London Market looks ahead

Preparing for the next big insurance event

Disclaimer
All scenarios related to the industry dry run exercise are fictional in nature and devised purely for the purposes of this project in order to determine the impact of market-turning events and the appropriate response. No identification with actual events, persons, places, buildings, and products is intended or should be inferred.

This document presents the views and recommendations of the dry run exercise participants and does not necessarily represent the views of observers, or other associated organisations, unless explicitly stated.

Nothing in this white paper constitutes Bank of England (PRA) policy or guidance. The PRA has set out its proposed expectations regarding how regulated general insurance firms should prepare for, and respond to, a so-called Market Turning Event in CP 32/16. Readers should not infer from this paper that the PRA will necessarily follow a particular course of action in the event of a significant general insurance market loss. The PRA will respond to any future situation as circumstances dictate, based on its assessment of the risks to its statutory objectives of policyholder protection and financial stability.

Unless otherwise stated, all figures refer to US Dollars.

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An introduction from Robert Childs, Chairman, Hiscox

The London Market needs to prepare itself for the next major market-turning event. The last time we were really tested was during the tragic events of 9/11, and much has changed since then.

Many of the people making key decisions at that time have either retired or are reaching the end of their careers. It is the school and college leavers of 2001 that are now running the businesses in our market and they haven't yet experienced anything like it. I hope they never do, but we need to be prepared for the worst. We also operate in a different regulatory environment now: the Financial Conduct Authority (FCA) and the Prudential Regulation Authority (PRA) have replaced the Financial Services Authority (FSA), and we have additional regulatory commitments in the form of Solvency II.

It is unusual for any market to proactively apply a 'dry run' simulation to itself. Normally, such an exercise would be imposed by a regulator – and often on a fairly reluctant group of participants. But, instead, we drove this together because we share a commitment to ensuring that the London Market remains the world's pre-eminent specialist insurance centre. We must be proactive in defending its position – and part of that means preparing for the next market-turning event. We must be under no illusion – other markets are ready and willing to challenge our position if we do not.

This project was a major undertaking for the London Market and involved 28 organisations; underwriters, brokers and their respective market organisations, Lloyd's and the rating agencies. We have acted with the support and assistance of the FCA and the PRA, and Her Majesty's Treasury. Participation involved significant effort and commitment at what was already a busy time of year for our industry, as we approached the important year-end renewals, and I'd like to extend my thanks and congratulations to everyone who was involved and worked so hard to bring the project to fruition.

In a tabletop exercise it is difficult to recreate the same sense of fear and uncertainty that gripped our industry in the days immediately following 9/11. However, the scenarios we selected provided the opportunity to consider responses and requirements during a rapidly unfolding crisis. How quickly would the size of the loss be known? What would we need from our industry regulators, and how quickly? As insurers, we plan for a whole range of events, but in this exercise we tested not only a well-modelled event (a hurricane) but also a far more opaque, less predictable and less modelled event (a major cyber-attack which would affect many different lines of insurance cover).

In such an exercise it is very easy to become fixated on financial performance, but assessing solvency was not the focus of this project, which is precisely why we went further than measuring the market's financial muscle in a market-turning event. It encouraged participants to think about how to get a handle on the loss, pay claims swiftly, and at the same time seize the opportunity in a hardened rating environment. We also focused on two other very important aspects of managing such a major crisis: how to communicate clearly and candidly, and how to provide leadership when there may seem to be disarray.

This exercise taught us many things, which we outline in this white paper. Perhaps the most valuable, though, is that a catastrophe doesn't need to be a crisis. The London insurance market is well established, highly regarded, and robust enough to withstand shock losses. We have deep underwriting and management expertise, a leading position in many lines of business and, most importantly, a commitment to pay claims. We have a vital part to play in the City of London as well as the wider UK economy. Contingent on a surefooted regulatory response when the worst happens, this exercise shows we have all the ingredients we need to not only survive a market-turning event, but to thrive. We look ahead with confidence.

Comments from Chris Moulder, Director, General Insurance, Prudential Regulation Authority

The specialist 'London Market' is where complex, low frequency, high severity risks are insured. Major market dislocations are typically caused by sudden, unexpected and often painful events.

In the extreme, these could undermine firms' financial soundness and affect the provision of critical services to the economy.

At the PRA we have been doing our own thinking on these issues and in September 2016 published a consultation paper setting out our expectations of general insurers in preparing for and dealing with such events. We have also supported the industry in conducting its own 'dry run' initiative as a way to test these issues in practice and welcome the publication of this report. We will take its conclusions into account as we consider the responses to our consultation.

The losses from the two events in the exercise would have generated a material degree of uncertainty in the London Market and tested firms to a significant extent. The exercise highlighted that firms would need to consider a number of simultaneous priorities under complex and uncertain conditions. They would need to manage the prompt payment of claims; assess and maintain solvency (recapitalising if necessary); and secure appropriate resources to write new business. These three issues are closely linked and in some cases firms and regulators would need to consider tensions between them.

Inevitably, an exercise such as this also requires firms to make a number of assumptions. For example, in this exercise firms were given an early indication of the overall market loss, which helped to condition firms' responses. In reality, there could have been an extended period of uncertainty, which could have affected the judgements made by both firms and regulators. Secondly, firms judged that they could recapitalise promptly after the event either though parental support or through third parties. In reality, such an event may have also affected parent companies and firms looking for additional third-party investment might have been competing against each other for capital. Finally, firms also assumed that reinsurance recoveries would be readily forthcoming.

If these assumptions had proved to be wrong, the ability of firms (and the market as a whole) to respond as assumed could have been different. One of the key lessons of the exercise, therefore, should be for firms to consider what they might do if the level of uncertainty is high, or the actions being taken across the market as a whole affect an individual firm's ability to act in the way it might have originally planned.

The exercise also allowed us to test some of our own internal processes and co-ordination with other stakeholders, e.g., Lloyd's, Her Majesty's Treasury and the FCA. We are committed to working closely to ensure any response to such events is managed appropriately and to avoid any unnecessary duplication. The report notes that firms are keen to understand our approach in this area in more detail. We have already published some material on this and will consider whether we can give any further clarification while preserving the flexibility needed to ensure that we can respond as appropriate.

The exercise also highlighted the importance of effective communication between firms and regulators. This will be of particular importance in the initial phase after an event when uncertainty is likely to be greatest. Where firms could have suffered large losses, we would expect a close level of interaction so they could explain how they plan to rebuild their financial position within an acceptable time frame. We stand ready to discuss with firms their current thinking on how they might do this so that we can understand their proposed approaches and ensure our expectations are clear.

I would like to extend my thanks to the Steering Group and the exercise's participants for overseeing the exercise, allowing us to observe its conduct, and for sharing its recommendations with us and with the broader industry. Our work on market-turning events, and this 'dry run' initiative, is a positive example of industry and regulators working towards a common aim and we look forward to continuing to work collaboratively to improve our collective ability to withstand such events.

Executive summary

It is over fifteen years since 9/11, the last truly market-turning event to impact the London Market. Much has changed since then, including the advent of Solvency II and the introduction of new regulators in the form of the PRA and FCA. The industry is no longer the same as at the time of 9/11, nor are its responses likely to be. To establish just how prepared the industry now is for major market-turning events, a group of more than twenty London Market insurers, brokers, regulators and rating agencies from across the industry – led by Robert Childs, Chairman of Hiscox – joined together at the end of 2016 to conduct a detailed dry run of how a market-turning event might play out in today's market.

The objective of the dry run was to test just how prepared the industry is today for ensuring that it can support its responsibilities to its clients in such circumstances, as well as to identify how it might improve its own resilience and prepare for such events, while further strengthening the London Market's leading position and expertise in the global marketplace.

The dry run enabled the industry to:

- **Test how prepared it is for ensuring that it can support its responsibilities to its clients following a market-turning event.**
- **Identify how it might improve its own resilience and prepare for such events.**
- **Determine how to further strengthen the London Market's leading position and expertise in the global marketplace.**

The dry run scenario included an unprecedented cyber event, a highly destructive hurricane, one of the largest ever stock market declines and a major reinsurer default with consequent delays in reinsurance payments. These simulated events resulted in extraordinary global insurance losses of approximately $200 billion, the largest in history.

In the past, the industry's financial responses to catastrophe have been shaped by five elements common to such market-turning events: the strain on liquidity, the need to seek additional capital, significant rate increases, responses of regulators in quickly assessing what actions need to be taken to ensure financial stability and protect policyholders, and the use of deep underwriting expertise to enable the London Market to continue to provide vital insurance cover during times of uncertainty.

From the participants' responses to the catastrophes that followed from the simulated events, it is clear that the market dynamics have changed significantly since the last market-turning event. The dry run shows that in today's circumstances only a few of the earlier elements continue to be important in differentiating the London Market from other markets during such a period. For example, while access to capital is still a vital prerequisite to compete, it is not necessarily a differentiating factor for the London Market in upholding and reinforcing its leading global position.

The exercise suggests that the industry has access to sufficient resources to cope with the extraordinary losses witnessed in this dry run. However, the London Market's resilience depends to a large extent upon the robustness of two elements: firstly, its reinsurance and recapitalisation arrangements and, secondly, fulfilment of its assumptions in regard to firms' ability to execute against these arrangements during the turbulent financial environment that follows a catastrophe.

To ensure that the London Market delivers the desired outcomes, the UK must continue to be a leading (re)insurance centre capable of attracting and retaining deep underwriting and industry expertise. It also requires regulators to carry out as quickly as possible any required regulatory actions (e.g., approvals) while meeting their statutory obligations and assuming that firms fulfil their obligations to engage with regulators and act appropriately.

We believe that the London Market needs to further build upon its capabilities by adopting three broad recommendations, as described below:

- **Ensure customers are well served by putting in place internal processes to respond effectively to market-turning events.**
  - Establish crisis management training programmes.
  - Ensure that a robust and well-tested response is in place.
  - Maintain clear plans for raising additional capital following a market-turning event.
- **Maintain the London Market's leading position and expertise in the global marketplace by strengthening Lloyd's position and proactive stakeholder interactions.**
  - Further strengthen and differentiate Lloyd's position.
  - Navigate a broad set of key stakeholders to maintain confidence during times of market-turning events.
- **Collaborate with the PRA to clarify mutual expectations and ensure an effective post-catastrophe response.**

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1. The importance of testing the system

The primary purpose of the insurance industry following a market-turning event is to support its clients and to ensure ongoing coverage of risk. This role is critical during the period of dislocation that follows in the immediate aftermath of such events – the period of maximum disruption.

The insurance industry is used to dealing with catastrophes. The industry prepares for them as an everyday part of its business planning, creating detailed strategies to cope with such events and to support their clients when such events strike. Nonetheless, there is the danger that standard simulations can fail to properly test the London Market's readiness for a truly exceptional once-in-a-generation event. Catastrophic events have a habit of challenging prevailing assumptions: in 2005, for example, no one expected the New Orleans levees to break and leave much of the city under water, nor, in 2011, had anyone predicted that an earthquake of the magnitude to hit Tohuku was even possible in that location, let alone that it would cause a tsunami that would overwhelm a nuclear power plant.

Conventional wisdom can hamper the process of planning for market-turning events. Prior to September 11th, 2001 (9/11), a major attack by foreign terrorists on a US city was considered unthinkable. No one who worked in the market during that catastrophe could forget the profound sense of confusion and uncertainty that gripped it. During the first few hours even the continued functioning of the insurance industry was called into question. As things stabilised a little, its capability to provide risk capital to the global economy in the face of such a threat was likewise questioned.

With hindsight we can see that the industry's ability to withstand such market dislocation and to support its clients through the aftermath of a major catastrophe is testament to its resourcefulness and resilience, as well as to the surefootedness of the regulators' responses. This capability should not become an excuse for complacency, however. Risks are always changing. In the past, most major catastrophes have caused physical damage in a relatively localised area. However, in today's digital age the increasing connectivity provided by technology means that a wide-ranging cyber-attack could create a catastrophe much more complex than any previously seen. Such an attack could cause disruption across national, linguistic and legal borders.

Catastrophic events seem to be becoming more frequent. Events previously thought to occur once in a century are happening once every 50 years, while serious manmade catastrophes are becoming more pervasive.

There are a number of reasons why this is the case:

- Increased interdependencies created by globalisation, such as just-in-time production methods, resulting in highly complex supply chains.
- Growing interconnectedness of systems, processes and devices, leading to secondary effects.
- Greater concentrations of property values in catastrophe-prone regions, such as the southeastern and southwestern United States.
- Expansion of industrial buildings in catastrophe-prone areas, such as those located in emerging economies
- Rising number of terrorist attacks.
- Substantial growth in business interruption exposure unrelated to property damage that is triggered by events such as cyber-attacks.

It is over fifteen years since the 9/11 terror attacks, the last truly market-turning event. Much has changed since then. While the London Market has considerable institutional experience, many of its new generation of managers have no personal experience of leading the response to such events. There is a new supervisory regime in place in the form of Solvency II and the London Market has new regulators following the transition to the Prudential Regulation Authority and the Financial Conduct Authority.

The London Market itself has changed substantially since 2001. At that time it used largely UK money to write risks from around the world: today its sources of capital are as global as the risks it underwrites. Many of its insurance businesses are no longer British owned but are owned by global companies based in the US, Bermuda or Asia.

At the same time, London is under increasing competitive pressure from other insurance markets. Bermuda, in particular, has responded quickly to previous catastrophes, for example, in raising new capital. This was true in relation to Hurricane Andrew in 1992 and Hurricanes Katrina, Rita and Wilma in 2005, as well as following the attacks of 9/11. More than half the new reinsurance capital raised globally in the immediate aftermath of 9/11 went to Bermuda, while established firms based in the island were able to raise additional capital with relative ease. Bermuda has become a magnet for new capital and today competes directly with the London Market.

It is true that markets such as Bermuda are now deemed equivalent under Solvency II, helping to create a level playing field. Nevertheless, it is likely that they will continue to react in a swift and decisive manner to any market dislocations caused by future market-turning events – and that they will be supported by their regulators when doing so.

London is under increasing competitive pressure – over half of the new reinsurance capital post-9/11 went to Bermuda.

The London Market needs to reinforce its reputation if it is to remain pre-eminent. Ensuring that it is well prepared for once-in-a-generation market-turning events has a key part to play in this.

The purpose of this exercise was to test how the London Market and the wider UK insurance industry would respond to a future market-turning event. The exercise entailed a full dry run of how such events would play out for London Market companies, regulators and other stakeholders.

The dry run examined participants' solvency positions and commercial and operational responses to assess how effectively the London Market would meet three key objectives when responding to the dislocation that follows a market-turning event. The three objectives were to:

- **Support clients' best interests.** Pay claims quickly and fairly, and ensure cover continues to be offered during a market-turning event.
- **Maintain financial stability.** Make sure there are sufficient financial resources to provide for the normal operation of the London Market, maintain continued confidence in the City and ensure that insurers can continue to provide services to the real economy.
- **Uphold the London Market's leading position and expertise in the global marketplace.** Ensure that experienced London-based underwriters have flexibility in using their informed judgement to price risk at a time when other markets might pull back.

The dry run was devised with input from Lloyd's and the catastrophe-modelling firm, RMS. Nine insurance and reinsurance companies tested their own business plans, internal procedures and decision-making processes within a detailed scenario of events that unfolded over a period of two weeks. The exercise was intended to test participants' preparedness and to help identify any gaps in the London Market's response to such a market-turning event. As part of this assessment, a broad range of observers, including regulators, rating agencies, and brokers, provided unbiased and objective feedback to the industry participants.

