this year's business planning process proceeds, syndicate executives will be hoping Lloyd's will allow expansion in lines where rates are increasing and there is scope for profitable growth.

Senior executives are feeling positive about the Lloyd's rating environment. Rates have been increasing almost across the board, supported by the impact of the Lloyd's Decile 10 initiative and the losses of the past two years.

Executives are also feeling optimistic that these increases will continue and, in some classes, bring rates back up to levels last seen seven years ago. "The leading indicators are looking positive for 2019. The cumulative effect will recover the rate reductions seen since 2012," one chief executive told *Insurance Day* recently.

Rates in lines such as property direct and facultative (D&F), marine hull, cargo, US directors' and officers', aviation and energy have increased significantly in recent months as syndicates have pulled back from writing unprofitable classes. Some D&F business has seen price rises of more than 20%.

"Margins in many lines of business now look healthier than they have in some years," Horton said following Beazley's interim report.

'Margins in many lines of business now look healthier than they have in some years'

Andrew Horton
Beazley

NEWS

Dorian hit 'will accelerate rate rises'

Swiss Re and Munich Re each expected to suffer a 4% share of the market loss, according to UBS estimate

Lorenzo Spoerry
Deputy editor

A direct hit on Florida by Hurricane Dorian could be a "tipping point" that would give a "meaningful" boost to property catastrophe reinsurance pricing, analysts said.

The re/insurance industry's capital position has declined significantly because of the disasters of 2017 and 2018 and excess capital is now estimated to stand at $30bn.

A $15bn hit by Dorian as part of a $70bn nat cat loss year would destroy the remaining capital buffer, resulting in a "meaningful impact on pricing", according to UBS's analysts.

After some hardening at January 1, reinsurance rates on loss-affected Florida business rose as much as 40% at June 1. On a risk-adjusted basis, rate increases are estimated to have averaged around 10%.

Many in the market hope for further rate rises at the January 1, 2020, renewals, although expectations are that rate increas-

'Catastrophe reinsurance rate increases and elevated reinsurance demand will persist into 2020'

KBW

es will mainly be borne by the worst-performing cedants, while the best-performing ones could count on their rates remaining stable or increasing slightly.

But a big loss resulting from Hurricane Dorian, only days ahead of the annual reinsurance Rendez-Vous in Monte Carlo, would put further upward pressure on rates, "consolidat[ing] a nascent re-pricing theme", UBS wrote.

This view was echoed by Keefe, Bruyette & Woods' analysts, who said Hurricane Dorian, combined with loss creep from prior-year events "means catastrophe reinsurance rate increases and elevated reinsurance demand will persist into 2020".

Ahead of this year's hurricane season, senior insurance-linked securities (ILS) managers privately warned another loss-heavy

year in 2019 could see investors flee the sector, pushing up rates even further.

ILS investors – many of them new to the sector – poured in billions of dollars of capital ahead of the triple whammy of hurricanes Harvey, Irma and Maria in 2017. This was followed by more major losses in 2018, as well as significant loss creep.

The problems faced by the Markel CatCo fund, which is under investigation by US and Bermudian regulators in relation to its loss reserving, have also hit investor confidence.

By UBS's estimation, Swiss Re and Munich Re would each bear about 4% of the industry loss from a hit by Dorian. Hannover Re is expected to take a 1% share of the industry loss, while Scor's burden is estimated at 0.7%. These calculations are based on an analysis of previous hurricane events in Florida.

A $15bn hit by Dorian would remain contained within the remaining third-quarter cat budgets of Munich Re and Hannover Re, but would erode the remaining third-quarter cat budgets of Swiss Re and Scor, UBS said.

South Florida landfall would cause 'sizeable' reinsurance loss: KBW

A projected Hurricane Dorian landfall to the north of West Palm Beach would cause "sizeable" losses that would largely be passed to the reinsurance sector, according to Keefe, Bruyette & Woods (KBW), *writes Scott Vincent.*

Based on the National Hurricane Center's landfall forecast at the time of writing, KBW said the reinsurance sector would be significantly affected by the event, which would lead catastrophe rate increases and reinsurance demand to persist into 2020.

Historical events of a similar magnitude close to Hurricane Dorian's possible landfall location have generated losses of up to $37bn in Florida, according to analysis by RMS.

The costliest of these events was Hurricane Three, which made landfall close to Hobe Sound in 1871, now a wealthy community of roughly 11,500 people along Florida's Atlantic coast.

The storm remained on land for roughly 24 hours as it travelled northward before recurving into the Atlantic over Georgia.

The RMS estimate for a $37.2bn industry loss from a repeat of this event is based on 2019 values and exposures. Hurricane Three reached category three status two days before hitting Florida and maintained this intensity through to landfall.

The 1947 Fort Lauderdale hur-

ricane would cost $26.1bn based on today's exposures, RMS said.

That storm struck south Florida as a category four hurricane before entering the Gulf of Mexico and ultimately making a second landfall close to New Orleans, where it caused widespread flooding. Fort Lauderdale, part of the Miami metropolitan area, is now a city that is home to more than 180,000 people.

RMS estimates the 1933 category three Treasure Coast hurricane would cost $11.3bn if repeated today, while the 1949 Florida hurricane, which made landfall at Lake Worth at category four, would cost $24.6bn.

Hurricane Jeanne, one of four Florida landfalls during the 2004 hurricane season, would cost $13.5bn based on 2019 exposures, RMS said.

Broker Guy Carpenter has estimated a repeat of Jeanne or the 1871 Hurricane Three event would cause losses in line with the major events affecting the state over the past two years.

The region has also seen several other major historical events, including the Great Miami 1926 hurricane, the 1928 Okeechobee hurricane and 1992's Hurricane Andrew. Each of these storms made landfall as strong category four or category five events, above the forecast intensity for Dorian at the time of writing.

Landfall location and duration of impacts key to loss bill

Hurricane Dorian's landfall location, extent of storm surge and rainfall and duration of impacts will be the critical components in determining the ultimate cost of insured damage in Florida this week, *writes Scott Vincent.*

Uncertainty among forecast models over the past week has created several potential loss scenarios for the storm. While the storm's hurricane-force winds remain compact at the time of writing, forecasters have voiced concern about the potential extent of storm surge and inland flooding.

The storm's slow forward momentum means Florida could be subject to severe weather conditions for several days.

As the storm approaches

land, even a slight shift in the storm's path could have a large potential impact on the possible industry loss bill.

These characteristics make direct historical comparisons challenging, given the relatively small number of major hurricane landfalls to have made a westward approach to the US East Coast.

Analysis by RMS has highlighted five historical comparisons based on a south Florida landfall, with the costliest of these events being the 1871 Hurricane Three event at $37.2bn.

The modelling firm stressed

these historical events provide guidance only and do not represent potential loss estimates for Dorian.

Dorian's ultimate loss bill could be substantially above or below this figure, depending on what gets hit and for how long. As demonstrated by Hurricane Matthew in 2016, a slight wobble in a storm's path during its approach to land can have a multi-billion-dollar impact on losses.

With land already saturated across much of Florida and days of heavy rain set to arrive with Dorian, flooding risk is widespread.

But the most severe wind and

$3.6trn
Florida's coastal exposures in 2018, up from $2.9trn in 2012

storm surge damage will be determined by landfall location and this will play a major role in determining Dorian's ultimate impact on the industry.

An increase in population and valuable property and assets along Florida's east coast in recent decades increases the potential for high-value losses.

Florida is the third-most populous state in the US and is continuing to grow, with many of those living in the state choosing to live by the sea.

According to AIR Worldwide data, Florida's coastal exposures (both east and west) were valued at nearly $3.6trn in 2018, up from $2.9trn in 2012.

While much of the south Florida Atlantic coastline contains

high-value properties, major metropolitan centres such as Miami present very large concentrations of exposures.

Between 1945 and 1950, five category four hurricanes made landfall in south Florida, four of which were along the east coast.

But landfalls along the coastline have traditionally been more sparse, with the most recent major hurricane landfall being Jeanne in 2004. RMS estimates Jeanne would cost $13.5bn based on today's exposures.

Dorian's impact on the state will unfold over the coming days. Assuming the storm does not recurve and remain offshore, Florida can expect several days of impacts before the loss picture starts to become clearer.