In parallel, a second group formed of representatives from twelve participating organisations met to consider the commercial and operational implications of the scenario. This group examined two issues: firstly, how the London Market could best provide reassurance and certainty to clients during such an event; and secondly, how it can maintain its role as one of the world's insurance capitals. In order to produce its conclusions, the group considered current issues and the lessons learned from previous catastrophes. These groups' responses have led to the series of recommendations outlined in this white paper.

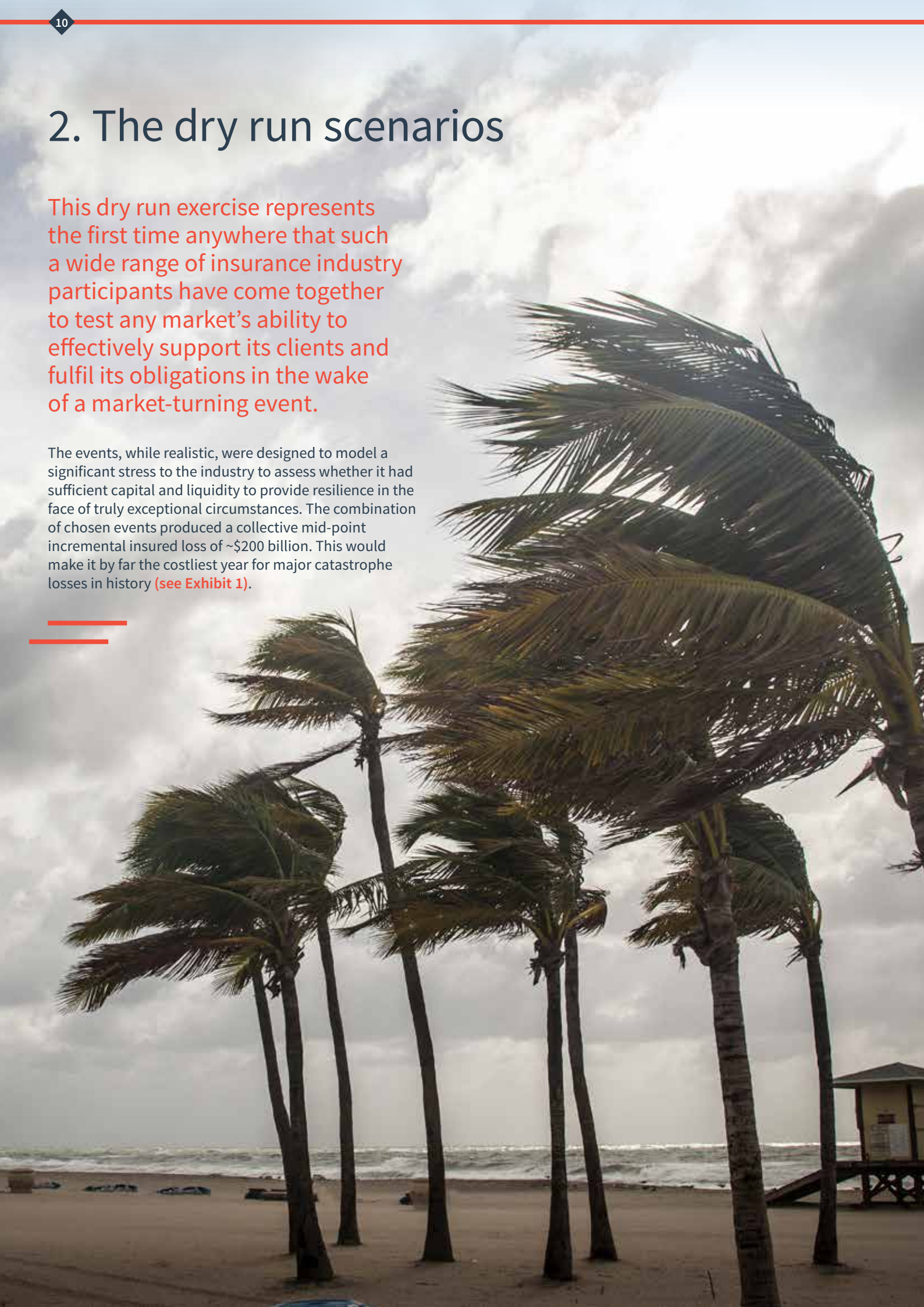
The natural tension between competition and collaboration that is a unique feature of the London Market was maintained throughout this exercise. Baker McKenzie provided advice on competition law compliance, together with guidance on data protection and confidentiality.

We are also grateful to McKinsey & Company, who provided support in designing and coordinating the exercise, as well as in quantifying and analysing the results.

2. The dry run scenarios

This dry run exercise represents the first time anywhere that such a wide range of insurance industry participants have come together to test any market's ability to effectively support its clients and fulfil its obligations in the wake of a market-turning event.

The events, while realistic, were designed to model a significant stress to the industry to assess whether it had sufficient capital and liquidity to provide resilience in the face of truly exceptional circumstances. The combination of chosen events produced a collective mid-point incremental insured loss of ~$200 billion. This would make it by far the costliest year for major catastrophe losses in history **(see Exhibit 1)**.



What was tested

During the course of the two-week exercise, participants tested the industry's ability to:

- Absorb a large market dislocation.
- Respond rapidly and maintain financial stability after the event.
- Maintain liquidity and raise capital during the period of dislocation following a market-turning event.
- Provide the trading capabilities required to respond operationally to such large losses. Communicate effectively with Lloyd's and the PRA regarding information sharing and model update considerations.

The exercise was also intended to test companies' internal processes, decision-making, and management reactions.

What was not tested

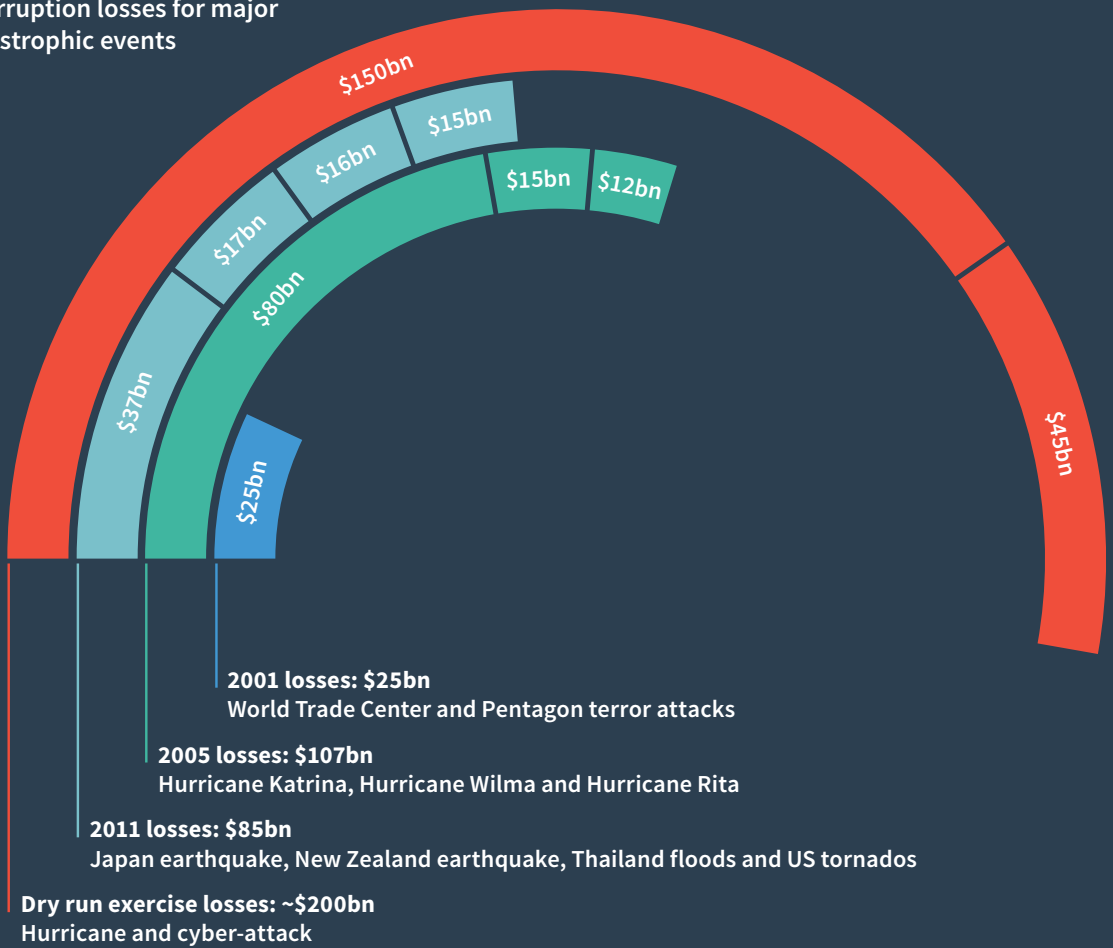
The exercise was explicitly not intended to test several areas, since these are already well covered by other stress-testing mechanisms. Specifically, the areas not tested are:

- A company's ability to accurately estimate and calculate losses.
- Accuracy of a company's internal capital or liquidity models.
- Individual solvency levels.

Participants were therefore provided with the incremental gross loss ratio impact of the events. While the incremental gross loss ratios were assigned to each participant based on their level of exposure to catastrophe risk, it is possible that in reality individual organisations could experience far higher (or far lower) losses. As a result, in a real world situation some may face greater pressure on capital and solvency levels. Having up-front details of the size of the losses also meant that uncertainty was not as severe as it would have been in reality and may have reduced the level of interaction required during the exercise between (re)insurers and the PRA and Lloyd's.

Exhibit 1

Insured property and business interruption losses for major catastrophic events



Losses from past events include property and business interruption and exclude liability and life insurance; US Nat Cat figures based on Property Claim Services (PCS)/incl. NFIP losses.
Losses converted to USD at end of year exchange rate. USD values are extrapolated using the US consumer price index to give 2015 values.
Source: Swiss Re, Sigma No 1/2016; Financial Stability and Commercial Working Groups.

The test events

The simulation looked to test participants' responses to a range of different types of events, each of which was intended to stress the market in a distinct way:

- **Non-modelled insurance loss ('Halloween Blackout').** This event built on the Business Blackout report and scenario published by Lloyd's and the University of Cambridge's Centre for Risk Studies in July 2015. This event forced companies to respond to the unknown and identify the most critical next steps during a time of uncertainty. It was designed to raise questions about policy coverage, the extent of losses and the likelihood of a similar event occurring again. It allowed participants to understand gaps in their existing knowledge and processes. It also provided the opportunity to test the interactions required between stakeholders following such an unprecedented event.
- **Modelled insurance loss ('Hurricane Guy Fawkes').** This event was designed in conjunction with Risk Management Solutions (RMS). The event modelled a very large catastrophe, one larger than that of Hurricanes Katrina, Rita and Wilma in 2005, and was designed to stress insurers' capital and liquidity positions. It leveraged existing models and the significant amount of relevant data already available, such as reinsurer exposures. This reduced the amount of time required by participants to understand the initial impact of the event upon their businesses and allowed them to focus on testing their financial stability.
- **Asset stress (global equity crash).** This event tested the participants' ability to handle the asset devaluations and dislocation seen during the period of uncertainty that immediately follows a catastrophe – conditions designed to force participants' leadership teams to engage in challenging conversations.
- **Operational / liquidity stress (reinsurance default / delay).** This event tested the participants' ability to respond to events other than insurance losses. Such events can place additional pressure on financial losses, liquidity and future reinsurance capacity during a market-turning event. Again, this was designed to force participants to engage in challenging conversations that might not otherwise arise during business-as-usual operations.

The dry run was split into two separate periods of one week each. Week 1 enabled the participants to explore the impact of a major non-modelled insurance loss event on their underwriting plans, capital and liquidity positions. In Week 2, the participants were asked to consider the cumulative impact of the Week 1 events, together with the impact of a significantly larger modelled event that was designed to further strain capital and liquidity positions.

In Week 1, the dry run simulated a cyber-attack and one of the largest-ever stock market declines. Week 2 events involved the costliest hurricane in history, together with reinsurer defaults and delays in recoveries (see Exhibit 2).

Exhibit 2
Global insurance losses of approximately $200 billion, with participants responsible for about 5%

		Description	Impact
Week 1	**Non-modelled** 'Halloween Blackout'	◦ Cyber-attack on power infrastructure with 93 million people impacted across 15 US States.	◦ Total insured losses of $45 billion.*
	Asset Global equity crash	◦ Severe drop in equity and bond market values.	◦ 16.2% drop in global stocks. ◦ 28.3% drop in (re)insurer shares.**
Week 2	**Modelled** 'Hurricane Guy Fawkes'	◦ Category 5 hurricane over Miami. Wind, storm surge and flood damage (1.8 million buildings and offshore platforms).	◦ Total insured losses of ~$125-175 billion.
	Liquidity Reinsurance default / delay	◦ Major reinsurer(s) failure. ◦ Delays in recoveries. ◦ Limits on reinsurance capacity.	◦ Hurricane: 10% default, 10% delays. ◦ Cyber: 10% limit on capacity.

*The $45 billion loss simulated in this exercise not only relates to existing cyber policies in force, but is also designed to reflect the growing uptake of cyber coverage and its potential impact on other lines of business.
**Compared to one week earlier.
Source: Financial Stability and Commercial Working Groups.
All scenarios are fictional in nature and devised purely for the purposes of this project.

A feedback process involving the PRA and Lloyd's, was incorporated into the exercise following the first set of events at the end of Week 1. This gave participants the opportunity to respond to any institutional guidance in their final submissions.

When examining the outcomes of this dry run it should be borne in mind that the conditions following any real-life market-turning events are likely to be much more complex and nuanced than those an exercise can create. The outcomes from the dry run depended upon a number of assumptions: that the participants could interpret these optimistically, even while keeping within the bounds of what is realistic, cannot be ruled out. The simulation did not delve into second or third-order financial implications, except in cases where the participants included these in their submissions. Nor was the impact of the market-turning events upon operations simulated. Participants were asked to incorporate such impact into their business plans where appropriate. This subject was, however, discussed by participants in parallel. Though participants in this exercise account for a substantial portion of the London Market, their exposure represents ~5% of global losses. The results have not been extrapolated to produce a global industry perspective.

The scenarios referenced in this section and throughout the remainder of this white paper, while taking input from recent real-life catastrophes, are fictional in nature and have been devised purely for the purposes of this project. More details of the events and the execution of the dry run are shared in the appendix.

The 'Halloween Blackout' forced participants to respond to the impact of an unprecedented cyber-attack on US power infrastructure.

3. Past major catastrophes

Three recent major catastrophes – 9/11, Hurricane Katrina and the 2011 Tohuku earthquake – provide crucial insights that helped to inform the scenarios laid out in the dry run exercise. These events were used to help identify some of the lessons for how the London Market can not only survive a market-turning event but also how it can support its clients and brokers during a time of great uncertainty.

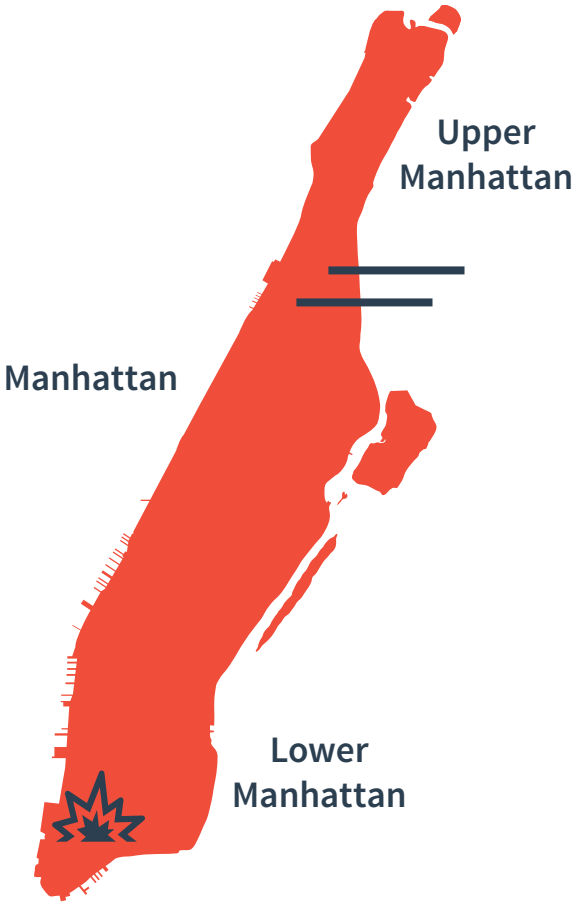
Innovation following major market dislocations

The industry has not stood still in the fifteen years since 9/11, the last truly market-turning event. It has adopted a more proactive approach to catastrophe planning and preparation, with companies working hard to ensure they are prepared for and able to respond well to catastrophic events and the volume of claims that ensue. The industry has made significant advances in catastrophe risk modelling and related technologies, such as the use of geographic modelling, big data, and exposure management. These technologies are increasingly used by brokers and (re)insurers to support their underwriting decisions.

The key developments in the industry include:

- Catastrophe models have evolved in terms of the perils they include, as well as their level of detail, accuracy and geographic coverage, and are now used to estimate losses arising from various types of hypothetical catastrophes.
- (Re)insurers have improved their ability to monitor geographic exposure accumulations, by linking their internal databases to geographic mapping systems in order to provide underwriters with visualisation of the real-time exposure in any given area.
- Following 9/11, underwriters of workers compensation have added covered lives to their geographic exposure databases in order to monitor concentrations of insured workers. Recently, wearable technology has started to be introduced to provide specific location data.
- Catastrophe models' predictive and event tracking capabilities have improved in regard to weather, earthquake and tsunami risks.
- Insurers and brokers have developed more sophisticated catastrophe response organisations, which they have tested and improved during recent disasters.
- Insurers now routinely sign pre-agreed contracts with international loss adjusters that are able to deploy teams anywhere in the world. Preparations also include the block booking of hotel rooms required to accommodate response teams.
- Broad-based technological developments have greatly assisted insurance companies in organising their on-the-ground response to claims during a catastrophe. These developments include the use of:
  - Web and smartphone based technologies to support event claims handling.
  - Satellite communications, GPS, laptops, portable generators and drones to assist response teams.

September 11



September 11th, 2001 saw a series of coordinated attacks by Al Qaeda terrorists on US targets, in which four airliners were hijacked and flown into buildings. Two American Airlines planes were flown into the North and South Towers of the World Trade Center in New York. Both buildings collapsed, destroying or badly damaging nearby buildings.

Insurers were left scrambling to work out how much the attacks would cost them. Prior to 9/11, terrorism cover was routinely included in commercial insurance policies for no additional premium. The risk of a major terrorist attack in the US had been considered slight, so companies did not keep track of their aggregate exposure, while computer models had not been used to predict losses from such man-made catastrophes.

In the days following the collapse of the Twin Towers, it was difficult for insurers to get an accurate picture of their exposure: much of Lower Manhattan had no power or telephones and mobile phone service was sporadic, while most of the area around the World Trade Center complex was sealed off as a crime scene. In total, 16 acres of the world's most expensive real estate was reduced to rubble and the country was gripped by the fear of further attacks.

The industry itself was closely involved in the disaster, as a number of insurance companies had offices in the Twin Towers. More than one in five of the nearly 3,000 people who died worked in insurance.

As the scale of the devastation became clear, the impact on insurers was apparent, with large losses generated in classes of business as diverse as property and fine art, business interruption, aviation and event cancellation. Some classes, such as workers' compensation, life and disability had not previously experienced catastrophic losses.

The attacks cost the insurance industry around $25 billion in property and business interruption losses[1] and $44 billion in total[2] (in 2015 Dollars). Lloyd's carried a large share of the losses. A report by the New York City Comptroller estimates the overall economic cost to be at least $166 billion.[3]

Following the attacks, insurers were able to quickly reassure policyholders, regulators and investors they had the financial strength to pay claims resulting from the attacks. Following 9/11, insurers introduced blanket terror exclusions into their policies to limit their exposure and said that future terrorist attacks might be uninsurable. These exclusions were not lifted until the Terrorism Risk Insurance Act (TRIA) was passed in November 2002. With this act, the federal government and the insurance industry agreed to share the cost of any future 'certified acts of terrorism'. The programme has since been revised and extended, and the proportion of the losses to be paid by insurers in any future attack has increased significantly.

Following 9/11, insurance prices rose significantly across the board, as insurers digested the scale of their losses and the increased terrorist risk. The cost of risk in the US rose by around 15% in 2001 and 30% in 2002, according to the Insurance Information Institute.

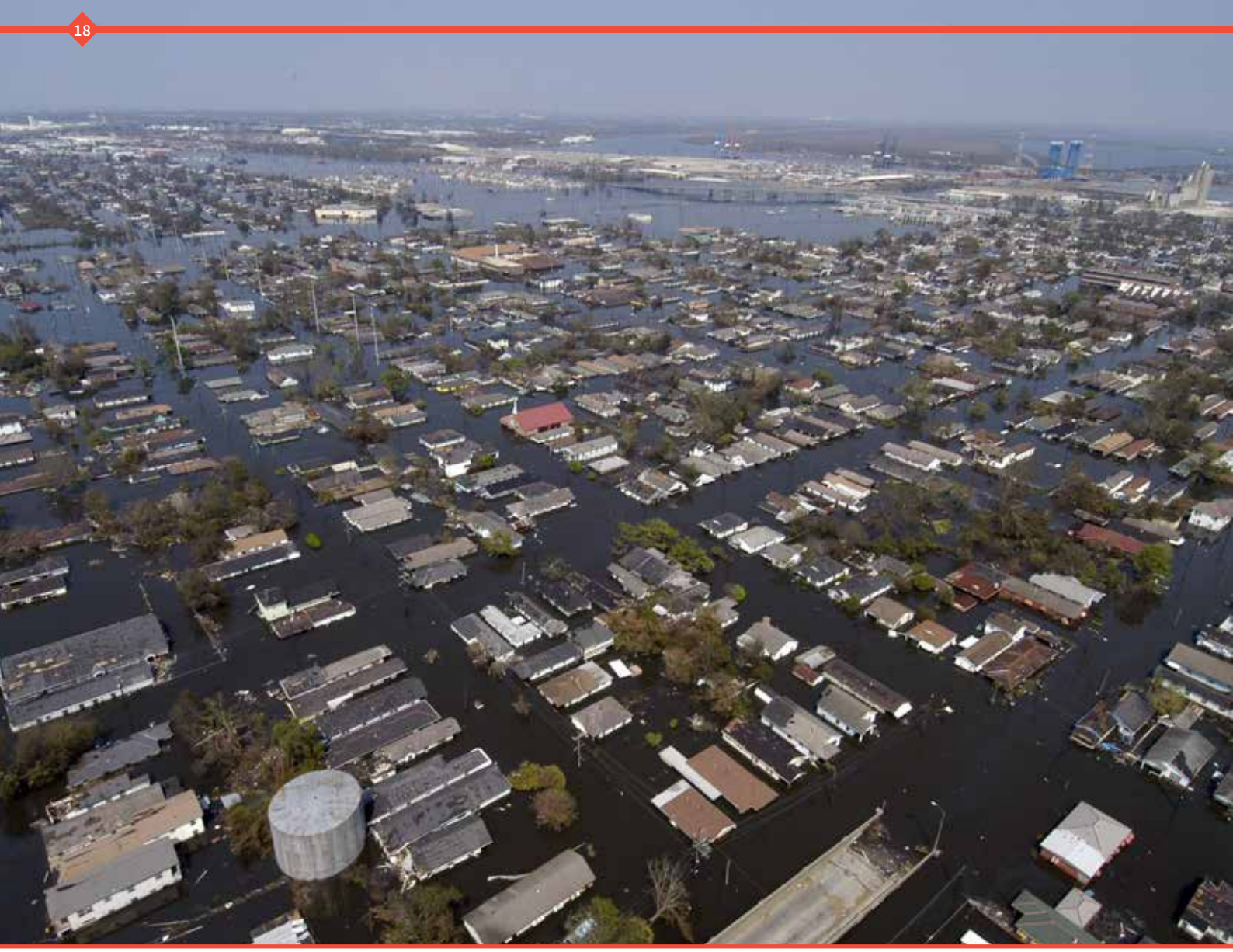
Congress moved swiftly to try to prevent a wave of litigation by capping the liability of those most heavily involved and also created the Victim Compensation Fund.

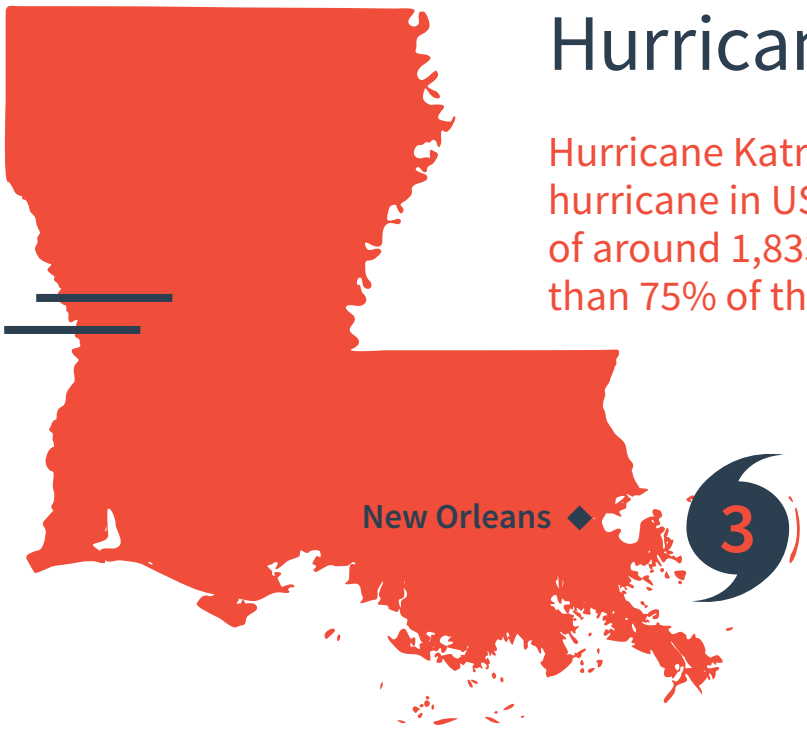
Larry Silverstein, the World Trade Center's leaseholder, sued insurers arguing the two planes crashing into the buildings should enable him to claim twice on his $3.55 billion policy. The dispute was complicated by the fact that the policy had not been issued by the time of the attacks. It was eventually settled in 2004, with insurers paying $4.1 billion. The dispute also acted as a catalyst for the London Market to tackle the 'deal now, detail later' culture.

Insurers' share prices plunged following 9/11, dropping more than 18% in the following week, but soon recovered. US property / casualty insurance stocks were down less than 2% for 2001, compared with 13% for the S&P 500 Index. Insurance brokers' shares actually rose in the weeks after the attacks.[4]

Although 9/11 pushed the US property / casualty industry into a negative position of $7.9 billion in 2001, new capital quickly poured in. By the end of the year, insurers had raised $20.5 billion of new money.[4] Reinsurers raised an extra ~$30 billion in the year following the attacks.[5] Investors seized a once-in-a-generation opportunity to launch new insurers into a market where the perception of risk had fundamentally changed. Although only one reinsurer had failed as a result of the attacks (while another had stopped writing new business), much capacity had disappeared while demand for risk transfer had jumped, creating an almost universally hard market. During this period 'The Class of 2001' was launched in Bermuda, comprising around a dozen new multi-line insurers with capital of $11 billion. This helped establish the island as a global capital for catastrophe risk.

Investors seized a once-in-a-generation opportunity to launch new insurers into a market where the perception of risk had fundamentally changed.





Hurricane Katrina

Hurricane Katrina was the most expensive hurricane in US history, claiming the lives of around 1,833 people and flooding more than 75% of the city of New Orleans.

On August 25th, 2005, Katrina made landfall in southern Florida, just north of Miami, as a weak (Category 1) hurricane, before passing into the Gulf of Mexico, where it quickly gained power from the unusually warm waters to become a Category 5 storm. From there, it weakened to a Category 3 storm with winds of 125mph as it first struck the Louisiana coast on August 29th, before moving northwards to make landfall again in the heavily populated area near the Louisiana / Mississippi border.

Over 1.5 million people were evacuated from Louisiana, Mississippi and Alabama before Katrina made landfall, but many more remained. The storm cut power to 2.5 million people and brought down over three million telephone lines.[6] Katrina produced a storm surge of up to 28 feet, which reached several miles inland, creating widespread devastation in Mississippi and Louisiana.

This wall of water swept over the sea defences protecting New Orleans, breaching them in 53 separate places. More than 75% of the city was flooded, according to the US Geological Survey. Two of the levees that succumbed were later shown to have failed under less stress than they were designed for: a US Army Corps of Engineers' report compiled in the wake of the disaster admitted failings in the city's flood defences' construction.

The government's initial response to the disaster was slow, confused and uncoordinated, as acknowledged in a later report[7] and illustrated at the time by TV images of groups of flood victims left stranded on rooftops. Mobs of looters ransacked shops in a city where law and order appeared to have broken down.

The overall cost to the US economy was put at $125 billion, making it the most expensive natural catastrophe to hit the country in three decades. Katrina generated over 1.7 million insurance claims, of which 1.2 million were personal property claims. Ten thousand claims adjusters were dispatched to the disaster zone, with mobile claims units equipped with portable generators, fuel, and satellite communications links. Within two years, 99% of the personal property claims had been settled, according to the Insurance Information Institute.

According to Swiss Re, Hurricane Katrina caused insured losses of approximately $80 billion (in 2015 Dollars).[1] It was the biggest disaster in a painful year for non-life insurers, during which three hurricanes (Katrina, Rita and Wilma) produced a total of $107 billion in insured losses[1] – another record. The scale of the insurance industry's losses led rates to jump across all industries by nearly 20%[6], though this rise was short-lived, with the rates returning to their pre-Katrina levels by the end of 2006. Following the 2005 hurricane season, ~$20 billion in new capital came into Bermuda and Lloyd's, according to Insider Quarterly.[8] The 2005 hurricane season also triggered new vehicles for capital and risk transfer, such as sidecars and insurance-linked securities, which have now become an established part of the market.

Insurers were shocked to find that their actual losses were more than ten times the amount forecast.

Hurricane Katrina exposed ambiguities and confusing language in the wording of policies. The principal problems were around whether damage was caused by wind (which is covered under standard property insurance policies) or by flood (which is not). This led to disputes between policyholders and insurers, and to litigation, including a lawsuit filed by Mississippi's attorney general that sought to force insurers to pay for flood damage under homeowners' policies, claiming that the flood exclusions were void and unenforceable. Underwriters have since tightened their policy wordings, including specific clauses on named storms and subsequent storm surges, as well as defining coverage limits and deductibles.