FOCUS/ RISK MODELLING

Named peril cover, supported by new risk modelling technologies, can finally transform liability underwriting to a science

Robert Reville
Praedicat

The question "What is the next asbestos?" has been asked by casualty insurers since the early 2000s in the aftermath of the biggest run of losses ever sustained by the insurance industry from a single risk in its history.

The question reflects a motivation to discover what emerging risks insurers need to look out for next, with the goal being to avoid them. After a $100bn industry loss, seeking to avoid a recurrence is reasonable.

However, this approach has stymied the liability insurance industry's growth in recent times and threatens to make it an irrelevance unless it can approach the problem differently.

The insurtech revolution has spawned innovations in risk modelling that leverage new technologies for gathering and analysing data. These capabilities have quite rightly been seen as both disrupters and saviours of the insurance industry, giving it the opportunity to meet the demand for cheaper and better coverage while facilitating a more granular understanding of the risk being written.

This is exactly what happened to the property market when it embraced risk modelling in the 1990s in the wake of Hurricane Andrew.

This strategic move enabled the industry to write Florida wind business at a profit in the aftermath of a number of loss-hit accounts.

Fundamentally, risk modelling provided the numbers and insights into risks that helped insurers close the coverage gap that would otherwise have existed had they decided to abandon Florida wind risk entirely.

Forward-looking modelling informed by big data and the deep technical knowledge of modelling start-ups is facilitating new insurance coverages that are fuelling growth in the industry

Transformative

Insurtech's modelling innovations become truly transformative for liability when they are delivered to clients as coverage on a named peril basis.

Named peril cover, such as hurricane or earthquake cover, driven by risk models, is a cornerstone of property insurance underwriting and risk management.

The early signs of named peril cover for liability are emerging, starting with liability risks that are driven by natural catastrophes. Recent catastrophic California wildfires, for example, were triggered by electrical equipment and spread by poorly maintained landscaping around power lines, resulting in large-scale liability losses. As electric utilities in California struggle to renew liability cover, innovative modelling and named peril coverage is emerging as part of the solution.

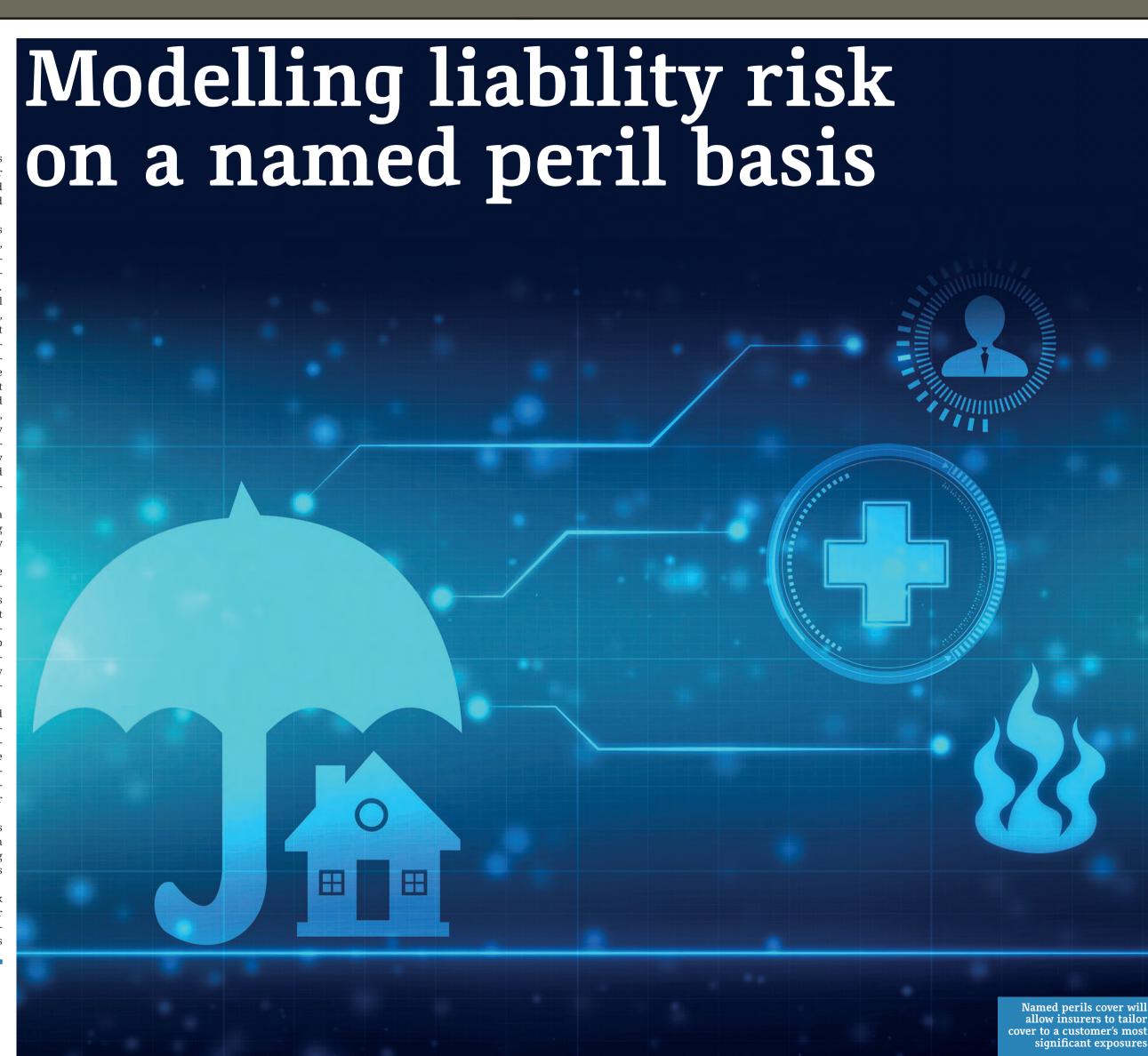Cyber risk is another area where emerging risk modelling and named peril cover is rapidly developing.

Historical claims data, the foundation of traditional underwriting and risk management, is of little use in writing cyber, but forward-looking modelling informed by big data and the deep technical knowledge of modelling start-ups is facilitating new insurance coverages that are fuelling growth in the industry.

In liability, innovation and growth are limited by the entrenched coverage of "all perils with exclusions". Under the all-perils regime, large-scale late-stage emerging risks are often excluded only after insurers suffer outsized or unexpected losses.

Conversely, the industry is sometimes catalysed by concern about a high-profile emerging risk and then promptly excludes it before loss.

Regardless of whether the risk ultimately results in losses for their customers, these perils remain excluded, limiting the risks

covered by the market and the utility of liability cover for managing long-tail liability risk.

Concern about the possibility that mass litigation would arise over the alleged carcinogenic effects of electromagnetic fields (EMF), whether in mobile phones or power lines, led to EMF exclusions in the 1990s that have been sustained in much of the industry ever since, even while the science has moved away from supporting hypotheses of harm.

When losses do emerge, buyers of insurance with exclusions or sub-limited coverages find themselves underinsured.

Coverage gap

The result of the all-perils regime is a severe and growing coverage gap. According to Towers Watson, the fraction of commercial tort covered by insurance has fallen from 94% in 1973 (before asbestos) to 56% today.

Whether exclusions, insufficient limits, higher retentions, the rise of captives, or avoidance of whole industries (such as pharmaceuticals), a coverage gap of this magnitude significantly undermines the value of liability insurance and the relevance of the industry.

Recent advances in data science have made a large range of poorly understood liability risks amenable to modelling. This type of modelling renders the question "What is the next asbestos and how can I exclude it?" moot.

Instead, liability insurers will ask "How can I prudently expand coverage for many emerging risks?" Coverage for a collection of named perils for which the risk is at an early stage of development can be specified upfront and then exposure to these risks for insurers managed on the back end through reinsurance or insurance-linked securities.

Moving toward named peril also means tailoring coverage

The opportunities for dramatic growth, expansive coverage and innovation will come with properly quantified baskets of named peril coverage, matched to the exposure, and responsibly managed to spread the aggregations

to a customer's most significant exposures. With models run against granular company risk profiles, the most material named perils identified can lead to a more productive dialogue about exposure and this dialogue will in turn lead to an appropriate premium for the risk covered with higher limits and lower self-insured retentions. As in the property insurance market, reinsurance and capital markets can then step in to efficiently spread resulting aggregations of named peril risk.