In the wake of Hurricane Katrina, rating agencies began to look much more closely at how (re)insurers dealt with catastrophes. Those that were unable to demonstrate strong capital management for catastrophe risks faced downgrades in their credit and financial strength ratings. This caused insurers to place extra emphasis on accurate risk modelling. Catastrophe models changed radically in the wake of the disaster: some insurers were shocked to find that their actual losses were more than ten times those forecast by the models, and so were forced to raise fresh capital in consequence. Until this time, models had been used primarily to help insurers calculate how much reinsurance protection they should buy, rather than to calculate a carrier's potential exposure to a catastrophe. Today, insurers will routinely run all of their catastrophe-exposed risks through at least one model.

Tohuku Earthquake and Tsunami

At 2.46pm on March 11th, 2011, a magnitude 9.0 earthquake, one of the largest ever recorded, occurred in the Japan Trench off the northeastern coast of Honshu, Japan's main island.

The earthquake triggered a tsunami, creating a wall of water 30 feet high that struck the Tohoku region, reaching as far as six miles inland. It destroyed 300,000 homes and damaged double that number, as well as causing enormous disruption to businesses. The combined number of dead and missing is put at ~18,500 people, according to the National Police Agency of Japan.

The tsunami flooded the Fukushima Daiichi nuclear plant, flooding both its main and emergency cooling systems. This led to the meltdown of three of the plant's nuclear reactors, releasing radioactive material into the environment, sparking a national alert. More than 160,000 residents living within 20 kilometres of the plant were evacuated, some 120,000 of whom have yet to return. More than five years later, the exclusion zone remains in place.

The disaster cost insurers $35-40 billion. The overall economic losses are estimated to be over $200 billion, making it the most expensive natural catastrophe ever, according to Munich Re. Residential property claims are paid by the government-backed earthquake scheme Japan Earthquake Reinsurance Company (JER), while the cost of the nuclear disaster was borne by the Japanese government. Less than one in five businesses had earthquake insurance, estimates AIR Worldwide.

Despite the scale of the disaster, it had relatively little impact on reinsurers' appetite for Japanese risks. Japanese insurers, which dominate the domestic non-life market, keep large catastrophe reserves, and although a handful were put on ratings watch, only one was downgraded. At this time, the industry's capital was at an all-time high of $470 billion. The fast-expanding catastrophe bond market also shrugged off the event. Although investors in one bond lost all of the $300 million they had invested as a result of the earthquake, new bond issuance had once again picked up by the third quarter of 2011.[9]

The earthquake's intensity surprised scientists, as they had not predicted an event of that intensity occurring in the Japan Trench, or it triggering such a large tsunami. Japan's seismological body, the Headquarters for Earthquake Research Promotion, revised its estimates for the strength and long-term probability of similar earthquakes. Several of the largest reinsurers and catastrophe-modelling firms also adjusted their own models to take into account the heightened risk of aftershocks and tsunami.

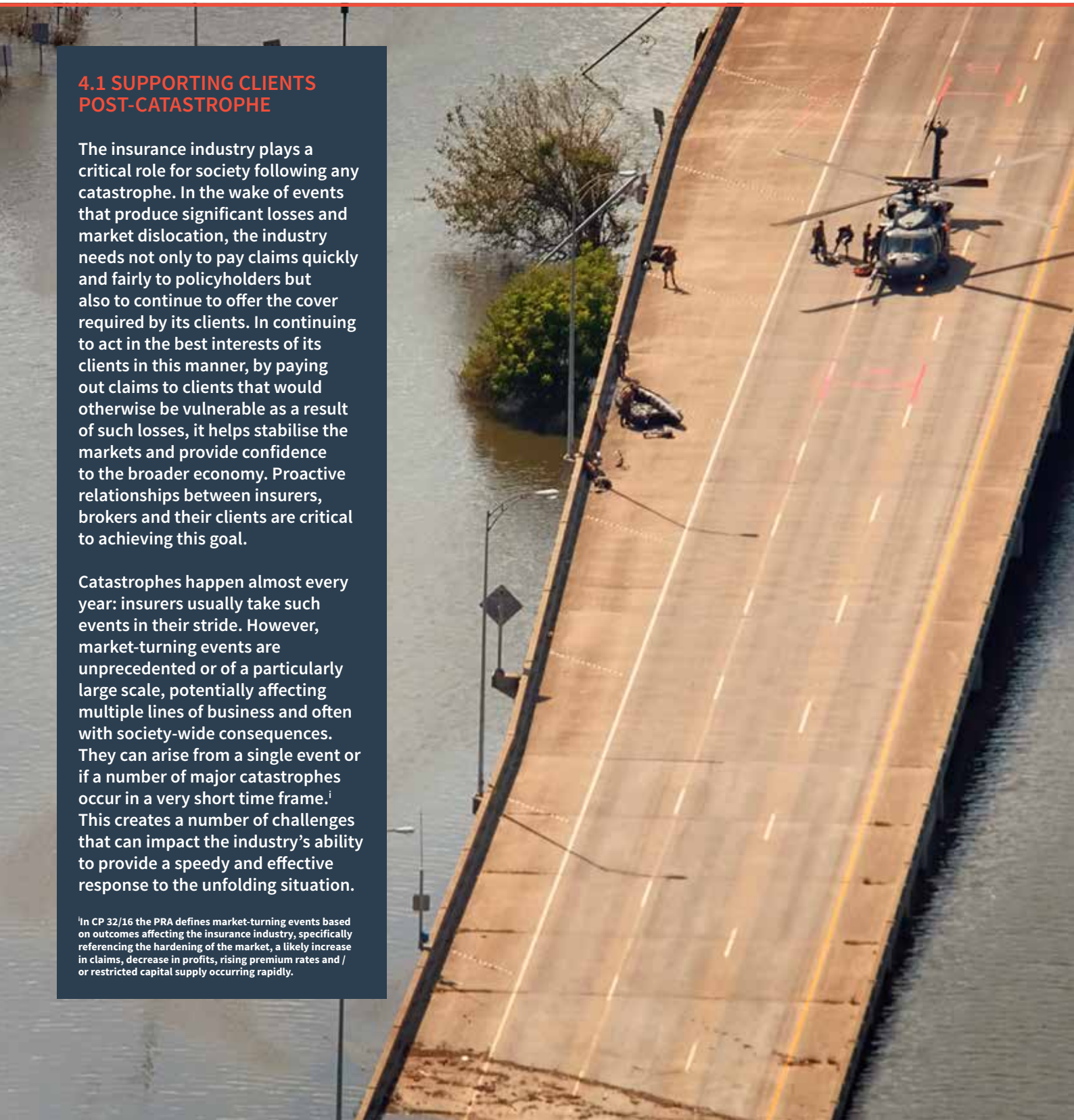
Although Japan is used to dealing with the aftermath of earthquakes, the Tohuku earthquake revealed the weaknesses in its plans for coping with the widespread devastation that can be created by an ensuing tsunami. The events also revealed vulnerability in global supply chains. Japanese factory closures caused disruptions to the global motor and high-tech industries for several months following the earthquake.

Kyotokumaru, a 330 tonne fishing vessel that became symbolic of the devastation of Japan's 2011 tsunami. Swept inland by 30 foot waves, the stricken tuna fishing boat came to rest in the residential area of Kesennuma where it became an emblem of survival. However, many of the residents considered it too painful a reminder and voted to have the ship destroyed in 2013.

The earthquake shocked scientists, who were surprised by such a severe tremor occurring in that location, and triggering such a large tsunami.

4. Outcomes and lessons learnt

The outcomes and lessons learnt from this exercise group into three areas: the London Market's resilience and readiness in supporting clients post-catastrophe, its framework for responding to market-turning events, and perspectives on the robustness of its financial position.



4.1 SUPPORTING CLIENTS POST-CATASTROPHE

The insurance industry plays a critical role for society following any catastrophe. In the wake of events that produce significant losses and market dislocation, the industry needs not only to pay claims quickly and fairly to policyholders but also to continue to offer the cover required by its clients. In continuing to act in the best interests of its clients in this manner, by paying out claims to clients that would otherwise be vulnerable as a result of such losses, it helps stabilise the markets and provide confidence to the broader economy. Proactive relationships between insurers, brokers and their clients are critical to achieving this goal.

Catastrophes happen almost every year: insurers usually take such events in their stride. However, market-turning events are unprecedented or of a particularly large scale, potentially affecting multiple lines of business and often with society-wide consequences. They can arise from a single event or if a number of major catastrophes occur in a very short time frame.[i] This creates a number of challenges that can impact the industry's ability to provide a speedy and effective response to the unfolding situation.

[i] In CP 32/16 the PRA defines market-turning events based on outcomes affecting the insurance industry, specifically referencing the hardening of the market, a likely increase in claims, decrease in profits, rising premium rates and / or restricted capital supply occurring rapidly.

In the wake of such events, insurers and brokers will need to demonstrate operational resilience and readiness while instilling confidence through their dealings with policyholders, regulators and governments. In particular, they should bolster their operations to:

- **Ensure prompt settlement of claims.** A major catastrophe will produce a very high volume of insurance claims. To manage this, the industry requires a large number of appropriately qualified loss adjustors. It might also need to deal with missing policy documentation. In this situation, clarifying the lead-follow relationships is critical for ensuring prompt claims settlement for clients. Insurers or brokers often form 'emergency response offices', temporarily staffed with cross-functional teams, in order to ensure preparedness and prompt support for their clients.
- **Resolve uncertainties.** Major catastrophes produce procedural challenges. Interpretation of policy wording can create uncertainties around coverage following market-turning events, particularly where such events are unanticipated (e.g., as with 9/11) or less well understood (e.g., cyber-attacks). For example, to what extent, if any, will individual property policies cover business interruptions caused by a large cyber-attack? This uncertainty presents challenges that can result in delayed payments to policyholders. This can also happen if insurers and reinsurers interpret the coverage differently. Both situations can result in delays in reinsurance recoveries or expensive legal proceedings (as in the case of Hurricane Katrina).
- **Reinforce the resilience of company infrastructure.** Insurers and brokers are well resourced to deal with the usual fluctuations in activity levels. However, the very high levels of demand following a major catastrophe can impact their ability to respond effectively in supporting clients. Catastrophes can damage or render inaccessible or unusable insurers' or brokers' offices or call centres (as with 9/11). They can damage the transport network or cause telecoms or power networks to fail. Likewise, the resulting spike in the volume of claims can compromise the usual operating procedures and response times.
- **Continue to offer cover.** To support its clients, insurers and brokers need to be in a position to provide significant additional cover in the event of a major catastrophe. The industry should be able to respond decisively and pragmatically when facing the inevitable surge in demand, even when the losses resulting from market-turning events can prompt a fundamental reassessment of risk, as happened to the aviation industry in the wake of 9/11.
- **Maintain open dialogue with regulators and other market agencies.** During the dislocation that follows a major catastrophe, it is important that insurers keep regulators informed of the impact of the unfolding situation. Regulators need information from firms as quickly as possible to assess the state of the industry and respond accordingly. Market agencies, if provided with sufficient evidence, would be in a position to reassure the business community and the wider public about the health of the industry and its ability to continue to maintain adequate financial resources to meet its commitments to settle claims.
- **Strengthen internal processes and capabilities.** The actual experience of a major catastrophe almost always highlights weaknesses in planning for such events. Events rarely play out exactly as the models forecast. Though significant advances have been made in catastrophe modelling over the past decade, a number of recent catastrophes have shown that insurers cannot rely totally on such models in their underwriting decisions. For instance, the 2011 Tohuku earthquake surprised both seismologists and catastrophe modellers. At magnitude 9.0, it was one of the most powerful ever recorded. The possibility of such a high magnitude earthquake occurring where it did had not been forecast. Though earthquakes are planned for in Japan, the most likely impact was predicted to occur many hundreds of kilometres to the south.

By definition, market-turning events present an enormous cost to insurers and stretch the industry to the maximum. However, handled well, they also present the London Market with the opportunity to secure and enhance its reputation. It can do so by helping affected communities to recover from such events and ensuring businesses can continue to operate during their aftermath.

While this section describes the outcomes of the dry run from an operational perspective, the remainder of the chapter describes how the industry responds financially to a market-turning event. The next sections consider the industry's financial stability and how such events would impact insurers' and brokers' ability to support their clients following unprecedented losses.

4.2 THE FRAMEWORK FOR RESPONDING TO CATASTROPHES NEEDS TO CHANGE

Previous major catastrophes have shown how uncertainty can grip the insurance industry during the dislocation that follows in the wake of market-turning events. This uncertainty is greatest when the scale of the financial fallout is largely unknown, particularly if the events fall outside the parameters of catastrophe models. The level of uncertainty can be increased still further if the events are likely to prompt a reassessment of the expected likelihood of its reoccurrence, as happened following the attacks of 9/11. This increased level of uncertainty can seriously affect insurers' and reinsurers' risk appetite. In some cases this can limit the ability of firms to raise new capital quickly, capital that might be needed to secure their position or to pursue new opportunities.

The traditional response to a major catastrophe

At the outset, a series of discussions were held with several senior leaders within the market to identify the main pressure points following past major catastrophes. Five important areas help determine the industry's financial response to a major market dislocation (see Exhibit 3).

Based on past events, the industry has developed a set of expectations about what is likely to happen in each of these five areas following a market-turning event:

- **Liquidity will come under strain.** Due to the need for insurers to pay claims promptly and their need to contribute to funds while awaiting payment from their reinsurers, market-turning events can result in substantial pressure on those exposed to the greatest losses, since additional cash will be needed within the system to meet all liabilities. The resulting liquidity crunch can be exacerbated by the insurers' and reinsurers' obligation to top up situs and trust funds, early claims payment requirements and delays in reinsurance recoveries.
- **Additional capital will be required.** The need for additional capital is driven by the insurers' and reinsurers' obligations to meet their regulatory requirements in combination with their desire to write further business. New money is often raised in the local insurance markets through traditional sources (equity, bonds), but in the circumstances of a market-turning event the ability to raise new funds in this manner can quickly become constricted, causing considerable challenges for some companies.
- **Rates will rise significantly.** This is particularly true in directly affected lines. The rate increases result from the industry's need to cover losses at a time of greatly reduced capacity, coupled with changing risk appetites. However, the increase in premium rates following a major loss event – the so-called hard market – evaporates over time, as new capital flows in.
- **Timely and appropriate regulatory oversight enables (re)insurers to continue to offer cover for clients.** This is critical at a time of market stress and uncertainty. In the dislocation that follows in the immediate aftermath of a market-turning event, it is particularly important that regulators respond quickly to insurers' and reinsurers' assessment of the impact of the event on their financial strength. Doing so will require Boards to act rapidly in regard to ensuring the individual firm's financial resilience and assessing whether to give the green light to writing new business. Without this, the London Market will be unable to seize the opportunity. Lessons can be learnt from previous such events, although it is impossible to predict the response that future events might necessitate. In the immediate wake of 9/11, it is understood that firms and regulators worked together to agree an appropriate time for firms to rebuild their financial strength. This, in turn, ensured that the market was able to provide much needed cover to clients in the midst of the crisis, thereby providing stability during times of uncertainty.
- **Deep expertise and surefooted management responses deliver on the promise to pay claims promptly and maintain cover for clients.** Following a major catastrophe, insurers will seek to provide robust claims and operational support to clients and brokers, while also quickly and effectively pricing and underwriting additional risk. This ability proved critical after 9/11, when Lloyd's helped to keep airlines flying by maintaining aviation cover. However, a market-turning event will attract global attention and the press and the public may not differentiate between the actions of a single company and the entire market if there are delays in claims settlement. Adverse publicity can tarnish the industry's reputation and take years to recover. Deep underwriting expertise and surefooted management are key to offering increased insurance coverage in the immediate aftermath of a market-turning event: management's responses require a heightened degree of agility in execution to ensure appropriate resource allocation.