Named peril also has the potential to solve the problem of the open-ended long time tail of casualty. With all perils, unspecified exposures today can result in claims decades in the future – if all perils are covered who is to say when they will emerge? But with named peril, the length of coverage can be set to the time scale of the underlying risk, and priced accordingly.

Some all-perils cover is valuable and will always be desirable for casualty insurers in necessarily limited quantities. But the opportunities for dramatic growth, expansive coverage and innovation will come with properly quantified baskets of named peril coverage, matched to the exposure, and responsibly managed to spread the aggregations. We estimate this to be a $90bn annual growth opportunity for liability insurance, along with a $15bn annual named peril reinsurance opportunity too.

Liability underwriting is often referred to as an "art" because all-perils cover lacks a sufficiently strong foundation in data. Named peril cover driven by big data and forward-looking modelling can finally transform liability underwriting to a science. ∎

Robert Reville is chief executive of Praedicat

Modelling liability risk on a named peril basis

56%
Percentage of commercial tort covered by insurance today, down from 94% in 1973 (before asbestos)

Named perils cover will allow insurers to tailor cover to a customer's most significant exposures

FOCUS/ RISK MODELLING

Mapping the new frontier of risk modelling

The use of satellites, drones, survey aircraft and big data technologies is proving to be a game changer for natural catastrophe modelling and claims management

Dave Fox
Geospatial Insight

Information and analytics can accelerate a revolution that will give insurance and reinsurance companies a new super-power. The most ground-breaking of these is geospatial technology – a term used to describe the range of new tools contributing to the geographic mapping and analysis of the Earth (and human societies).

The main reason for this breakthrough is sophisticated imagery technology that is giving companies and insurers unprecedented access to real-time data and situation awareness to protect property and assets and help with crisis response.

Despite insurers' best efforts to understand the consequences of natural disasters, insured property losses continue to stress the

industry. The use of intelligence derived from images acquired by satellites and drones is increasingly becoming good practice in the industry.

Satellite boom
As little as five years ago, there were only around 15 commercially useful Earth observation satellites in orbit. Today, thanks in part to companies such as Space-X, the private US aerospace manufacturer and space transportation services company, there are now more than 350 observation satellites around the planet.

The rapid increase in Earth observation satellites in orbit provides re/insurers with vast amounts of quality data
aapsky/Shutterstock.com

By using this new world of data and analytics re/insurers can gain significant competitive advantage over their peers, as well as enhanced customer service and response times

This has given insurers and reinsurers the ability to access exceptional levels of high-quality, useful and reliable data for the first time in history, which provides regularly updated statistical and factual information for every part of the Earth.

At the same time, several innovations have created data-rich platforms and data sets for the insurance industry – all of which are cost-effective and ready to use. Initiatives such as blockchain, artificial intelligence and predicative analytics have helped create these data sets, as

well as the availability of considerable computing power through cloud advancements.

Fascinating progress in machine learning and deep learning methods based on artificial neutral networks and computer vision mean technology exists for computers to be taught how to gain high-level understanding from digital images or videos.

By using this new world of data and analytics re/insurers can gain significant competitive advantage over their peers, as well as enhanced customer service and response times.

When paired with risk modelling tools, re/insurers are finding geospatial technology is a game changer. Companies can adapt the data using the real-time visual evidence produced to better inform the models. This then gives the insurer the best of both worlds and provides the most comprehensive risk management toolkit. This is changing the property/casualty (P&C) industry across the board.

This technology can also identify the assets most at risk and obtain an in-depth understanding of how events will affect them.

In essence, to make itself robust, the P&C industry will have to use the insights technology can give it and invest on the pre-risk side to improve its products. This will make sure the market has a better understanding of its multinational portfolios, which will in turn help to improve pricing and obtain a deeper and broader perspective on the various risks it insures.

"Data enrichment", as it is being termed, augments insurers existing data sets to provide denser and much more detailed data, drilling right down to postcodes and individual properties and providing a more holistic understanding of the primary exposures. To be true superheroes to the world, re/insurers' future investment should be made in preventative measures rather than paying claims. ■

Disaster response
The use of satellites, drones, survey aircraft and social media can help improve the speed and accuracy of initial assessments and bring new insights into contingent business interruption contracts. With this technology vital infrastructure can be mapped, allowing insurers to see if roads or railways are blocked or if carparks are under water. They also allow insurers to check properties in their business supply chain for damage.

With residential and commercial property, the granular detail can include building size, building height and number of storeys, total floor area, roof type and material – and there is no surprise this is changing property insurance. Insurers can also quickly populate risk-focused property databases, which in turn reduces the burden on clients to provide claims information, which all helps with client on-boarding and retention.

Dave Fox is chief executive of Geospatial Insight

Matching model theory to the realities of the market

Insurers need to better understand how the outputs from risk models interact with the day-to-day dynamics of the market

Grant McManus
Standard Club

The insurance industry has come to rely heavily on risk modelling to inform capital setting, business planning and decision-making on a variety of topics, from reinsurance purchases to new product launches.

Although partly driven by regulatory expectations, this has undoubtedly led to insurers having a more sophisticated understanding of their risk profile and an improvement in the financial strength and stability of the wider industry. However, there is often only a small number of people in any organisation who have a true understanding of how risk models work and therefore how best to interpret their outputs.

Risk modelling for insurers typically refers to the use of stochastic and other quantitative techniques to better understand the financial impact and interaction of different risk variables at different levels of likelihood. Actuaries are expected to have strong knowledge of risk models, with the statistical and probabilistic assessment of data and risk a fundamental part of their formal training. However, it does not feature heavily in the training of those from other professional backgrounds who are prevalent in the specialist insurance market, such as accountants or lawyers. For many people, it is therefore something that needs to be learned on the job and/or never fully understood.

This presents a problem when people in the business who are arguably unqualified to interpret what the model is telling them go on to make decisions based on its outputs. Decision-makers need to

understand the limitations of a model and avoid using it in ways that are potentially inconsistent with its design.

Expectations gap
There is a responsibility on the part of modelling experts in an organisation to report and explain technical matters in a way that is understood by a wider group of decision-makers and an equal responsibility on those decision-makers to bring up their knowledge of risk models to an appropriate level. This is where there is often a mismatch in expectations.

If senior underwriters do not fully appreciate what the model is saying about the risk or profitability of a book of business, how are they supposed to use this information effectively when developing underwriting strategy and making underwriting decisions regarding exposure and pricing?

There are a whole host of shortcomings that may or may not be apparent to those relying on risk models to tell them something about their business. The ability of models to predict new threats is generally limited. If models are predominantly based on principles established through historic observations, how good will they be at predicting the impact of new or unforeseen threats such as disruptive technologies? A model is also only as good as its data going into it, which can often be incomplete or inaccurate.

For capital models calibrated at a one-in-200 level, there are very few observations and the likelihood reality would differ from the modelled number is high.

For a protection and indemnity (P&I) club, all claims of more than $10m are shared between the 13 members of the International Group of P&I Clubs based on a collectively agreed method. This means each club needs to con-

Insurance management needs to understand models' limitations so they use them appropriately
jijomathaidesigners/Shutterstock.com

If models are predominantly based on principles established through historic observations, how good will they be at predicting the impact of new or unforeseen threats such as disruptive technologies?

sider the P&I exposure related to approximately 90% of the world's ocean-going tonnage. These large pool claims also tend to behave in unpredictable ways and, unsurprisingly, are the biggest driver of volatility for many P&I clubs.

Linking theory to reality
Understanding the dynamics of the shipping industry and the challenges facing shipowners and operators is paramount to better understanding the associated insurance risk. This is what should form the foundation when developing insurance strategy and risk appetite, with risk

models used as one tool of many to aid structured thinking.

A well-considered and comprehensive scenario testing framework is another essential tool that can help management systematically consider what might go wrong, what the impact is likely to be and therefore how best to protect the insurer financially, reputationally and operationally. Scenario analysis can be a very effective way of engaging wider management, who might have less interest in the technical components of a capital model, to better understand how much capital should be set aside to protect the

balance sheet. Working through tangible examples of worst-case scenarios, built up using the knowledge and experience of the relevant experts, can also be an interesting way to challenge the outputs of a capital model.

To get the most out of risk models, there needs to be more clarity about how the outputs of risk modelling link and interact with other more tangible activities and analysis. It should not be seen as a separate actuarial exercise that is unconnected to the day-to-day running of the business. To do this, risk professionals and actuaries need to think intelligently and innovatively about how to make risk models useful and interesting for the wider management team.