The resulting uncertainty from market dislocation presents opportunities for new business. As the result of the heightened competition, the response of other markets in the immediate aftermath of a market-turning event can pose a threat to the longer-term position of the London Market, particularly if they are able to raise capital more quickly. In such circumstances these markets can gain share from London.

Why the traditional response framework needs to change

The dry run exercise tested participants with the largest losses in recent history (~$200 billion) over a two-week period. This included an unprecedented cyber event ($45 billion),[ii] a highly destructive hurricane ($125-175 billion), one of the largest ever stock market declines, reinsurer default (10%), and reinsurance recovery delays.

The nine participants incurred losses of ~$10 billion (~£7 billion), approximately 5% of global insurer losses. The average incremental gross loss ratio impact of these events was 64%; for one participant's Lloyd's syndicate the gross loss ratio impact was as high as 123%. The losses represented between 30% and 120% of participants' net capital base. In addition, there were limits to the reinsurance of future cyber risks. Despite this, all participants expected to be able to trade through the period of dislocation following the market-turning events, while maintaining the necessary levels of capital and liquidity. Their assumption was that they would be able to raise the capital required, sell assets, and transfer large amounts of funds quickly in what could prove to be a very turbulent financial environment.

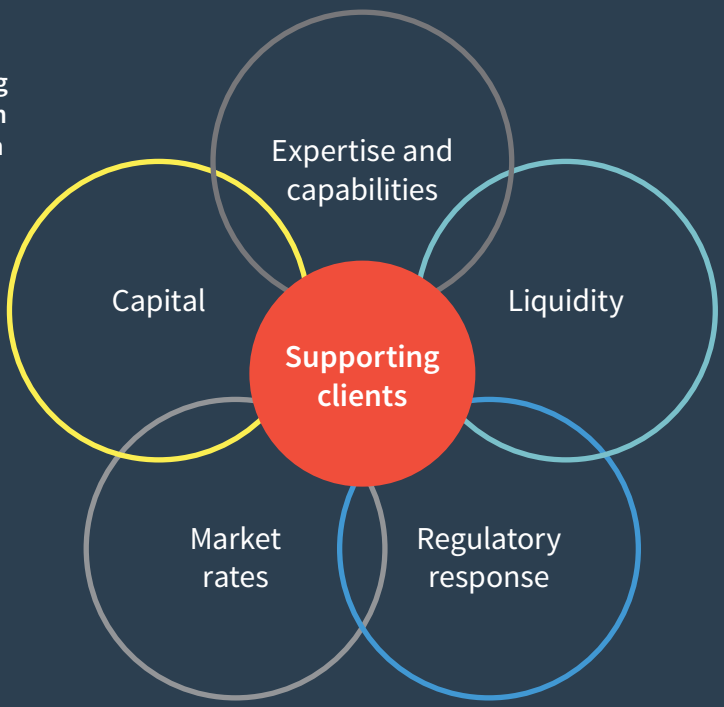
- Despite the large losses, there seemed to be sufficient liquidity among participants – each participant's reported liquidity level remained positive, though the actual level varied significantly over time.
- Losses of up to 120% of a participant's capital base were reported. Though this impacted their solvency capital requirement (SCR) coverage ratios[iii] (to varying degrees), all participants expected to be able to raise the required funds (over 50% of the reported net capital base in aggregate) through their parent company, or by other means, such as raising new equity and issuing bonds.
- The predicted rate increases and the influence that this had on underwriting plans varied considerably between participants: while some expected significant rate increases, others anticipated low or minimal rate increases.
- Participants expected to keep regulators informed rather than seek approvals or assistance. However, they underlined the importance of the regulator being quick to respond if requests for approval of changes to models or business plans were required.
- Participants expected to see the London Market thrive and the City continue to be a key hub for placing difficult insurance.

The experience of the dry run suggests that current market dynamics have changed substantially since the last truly market-turning event in 2001. In this exercise all but two of the five elements of the traditional framework used in shaping the industry's responses to market-turning events have decreased in importance.

Liquidity and capital are critical for financial stability but are now much less important as key differentiating factors in the wake of such an event – assuming that insurers are able to act on their plans quickly and efficiently – while there is reduced scope to raise and hold rates. Expertise and regulatory response remain fundamental elements of the industry response. Market participants need to ensure, therefore, that the framework they use reflects these changed conditions.

[ii] The $45 billion loss simulated in this exercise not only relates to existing cyber policies in force but is also designed to reflect the growing uptake of cyber coverage and its potential impact on other lines of business.
[iii] The SCR coverage ratio is defined as the amount of capital held over the SCR.

Exhibit 3
The industry response to support is clients following a major market dislocation can be considered through five important lenses



Source: expert interviews.

4.3 PERSPECTIVE ON THE MARKET'S FINANCIAL STABILITY

We will now describe the outcomes of the dry run exercise by stepping through each of the five elements of the response framework.

Liquidity: Despite the large losses, there seemed to be sufficient liquidity in the market to sustain business
Even though participants lost unprecedented amounts of money, their reported liquidity remained positive over time and did not appear to become a major pressure point. In this exercise we tracked the impact on insurers' and reinsurers' quarterly liquidity low points – that is, the point in any quarter at which they had the lowest amount of funds available to pay claims to clients, following any cash outflows and funding inflows. Approximately 70% of participants were able to maintain a quarterly low point of at least 40% of their initial cash positions. While no participating organisation had originally planned to reduce liquidity by more than 40%, over half of them expected that they would need to as a result of the events of this exercise (see Exhibit 4).

During the dry run, two participants' liquidity low points decreased by over 80% from their starting low point. Both required lines of credit for funds equivalent to over 50% of their starting liquidity low point in the first six months of 2017.

Of the participants who provided this information, only two had plans in place that ensured they had sufficient liquid funds to guarantee they would have no need to raise additional capital to pay claims or cover situs fund requirements during the first half of 2017 (see Exhibit 5).

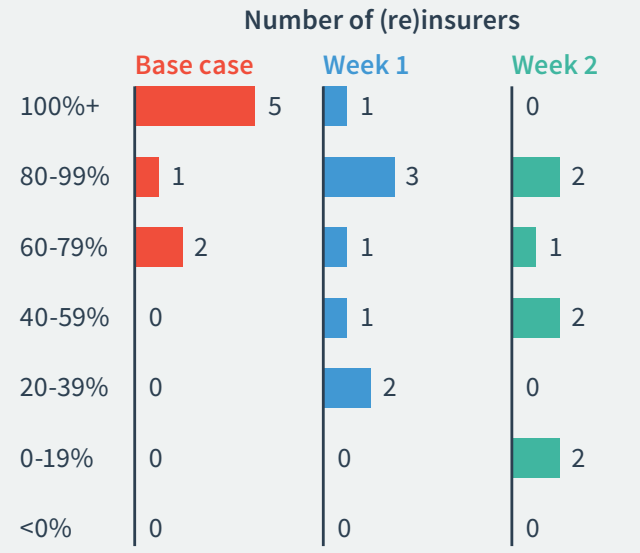
Prior to the dry run, most participants had expected to end 2017 within 80-120% of the funds originally planned for the liquidity low point of 2016 Q4. Even as they allowed their liquidity low points to fluctuate over time, they tried to revert to within 40% of their initial low point, as seen in Exhibit 6. Of the two that remained below 40% of their starting point at the end of 2017, one had always planned to reduce the cash they held.

The fluctuations in a number of the participants' liquidity low points reflect the choices made prior to the exercise: for example, some had planned to increase liquidity and this could be observed until the point at which claims associated with the major catastrophes started to be paid to clients.

Six of the nine participants believe they could source additional funds from lines of credit or intercompany transfers from well-capitalised parent companies. Participants assumed that their parent companies would be able and willing to replenish their UK entity's funds quickly in an emergency, with no impact on existing covenants, at a time when the market is stressed. The capitalisation or health of participants' ultimate parent company was not tested in this exercise. Participants noted that it is difficult to predict how their wider corporate group might be strained by such a market-turning event, as the financial health of other group companies would not be known to UK-based entities.

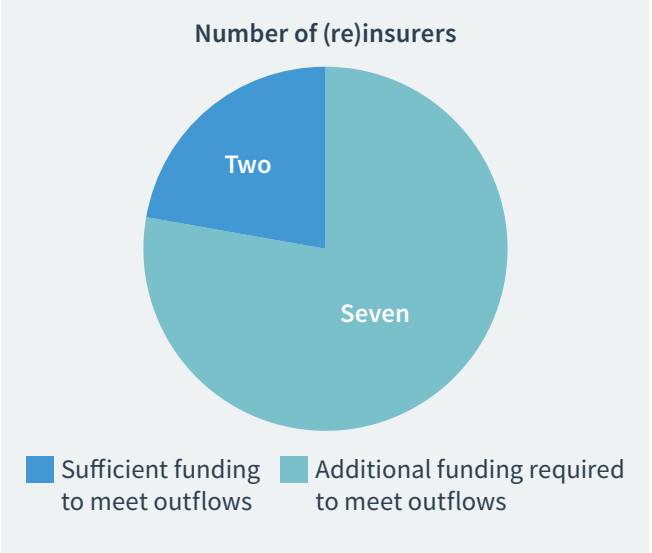
Participants also planned to sell relatively illiquid assets to fund liquidity requirements at different times over

Exhibit 4
Participants' minimum liquidity point



Notes: Eight participants submitted quarterly liquidity low points for Week 1 and seven for Week 2. Minimum liquidity low point indexed to Q4 2016 of base case, that is Q4 base case = 100%; highest level of reporting presented.
Source: Financial Stability Working Group submissions.
All scenarios are fictional in nature and devised purely for the purposes of this project.

Exhibit 5
Participants with sufficient planned liquidity for six months of outflows



Notes: Indicates number of insurers that had planned liquidity low points in Q4 2016 that were sufficient to cover outflows in Q1 and Q2 of 2017 without needing to raise additional capital or sell illiquid assets.
Source: Financial Stability Working Group submissions.
All scenarios are fictional in nature and devised purely for the purposes of this project.

the following eighteen months. They assumed that they would be able to do so relatively quickly and would be able to call in lines of credit in this stressed environment, though many other (re)insurers would also likely be doing the same.

Participants reported being mindful of the risks resulting from the reinsurance payment delays and default, but were confident of their own position. Although the simulated reinsurance problems would create extra uncertainty in estimating net losses, they were confident about their own reinsurers' financial health and believed their reinsurance was sufficiently collateralised. Some participants noted that there was potential for the (re)insurance industry to suffer reputational damage if there were significant delays in claim payments or if liquidity issues arose.

Capital: Participants reported ready access to additional capital

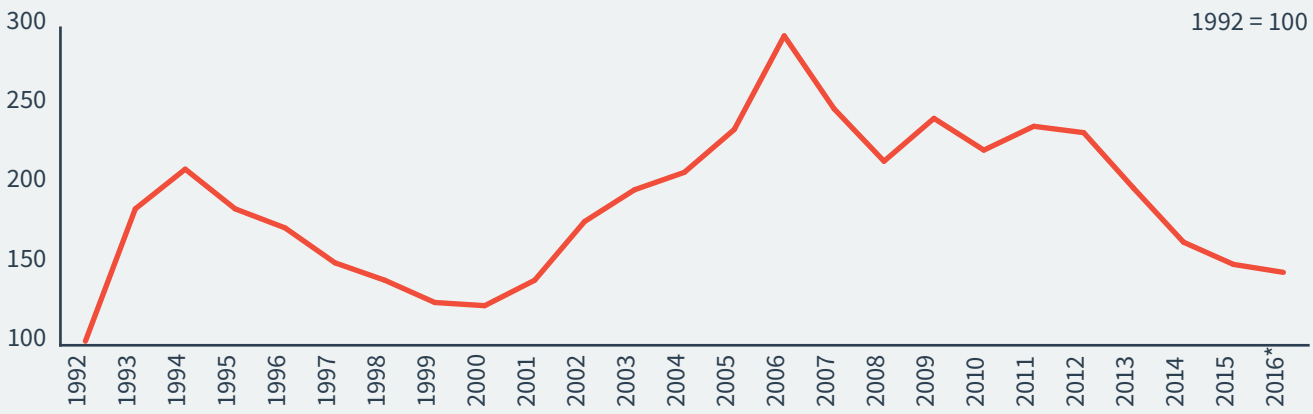
Participants noted that following several years of low loss experiences and capital inflows, the global (re)insurance market is currently awash with capital and is thus well placed to respond to most future catastrophes. This belief is corroborated by Exhibit 7, which shows the cost of reinsurance approaching lows last observed in 2001. Despite the entire industry's apparent strong capitalisation, some participants considered their strong capital position to be a competitive advantage in the aftermath of a market-turning event.

Exhibit 6
Variation in participants' liquidity low point over time

Notes: Eight participants submitted quarterly liquidity low points for Week 1 and seven for Week 2.
*Indexed to Q4 2016 of base case, that is Q4 base case = 100%; highest level of reporting presented.

Source: Financial Stability Working Group submissions.
All scenarios are fictional in nature and devised purely for the purposes of this project.

Exhibit 7
JLT Re's Florida property-catastrophe rate-on-line index



*Quarter one only.
Source: JLT Re

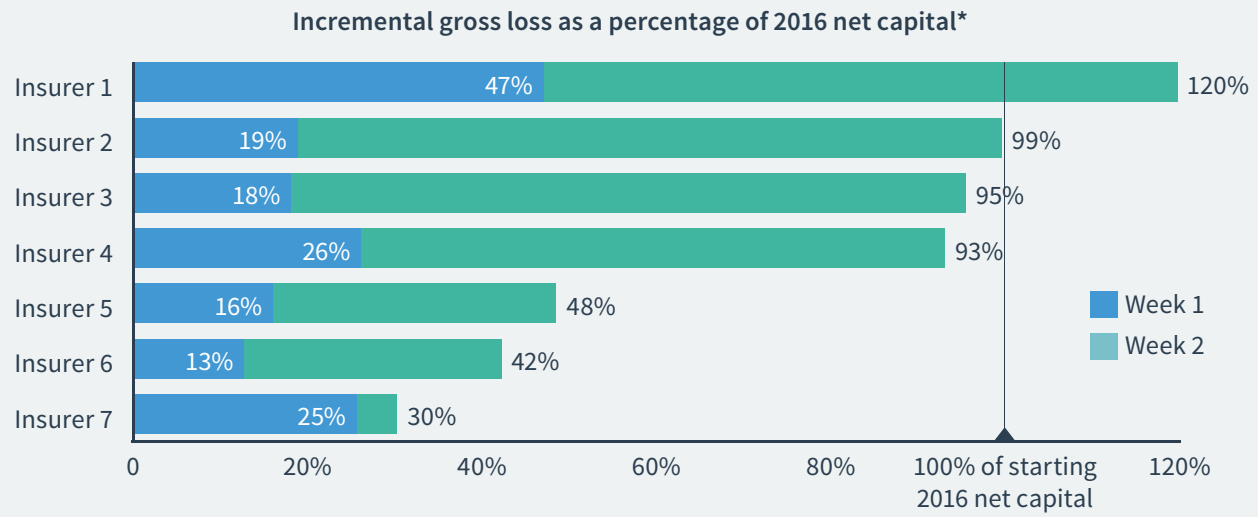
A. Impact of events

During the exercise, participants incurred losses of up to 120% of their reported net capital base[iv] prior to the catastrophic events; half the participants incurred losses of over 90%, as shown in Exhibit 8. This metric, of impact relative to net capital base, is useful in determining the severity of impact on both an individual insurer's balance sheet and on the industry as a whole. Because capital can be raised to offset losses, reductions in the net capital base of over 100% do not necessarily lead to insolvency.

Participants' SCR coverage ratios varied significantly following the dry run. Due to the assumption that recapitalisation would occur quickly, only one participant's ratio fell below 100%, as seen in Exhibit 9. This occurrence in Q4 2016 was relatively minor and temporary, with the participant planning to restore its SCR position in Q1 2017. All participants had SCR coverage ratios above 100% at the end of 2017, which would presumably be sufficient assuming participants fulfilled the Solvency II requirements for any SCR breach.

[iv]Net capital is defined as opening net tangible assets plus other forms of allowable capital (prior to any events).

Exhibit 8
Participant gross loss



*Indexed to Q4 2016 of base case, that is Q4 base case = 100%; highest level of reporting presented.
Source: Financial Stability Working Group submissions.
All scenarios are fictional in nature and devised purely for the purposes of this project.

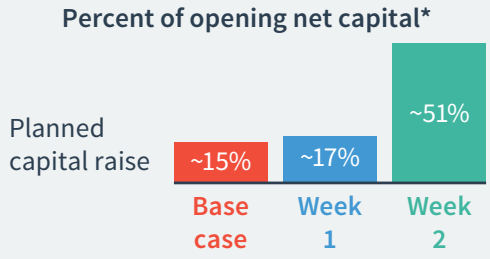
Exhibit 9
Change in SCR coverage ratios following events

Number of (re)insurers

		Ending SCR Coverage Ratio for 2016			
		Greater than 175%	125-175%	100-125%	Under 100%
Starting SCR Coverage Ratio	Greater than 175%	1	2	-	-
	125-175%	-	-	-	1
	100-125%	-	1	2	-
	Under 100%	-	-	-	-

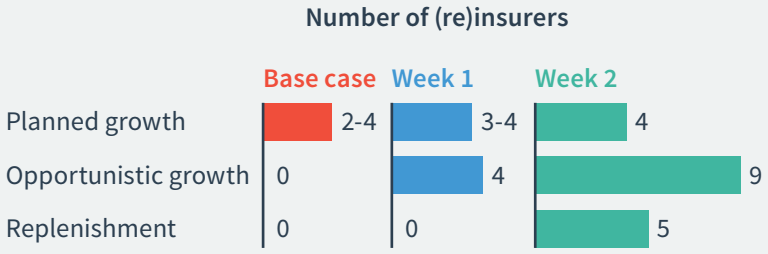
Notes: Lowest reported final solvency capital requirement coverage ratio.
Source: Financial Stability Working Group submissions.
All scenarios are fictional in nature and devised purely for the purposes of this project.

Exhibit 10
Planned capital raise as a proportion of opening net capital



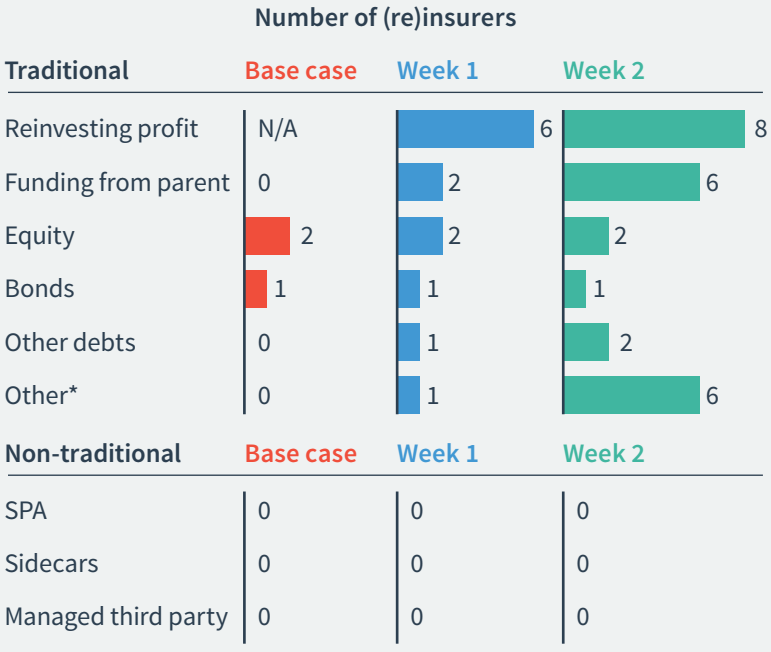
*Net capital is defined as opening net tangible assets plus other forms of allowable capital (in the base case).
Source: Financial Stability Working Group submissions.
All scenarios are fictional in nature and devised purely for the purposes of this project.

Exhibit 11
Uses of raised capital



Source: Financial Stability Working Group submissions.
All scenarios are fictional in nature and devised purely for the purposes of this project.

Exhibit 12
Sources used for additional capital



*Includes non-parent Letters of Credit (LOC), sale of securities and withholding of dividends.
Source: Financial Stability Working Group submissions.
All scenarios are fictional in nature and devised purely for the purposes of this project.

B. Planned response

In aggregate, by the end of the dry run participants needed to raise at least 50% of their reported opening net capital base in order to repair their capital position and pursue growth opportunities. This proportion would have been even higher if it included funds to be raised through Names or non-traditional methods that were mentioned but not quantified, such as sidecars, special-purpose vehicles and Lloyd's SPAs. The exercise forced participants to raise over three times the amount of new capital they had originally planned to raise, as Exhibit 10 illustrates.

At the end of Week 1, following the 'Halloween Blackout', most participants raised capital solely for the purpose of supporting growth. However, by the end of Week 2, following 'Hurricane Guy Fawkes', many more required additional capital to cover shortfalls (either to meet regulatory requirements or to pay claims), as Exhibit 11 shows.

C. Capital raising approach

Many participants in this exercise have global corporate parents or are London-based underwriting entities that could access global capital. In the past, access to capital for these underwriting teams may have been more UK and London focused.

Even those participants that do not have global corporate parents have greater access to capital from outside the UK than they did in the past. For example, in addition to participants raising such capital through their UK entity, they said they could potentially raise it from their Lloyd's syndicate or a Bermuda-based entity. It should be noted that despite the current availability of insurance capital, it might not be possible for all participants to quickly restore their capital positions following such a set of events.

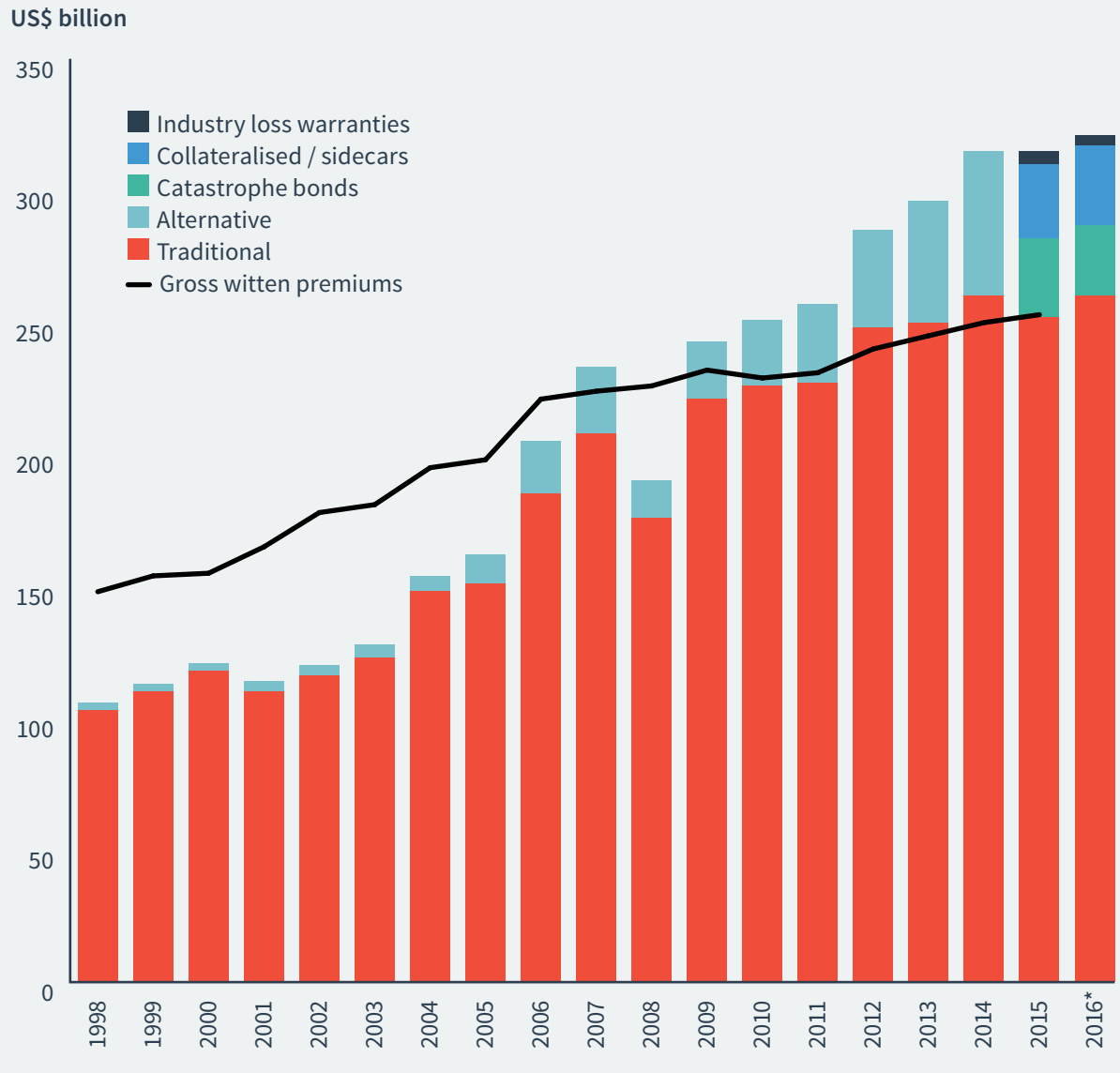
While Exhibit 12 confirms reinvestment of profits to be the most common source of additional capital, it also shows that six of the nine participants planned to source funding from their parent company. Participants indicated that the health of the parent company and other corporate subsidiaries would influence the availability of capital to UK entities. As previously outlined, the capitalisation or health of participants' ultimate parent company was not tested in this exercise.

Three participants considered using non-traditional sources of capital, such as sidecars, special-purpose vehicles or Lloyd's SPAs – though the amount of capital to be raised through such channels was not specified. Participants noted that the use of these sources would depend on their ability to confer with Names and regulators. Their limited use by participants contrasts with the overall picture of capital innovation, as seen in Exhibit 13. Such sources of capital have played an increasingly important role in the (re)insurance business in recent years, particularly in the property-catastrophe space.

Although much of this new capital has yet to be tested severely by a major catastrophe, it is believed that alternative or non-traditional capital is here to stay.

The dislocation following any future market-turning event would almost certainly see an inflow of fresh capital into the sector. In fact, some predict that the amount of capital that could potentially enter the sector after a major loss is so large that it could fundamentally alter the business. Others go so far as to suggest that the unprecedented size of this capital inflow might eliminate the cycles that have been an inherent feature of the market by alleviating capacity constraints and the consequential upward pressure on pricing. If this proved to be the case and existing London Market participants were not able to raise adequate capital during the uncertain times that follow a market-turning event, then it is highly likely that new competitors, backed by non-traditional sources of capital, would emerge in London or elsewhere.

Exhibit 13
Dedicated reinsurance sector capital and gross written premiums



*Quarter one only.
Source: JLT Re

D. Requirements for the London Market

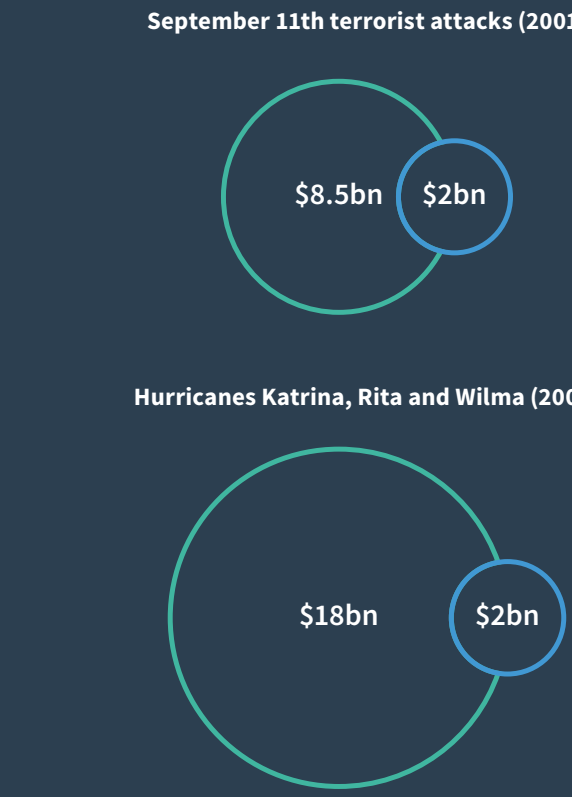
Following a market-turning event, the London Market's capital requirements will be assessed in the global context. Whether or not global insurers decide to raise and invest additional capital in the London Market will depend on its competitiveness at that time. Independent London-based insurers, such as smaller Lloyd's syndicates, may face challenges raising capital as quickly as some of their competitors, particularly when compared to those that have a presence in markets such as Bermuda, where equity can be raised more quickly.

The participants in this exercise made several assumptions about capital availability. These include:

- An assumption that Lloyd's would maintain its credit rating throughout the period of market dislocation and that it would be able to continue to trade through losses of this magnitude. Several participants nonetheless questioned the impact that such a loss would have on Lloyd's capital position and the additional capital, if any, that it might require from its syndicates in order to maintain its strong credit rating. Any increase in Lloyd's capital requirements could potentially reduce insurers' ability to grow in the ensuing hard market, especially as most participants assumed in their business plans that their Lloyd's capital requirements would remain unchanged or even decrease due to higher profitability in 2017.
- An assumption that the reinsurance and recapitalisation arrangements they have in place are robust. It was assumed that the required recapitalisation could occur quickly. Despite the considerable amount of capital that was required to be raised by participants, only one insurer's SCR fell below 100% at any point and this fall was only temporary.
- An assumption that confidence in the London Market would remain high. Participants indicated that confidence in the City and the London Market would be the key factor in determining whether or not they would decide to place additional capital in the UK. In this context, intimations from the rating agencies, the opinions of independent economists, actions of existing or new shareholders (including parent companies), and statements from the regulators would all help shape the level of confidence in the London Market.
- An assumption that insurers would be able to proceed with their proposed capital raising plans (such as additional equity raising, fund transfers and lines of credit) without encountering significant restrictions or delays. Participants mentioned that this assumption includes, i) their ability to continue to trade through short-term declines in capital ratios, and ii) their need to quickly confer with and / or pre-empt Names and shareholders before injecting additional capital to write new business through their Lloyd's syndicates. Several participants, especially non-UK entities and those with international parent companies, indicated that either of these two conditions not being fulfilled would potentially limit their ability to capture growth opportunities, forcing them to write business outside of Lloyd's and the UK.

Exhibit 14 shows how capital inflows in Bermuda outstripped the capital raised at Lloyd's in both 2001 and 2005. This situation could be repeated or even exacerbated if any of the above assumptions fails to materialise.