Consideration of qualitative factors, expert experience and a ground-up understanding of risk should carry equal weighting when trying to understand the risk profile of an organisation. ■

Grant McManus is group risk officer at the Standard Club

FOCUS/ RISK MODELLING

© Jeff Chiu/AP

Rethinking the modelling of wildfire risk

The Tubbs fire in 2017 was a wind-driven event, so ember contributions to structure damage were significant

The increasing severity of wildfire losses means the market must take the same long-term approach to the management of the peril as it does with hurricanes

Michael Young
RMS

The world might be looking at the wildfires in the Amazon, however the insurance industry is also closely watching US wildfire.

After two record-breaking US wildfire seasons in 2017 and 2018, the insurance industry understands that wildfire can no longer be viewed purely as a secondary peril for exposed states.

Six of the top 10 fires for structural destruction have occurred in the past 10 years in the US, while seven of the top 10, and 10 of the top 20 most destructive wildfires in California history, have occurred since 2015.

The industry now needs to achieve a level of maturity with regards to wildfire that is on a par with that of hurricane or flood. The California losses are forcing re/insurers to overhaul their approach to wildfire, both at the individual risk and portfolio management levels.

It is perhaps one of the biggest re-evaluations of a natural peril since Hurricane Andrew in 1992.

For both California wildfire and Hurricane Andrew, the industry did not fully comprehend the potential loss severities. Catastrophe models were relatively new and had not gained market-wide adoption and many organisations were not systematically monitoring and limiting large accumulation exposure in high-risk areas. As a result, the shocks to the industry were similar.

Exposure has crept up. For decades, approaches to underwriting have focused on the wildland-urban interface (WUI) – the area where exposure and vegetation meet.

However, exposure levels in these areas are increasing sharply. Combined with excessive amounts of burnable vegetation, extended wildfire seasons, and climate change-driven increases in temperature and extreme weather conditions, these factors are combining to cause a significant hike in exposure potential for the re/insurance industry.

A recent report published in the *PNAS* journal showed that between 1990 and 2010 the WUI area increased by 72,973 square miles (189,000 square kilometres) – an area larger than Washington state.

The report stated: "Even though the WUI occupies less than one-10th of the land area of the conterminous US, 43% of all new houses were built there, and 61% of all new WUI houses were built in areas that were already in the WUI in 1990 (and remain in the WUI in 2010)."

72,973 sq miles
Increase in the wildland-urban interface area between 1990 and 2010

Rethinking wildfire analysis
A rethink of how the industry currently analyses the exposure and the tools it uses is in order, as historically, the industry has relied primarily upon deterministic tools to quantify US wildfire risk, which relate overall frequency and severity of events to the presence of fuel and climate conditions, such as high winds, low moisture and high temperatures.

While such tools can prove valuable for addressing "typical" wildland fire events, such as the 2017 Thomas fire in southern California, their flaws have been exposed by other recent losses. They insufficiently address major catastrophic events that occur beyond the WUI into areas of dense exposure such as the Tubbs fire in northern California in 2017.

Further, the unprecedented severity of recent wildfire events has exposed the weaknesses in maintaining a historically based deterministic approach.

A number of areas are currently understated in underwriting practices, such as the far-ranging impacts of ember accumulations and their potential to ignite urban conflagrations, as well as vulnerability of particular structures and mitigation mea-sures such as defensible space and fire-resistant roof coverings. Among many innovations in its RMS north America wildfire high-definition models it can simulate the ignition, fire spread, ember accumulations and smoke dispersion of the fires.

For instance, in last year's Camp and Woolsey fires, RMS modelled the accumulation of embers, their wind-driven travel and their contribution to burn hazard both within and beyond the fire perimeter.

Average ember contributions to structure damage and destruction is approximately 15%, but in a wind-driven event such as the Tubbs fire in 2017 this figure is much higher. This was also a key factor in the urban conflagration in Coffey Park.

Wildfire severity is here to stay, wildfire frequency and intensity – similar to other perils, will vary, but as with hurricane, a mature, long-term approach to risk management is now required for wildfire. ■

Michael Young is vice-president of product management at RMS