Exhibit 14
Inflow of new (re)insurance sector capital in 2001 and 2005



Source: Insider Quarterly

S&P Global Ratings' observations

Process overview

Immediately after such an event, the rating agency would expect to hold meetings to decide their likely response. During these meetings ratings analysts are likely to be asked to scan their portfolios to assess the most exposed sectors and companies. A bulletin might then be published on the impact of the disaster on the sector, but this would not comment on any potential ratings actions on individual insurers or reinsurers, as Committee approval is required for rating actions or affirmations.

An initial assessment of most exposed companies to the event would be carried out using internal data, before deciding which companies to contact to request further information and discussion.

Within 24 hours of the event, the rating agency would likely make contact with rated issuers to get their early estimates of exposure, loss, reinsurance coverage, and other key data.

A rating committee could be convened within 24 hours, depending on the information flow and the severity of the event, reconvening at regular intervals thereafter. Any rating actions agreed by the committee are likely to be published within 24-36 hours following the committee decision (subject to various regulatory obligations to provide pre-publication notice to issuers before publication), including details about ratings that have been affirmed, if the situation warrants this level of detail.

If S&P has a high level of certainty and sufficient information to confirm that a rating needs to change immediately, then it will take this action. Any uncertainty around further rating actions would be reflected in the CreditWatch / Outlook.

Rating factors

A major catastrophe could impact on a number of rating factors. Some could be impacted by information or estimates that are available immediately or shortly after the event, while others are more likely to be impacted over the CreditWatch period (within 90 days) as information about the loss develops and the full implications become clear. Relevant rating factors may include:

Immediate impact

- Capital adequacy: What is the immediate impact on capital adequacy (loss of Total Adjusted Capital or TAC), reserve charges, asset valuation, etc.? Does our base-case forecast hold? As our assessment of capital and earnings is prospective, does the combination of the immediate hit to capital and our new forecast give reason to consider a change in the rating?
- Liquidity: How is the liquidity ratio impacted? What covenants might be triggered by a hit to capital? Is there an increased risk that collateral may need to be posted after the loss that might lead to an encumbrance of liquid assets?
- Financial flexibility: Do we expect that the issuer will be able to access new capital if needed? How strong is our assessment of their access to sources of capital and liquidity? Does their capacity to issue capital-qualifying debt change following the loss?

CreditWatch impact

- Capital adequacy / forecast earnings growth: Estimates for premium growth, rate changes, asset liquidation, dividend / coupon deferral, etc. may be taken into account and reflected in the forecasts of capital adequacy (over the forthcoming three-year period).
- Competitive position: Was the issuer an outlier? Does it have the ability to leverage its market position to take advantage of any rate hardening in a manner that is more or less favourable than that of its peers? Risk position: Will the company's exposure to high-risk products change as a result of the loss and its new business plan?
- Financial flexibility: What is the plan for raising capital if required? How likely is it to be successful?
- Enterprise Risk Management (ERM): Did the company's ERM processes hold up under stress? Were its losses within the company's stated risk appetite? Are there any changes to its ERM after the event?
- Insurance Industry and Country Risk Assessment: Has the loss led us to revise our view of a country or industry's product risk or ROE expectations, or other IICRA factors?
- Group support: For subsidiaries of global groups, what is the response of the parent to recapitalising or supporting the entity post-loss?

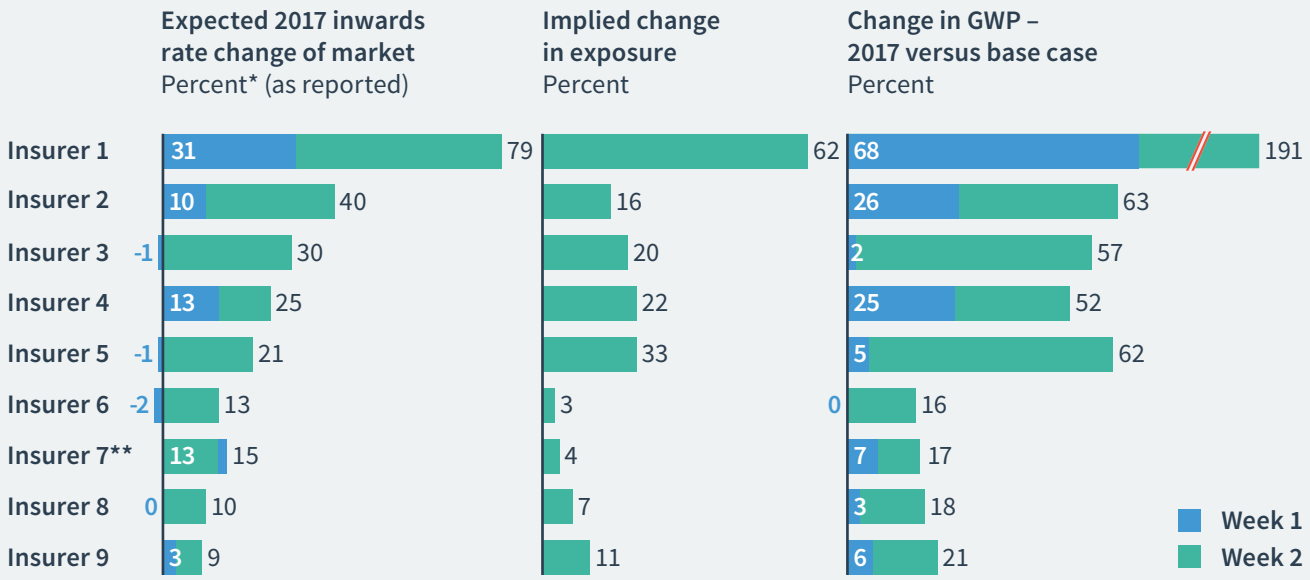
Analytical topics S&P will focus on more following the industry dry run exercise

There are a number of areas where it would be good to obtain more data and information as part of surveillance. Having regular updates would enable S&P to provide a faster response in the event of a real catastrophe:

- Companies' exposure to cyber risk (not just internally, but also insurance exposure).
- Policy limits, exclusions, etc. on major lines of business.
- Reinsurance or retrocession protection.
- Understanding a company's appetite for maintaining a lower rating post-event in order to grow its business with lower capital charges.
- Granular market share by region and by line of business.

S&P also emphasises the importance of companies completing its annual property catastrophe survey. Where it does not have completed survey data, it is likely to be more prudent in its incurred-loss estimates.

Exhibit 15
Change in gross written premiums, expected rates and exposure



*Not all participants submitted expected rate changes at all levels of reporting. Rate change shown relates to expectations at highest level reported.
**Insurer 7's expected 2017 inwards rate change of market was 15% for Week 1 and 13% for Week 2
Source: Financial Stability Working Group submissions.
All scenarios are fictional in nature and devised purely for the purposes of this project.

Market rates: Participants' expectations of how high rate increases would be influenced their underwriting plans

Participants largely split into two categories – those who expect significant rate increases and those who expect low or minimal rate increases. Participants that have existing lines with exposure to the scenarios in the dry run had higher rate expectations and more aggressive growth plans. In particular, those without cyber exposures report minimal growth opportunity and do not expect the cyber market to mature for at least the next twelve months.

Participants that have existing lines with exposure to the scenarios in the dry run had higher rate expectations and more aggressive growth plans.

Rate increases rather than exposure drove most of the gross written premium (GWP) growth expected by participants, as shown in Exhibit 15. The majority of participants expected growth in the range of 15-60%. The expected mean GWP growth was higher, at 72%, the higher average resulting from one participant expecting premiums to almost triple. It would seem that those expecting to grow significantly after such a huge loss do not believe that the prevalence of readily available new capital will limit rate increases. Other participants, potentially believing that capital availability will have an influence, expect that any rate increases will be short-lived and potentially smaller than in the past.

Following the 'Halloween Blackout', Lloyd's questioned whether participants would really be able to fully capture the expected positive rate change because many existing products (particularly for cyber risks) may not be fit for purpose and companies would not be able to rapidly introduce new products with sufficient reinsurance coverage. However, participants indicated that rates could see a halo effect for 'good enough' products during the period when new products are being introduced, and some insurers may be willing to proceed on a net basis without additional reinsurance coverage in the short term.

In addition to product suitability, other factors, such as competitive market dynamics, the presence of new capital awaiting entry to the market, and the response of other markets to the market-turning events would also impact how high rates might rise.

Regulatory response: Rather than seek assistance, participants expect to keep the PRA and Lloyd's informed

During the dry run it became clear that participants expected to keep regulators informed rather than seek approvals or assistance. This may have been a function of the compressed timelines of the exercise. In reality, a number of factors would have complicated the position during this initial period. For example: the scale of events was unprecedented; the cyber blackout was 'non-modelled'; there was a high level of likely uncertainty in loss estimates; and there was the potential for solvency levels to be affected adversely prior to recapitalisation. It is also likely that these factors would have played out over a longer period than allowed for by the exercise. In such circumstances, firms should consider whether greater interaction would be warranted with regulators during the period of uncertainty that would undoubtedly have unfolded.

Though they were potentially facing some uncertainty with regard to whether or not the PRA and Lloyd's would quickly approve new plans, many of the participants nevertheless expected to be able to increase their risk appetite and new business capacity in the subsequent period. In general, participants noted that while their business plans might change, they were unlikely to review internal models in the immediate aftermath of such events (at least, during the three months following their occurrence) and were more likely to focus on dealing with claims and ensuring that sufficient resources were in place to write new business. They made the assumption, at least in the short term, that the recent events would not substantively change the nature of the risks.

PRA

Though most participants anticipate that they would increase communication with the PRA over their capital and business plans, they did not expect that their first call would be to request greater flexibility or to seek specific approvals, despite the unprecedented losses.

While participants would monitor their SCR coverage ratios, they would be unlikely to undertake a detailed review of their approved internal models or carry out a fully validated SCR remodelling in the immediate aftermath of the market-turning events.

Participants did consider what actions they would need to take to make the PRA comfortable with their financial stability, ability to trade forward, and their decision not to prioritise reviewing their catastrophe models in the immediate aftermath of these events.

Lloyd's

Those participants that did plan to communicate with Lloyd's in the immediate aftermath of a catastrophe noted that they also expected Lloyd's to allow them to accelerate their growth plans or take account of higher profitability – for example, by reducing their 2017 requirements for Funds at Lloyd's (FAL) to take into account the higher anticipated rates and increased profit margins. They also expected that Lloyd's would quickly approve any requested changes to business plans, including reserve assumptions, capital to support underwriting and reinsurance.

Most participants did not expect to make changes to catastrophe models or to require approvals in the short term. Those that did, expected that the updates would primarily reflect the change in likelihood of the reoccurrence of such events. In contrast, Lloyd's expected that participants would request approval for more significant catastrophe model changes or that they would justify why such changes were not required.

When participants mentioned that they expected to review their catastrophe models, they also assumed Lloyd's would quickly review and approve such changes. This presupposes that following a real event Lloyd's would have the capacity to review and the willingness to approve changes requested by the large numbers of businesses that would be affected by such enormous losses.

Expertise: The London Market plays a key role in placing difficult insurance during times of uncertainty

Participants expect to see the London Market thrive following a major market dislocation, and believe that the market has the technical strength and preparedness to face a very large hurricane such as 'Hurricane Guy Fawkes' or the less familiar implications of a wide-spread cyber-attack such as the 'Halloween Blackout'.

The London Market has considerable experience and institutional knowledge in dealing with mega-disasters. As a result of the combination of its experience, regular tests mandated by regulators and its own tests, its companies are well versed in preparing for how they would deal with a catastrophe.

Participants' submissions suggest that they have confidence in the underwriting expertise in the UK, and consistently indicated that, if a market-turning event along the lines outlined in the dry run were to occur, they would be able to develop fairly robust loss estimates within a relatively short time frame. They also believe they have the mechanisms in place to regularly update the estimates as more information becomes available.

There is one cloud on the horizon: new capital flows following previous events have not always favoured London **(Exhibit 14)**. Although it is not clear whether expertise follows capital or vice versa, it is nonetheless possible that, even as new capital flows to other markets, the necessary management and underwriting capacity will nevertheless remain in London. This assumes that the London Market will continue to possess sufficient technical expertise to meet the growth in international demand and that this expertise continues to reside in UK firms and the London-based entities of global groups.

5. Recommendations for the industry

This chapter outlines three broad recommendations that, when taken together, support the objectives of the industry dry run exercise.

To recap, the three objectives were to:

- Support clients' best interests by paying claims quickly and fairly, and ensuring that cover continues to be offered during a market-turning event.
- Maintain financial stability by ensuring sufficient financial resources to provide for the normal operation of the market, maintain continued confidence in the London Market, and ensure that insurers can continue to provide services to the real economy.
- Uphold the London Market's leading position, ensuring that experienced London-based underwriters have the flexibility to use their informed judgement to price risk at a time when other markets might pull back.

5.1 ENSURING CUSTOMERS ARE WELL SERVED BY PUTTING IN PLACE INTERNAL PROCESSES TO RESPOND EFFECTIVELY TO MARKET-TURNING EVENTS

In order to fulfil its key role during the dislocation that inevitably follows a market-turning event, the London Market should maintain best practice standards in its operations to support its clients' recovery from their losses, continue to price cover, and instil confidence in the insurance market and broader economy. London Market insurers and brokers need to continue to further strengthen their responses to major catastrophes in order to maintain and enhance the London Market's strong reputation for dealing with such events. It is clear that the London Market's overall reputation and distinctiveness among international retail brokers and clients are based on its collective performance. It is nonetheless the responsibility of individual companies to determine exactly how they respond to these recommendations.

Establish crisis management training programmes

Industry participants should establish crisis management training for executives and middle management to ensure they are well prepared for a market-turning event. This is especially important for those who were not present in the London Market during previous events such as 9/11 or Hurricane Katrina. A dry run of the London Market's response to a market-turning event could be performed once every two to three years as part of this preparation.

Ensure that a robust and well-tested response is in place

While many insurers may consider that supporting clients in the wake of a catastrophe to be something they already do well, the dry run highlighted participants' varying levels of preparedness. Insurers should, therefore, prepare a framework for supporting clients during the aftermath of a market-turning event. This should include up-to-date crisis plans, the development of 'war rooms', and the identification of trigger mechanisms and sources of contingent capital (including plans for accessing capital in an emergency).

- **Develop, test and continuously refine crisis management plans.** All companies need to have a crisis management plan in place for how they will support clients following a market-turning event. This should include how they will continue to do business if their offices or communications are out of action, manage a surge in claims, avoid cashflow crises, support affected coverholders and access outside expertise (e.g., loss adjusters, building contractors, etc.). Plans should be reviewed regularly, tested and revised as necessary in light of real-world events.
- **Create rapid-response teams.** Companies should ensure that they have a rapid-response team that can be quickly mobilised to provide coordination across multiple countries, time zones and jurisdictions in the challenging circumstances that immediately follow a major catastrophe. This team should be responsible for coordinating and mobilising the relevant resources across the organisation during this period of substantial uncertainty. Membership of this cross-functional team should be tailored to the needs of the individual organisation of the (re)insurer or broker but will typically include members from operations, finance, underwriting, reinsurance, claims, risk modelling and marketing, as well as key account managers.
- **Provide operational training for employees.** Training should be provided for employees in processing routine claims and adjusting losses. In the advent of a major catastrophe, they will be able to provide additional resources for processing the large increase in the volume of claims.
- **Improve information management.** Establish well-defined links to news agencies, government entities and emergency relief agencies to ensure speedy, accurate and efficient data gathering and analysis in the wake of a market-turning event.
- **Contract key experts and suppliers in advance.** Coordinate and contract with experts and suppliers to secure the support of key professions (e.g., loss adjusters, remediation experts, risk engineers) to serve clients as and when required.
- **Locate clients following a disaster.** Insurers and brokers should have plans in place to actively find and identify clients following a catastrophe in order to help them make relevant claims. In such circumstances, clients may not be in possession of their policy documents or even have records of who their insurers are.

Maintain clear plans for raising additional capital following a market-turning event

In principle, insurers should always be in a position to indicate how they would recapitalise following a major catastrophe. These plans should include the amount of new capital that would be available to them at any given time, as well as its source (e.g., which banks would be used to provide Letters of Credit). Companies should also consider signing agreements to access contingent capital during the dislocation following a market-turning event.

In this dry run exercise, participants had to raise capital equivalent to ~50% of their starting capital base. In real life, achieving this level of recapitalisation could prove somewhat more difficult than in this exercise, particularly within the short time frame envisaged and when multiple (re)insurers may be looking to take similar action. It is important that (re)insurers should identify their preferred options for recapitalising their business following a catastrophe prior to such an event, and that they should be in a position to swiftly execute these plans when necessary. Their preparations should include a full understanding of the potential impact of the various recapitalisation methods upon existing covenants and knowledge of who, at both the entity and Group level, will need to be involved in decisions to change capital structures or inject additional capital.

5.2 MAINTAINING THE LONDON MARKET'S LEADING POSITION AND EXPERTISE IN THE GLOBAL MARKETPLACE BY STRENGTHENING LLOYD'S POSITION AND PROACTIVE STAKEHOLDER INTERACTIONS

The London Market's leading position in the global marketplace can be further strengthened by bolstering its unique proposition in relation to the presence of Lloyd's and by ensuring that it has effective communication with its broad range of stakeholders.

Further strengthen and differentiate Lloyd's position

Lloyd's is a key component of the London Market and central to its success. The London Market's relationship with Lloyd's can be used to help further differentiate it from other international markets and so advance the London Market's reputation. Lloyd's commitment to ensuring rapid payment of claims to its policyholders is an important factor in maintaining its distinctive position. This position is bolstered by its unique capital structure and, in particular, the presence of Lloyd's Central Fund.

There are four steps Lloyd's could take to further strengthen and differentiate its position:

- **Prepare for rapid response.** In the best interests of its syndicates and their policyholders, Lloyd's should consider how, following a catastrophe, it could shorten the time required to review and approve syndicates' revised business plans or updated internal models. This should include, wherever possible, how it can best support syndicates' reporting requirements to the PRA and other regulators. Lloyd's could also help accelerate the process by which syndicates revalidate their internal models following a major catastrophe by providing additional guidelines on which aspects it is likely to expect syndicates to focus on when reviewing or adjusting their models.
- **Maintain its position as a centre of excellence by supporting (re)insurers and brokers with a best practice emergency service.** Catastrophic events can occur at any time of the day or night, and require 24/7 access to facilities and emergency service, as was the case post-9/11. Lloyd's should consider building on its existing catastrophic event response mechanisms by further improving the clarity around the post-event process of paying claims rapidly, co-ordinating regulatory responses across geographies, capital assessment, and underwriting opportunity. Depending on the size and nature of the event, this may or may not require a single point of contact to bring together different Lloyd's workstreams.
- **Further deepen underwriting and management expertise.** Lloyd's and the London Market should continue to attract, develop and retain top talent to deepen its already well-regarded expertise in pricing risk and dealing with catastrophes. Insurers gain significant competitive advantage from experienced London-based underwriters who use their informed judgement to price risk in such circumstances, at times when less experienced markets and underwriters may pull back. Lloyd's can continue to build on this by leveraging its institutional expertise to support clients in identifying and pricing new and emerging risks, and by building on its core technical strengths and deep expertise developed post-2005 and Solvency II. This new knowledge has greatly improved the Market's understanding and validation of catastrophe models by identifying such models' strengths and weaknesses and providing a clearer view of the risks insured. This objective can be furthered if Market participants work with the London Market Group to increase the level of participation in the existing training programmes, as well as by developing further programmes to build best-in-class capabilities for underwriters and management.
- **Establish key performance indicators to reinforce Lloyd's distinctive brand position.** Lloyd's pre-eminence is based largely on its reputation for paying claims promptly following a major loss. It should reinforce this reputation by establishing and publishing key performance indicators on its performance and that of its syndicates, especially in relation to claims. Such metrics would provide evidence of Lloyd's as a leader in the global (re)insurance business.

Navigate a broad set of key stakeholders to maintain confidence during times of dislocation

The London Market needs to actively engage with key stakeholders in order to reinforce its value proposition. As well as quickly engaging with those affected following a catastrophe, insurers and brokers should immediately explain the event's implications to policyholders, investors and regulators. Plans need to be in place ahead of time to ensure that such actions are effective during the period of uncertainty that follows a market-turning event.

- **Set up a central team to manage market level stakeholder management.** A central team should be set up, potentially within the London Market Group, to identify and coordinate the overall London Market's response to key stakeholders following a major catastrophe. These stakeholder groups should include clients, the government, regulators, rating agencies, and the media. The central team should plan what communication will be required to ensure continued confidence in the London Market. These plans should include definitions of the various communication protocols and how the London Market intends to maintain its links with key contacts in such circumstances.
- **Work with Her Majesty's Treasury to support the London Market's profile.** The London Market should work with Her Majesty's Treasury to highlight how the London Market is an integral part of the UK economy. Her Majesty's Treasury can play a key role in endorsing the industry's efforts in sustaining London as the premier location for writing and placing difficult risk. This would be particularly important following a market-turning event. The London Market should work with the PRA to ensure that plans are in place for dealing with the dislocation that follows such an event, when the integrity of the industry might be in question. If considered appropriate at the time, existing governmental crises frameworks could be invoked to facilitate time-sensitive conversations within government and / or between financial authorities.

The London Market Group's (LMG) observations on the dry run

The London Market Group is pursuing an agenda of growth and modernisation designed to protect and enhance the position and reputation of the London Market with our clients, prospective clients, other key stakeholders and within the global industry. The LMG has four principal workstreams: to promote the market, build a better business environment through improved relations with government and regulators, grow the market's talent pool and make London an easier place to do business.

There is no single remedy that will help the London Market overcome the challenges it faces, or maximise the opportunities that lie before it. We need to be more efficient at delivering our products and we need to be easier to access. But there is no point in being efficient if we are not developing products that respond to our clients' needs. So we need to innovate, but again, there is no point if potential clients in parts of the world where insurance demand is growing strongly have no idea of our abilities and our reputation.

As we move into 2017 the LMG will begin to articulate more actively a proposition for the London Market, laying out the rationale for buying our products and trading with the hundreds of businesses that operate in London. People who do not buy from us today will be provided with the case to do so, and those that do already will be reassured that they are making the right choice.

The LMG needs to give potential and existing clients the detail they require as to why London is the market to choose. This is a key focus for the LMG and an area in which we have made great progress in 2016. Our collective credibility in the face of a crisis is a core component of how we are perceived by clients, investors, ratings agencies and other global markets, which is why this report is very complementary to our wider agenda. The LMG is delighted to have been a part of the working group and we warmly welcome its findings.

Christopher Beazley
Chief Executive Officer
London Market Group

5.3 COLLABORATE WITH THE PRA TO CLARIFY MUTUAL EXPECTATIONS AND ENSURE AN EFFECTIVE POST-CATASTROPHE RESPONSE

It is important that before a major catastrophe occurs, insurers and regulators work closely with each other to agree on their respective expectations, key tasks and processes. Better coordination between the industry and the various regulators and government bodies will free insurers and their Boards to focus on their responsibility to serve their customers during the period of uncertainty that follows a major loss.

The industry should build on the ideas in the PRA's recently published consultation paper, "Dealing with a market turning event in the general insurance sector"[10] and Chris Moulder's speech on the same topic.[11] This paper sets out the PRA's expectations of regulated firms, including those operating at Lloyd's, in relation to a market-turning event that might affect solvency and future business plans. It also outlines its expectations of how firms might plan for and react to such an event. The PRA indicates in CP 32/16 that following such a large loss it might collect information on a standardised basis through an ad hoc data request. The paper includes a draft template for what such a request might look like.

Dry run participants suggested that they could work quickly to address the PRA's key concerns following a major loss event if they better understood what the PRA's activities, priorities and expectations would be in such circumstances, while accepting that flexibility may be required depending on the specific nature of any future event. The PRA could communicate and coordinate such expectations with Lloyd's. This would allow companies to engage meaningfully with both organisations and would avoid any conflict in priorities.

Building on this consultation paper, the PRA should consider whether it could provide regulated entities with additional details to ensure that they have absolute clarity on its processes that will be in place following a market-turning event. This should include how the PRA will respond to a large loss, including details of the teams it will mobilise (in terms of their structure, roles and responsibilities), a checklist of general criteria being evaluated, and the expected timelines. In order that companies can be prepared to respond to the PRA's requests, it should also provide details of the information that it might request from corporate parent companies or international groups.

The industry should work with the PRA to refine its communication channels and identify how, in response to a market-turning event, the PRA and the industry should engage with other stakeholders in the Bank of England, the Financial Conduct Authority, Her Majesty's Treasury and other relevant government departments in the UK and other countries. Insurers and syndicates with foreign corporate parents should work in partnership with the PRA and Lloyd's to agree how, in these circumstances, UK regulators can obtain, as soon as possible, the most complete picture of the catastrophe's impact. This is necessary to ensure that UK regulators are able to provide sufficient guidance and flexibility to insurers in the wake of such an event.

6. Conclusion

It has been over fifteen years since 9/11, the last major market-turning event to dislocate the London Market. Developments in the global insurance marketplace, together with the advent of Solvency II and new regulators in the form of the PRA and FCA, means much has changed in the industry since then.

The dry run simulated the largest loss to ever hit the insurance industry. It is clear from this exercise that the industry's traditional responses to major catastrophes no longer hold. Liquidity and capital are critical for maintaining financial stability but are now much less important as key differentiating factors in the wake of such an event – assuming that insurers are able to act on their plans quickly and efficiently – while there is reduced scope to raise and hold rates.

The changed circumstances of the London Market make it imperative for the UK insurance industry to differentiate itself through deep underwriting and management expertise and a prompt regulatory response. This produces three broad recommendations.

1. **Ensure customers are well served by putting in place internal processes to respond effectively to market-turning events.**
   - Establish crisis management training programmes.
   - Ensure that a robust and well-tested response is in place.
   - Maintain clear plans for raising additional capital following a market-turning event.

2. **Maintain the London Market's leading position and expertise in the global marketplace by strengthening Lloyd's position and proactive stakeholder interactions.**
   - Further strengthen and differentiate Lloyd's position.
   - Navigate a broad set of key stakeholders to maintain confidence during times of dislocation.

3. **Collaborate with the PRA to clarify mutual expectations and ensure an effective post-catastrophe response.**

Appendix: further details of the dry run

All three major catastrophes used in the dry run scenarios are fictional, though entirely plausible. The scenarios are informed by how recent major catastrophes have played out.

This composite image from Lloyd's Emerging Risk report – Business Blackout: The insurance implications of a cyber-attack on the US power grid, depicts night lights in the continental USA (source: NASA Earth Observatory / NOAA NGDC) overlaid with the output capacity of power generation plants and representations of 50 individual generators in the targeted region. It has been produced for illustrative purposes only.

NON-MODELLED INSURANCE LOSS: 'HALLOWEEN BLACKOUT'

On Monday, 31st October 2016, 15 US states and Washington, DC suffered a blackout lasting several days, shutting off power to 93 million people. More than 50 generators malfunctioned during the blackout, a large number of which were overwhelmed and many more turned off as a precaution. As the blackout rolled into a second and then a third day, mobile phones stopped working as backup power to mobile phone towers failed. With communications greatly affected there was a growing mood of uncertainty.

On Wednesday, 2nd November, power was restored to roughly half the affected areas, with the priority given to getting critical infrastructure back up and running. Major urban areas, including New York City, would remain without power for almost two weeks longer, until November 14th, while those places where it had been largely restored continued to suffer rolling blackouts. Intermittent outages were expected to continue indefinitely. Even as positive reports emerged of local farmers' markets springing up, there were alarming stories of food shortages and a spike in visits to hospital emergency rooms. There were also multiple instances of industrial and environment damage, as machinery failed mid-cycle. Reports emerged of chemical plants leaking toxic chemicals into the Hudson River.

The event was projected to cost ~$45 billion in total insured losses – of which our participants accounted for 6.8% or $3.1 billion (£2.2 billion). It should be noted that the $45 billion loss simulated in this exercise not only relates to existing cyber policies in force but is also designed to reflect the growing uptake of cyber coverage and its potential impact on other lines of business.

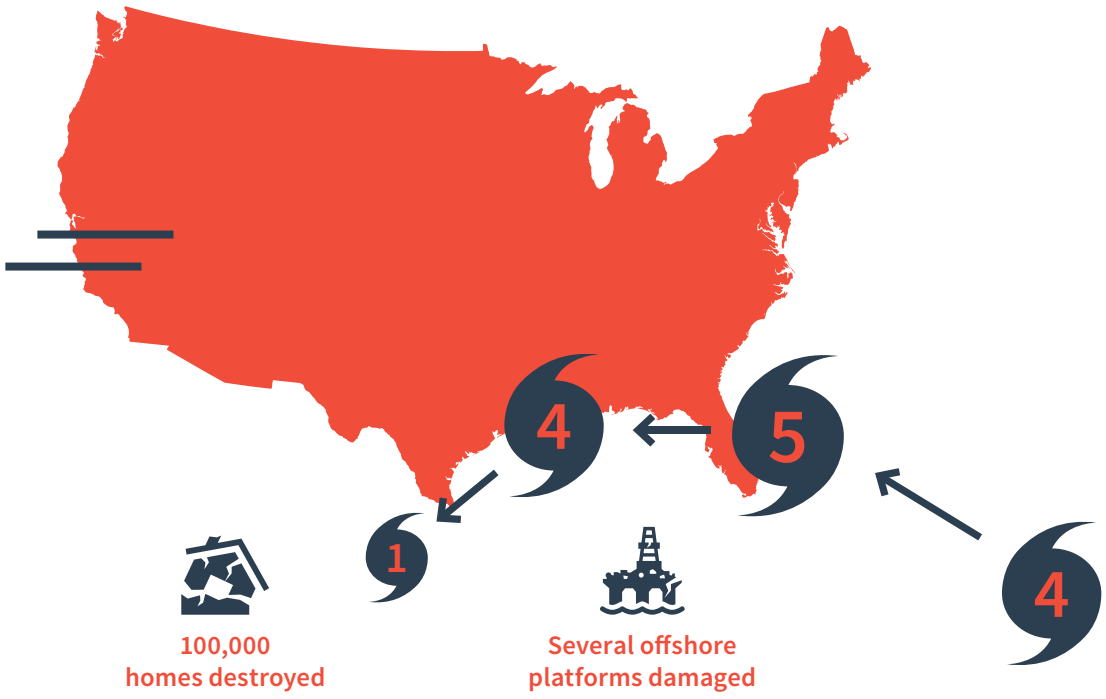
ASSET STRESS: GLOBAL EQUITY CRASH

On Monday, 31st October, the first day of the blackout, the New York Stock Exchange (NYSE) paused trading for two full days for only the second time since 9/11. Global stock exchanges reported drastic falls in values. The NYSE witnessed a similar fall of over 10%, when it reopened on Wednesday, 2nd November. Collectively, global stock valuations dropped 16.2% over the week, while property / casualty (re)insurers' share prices slumped by 28.3%.

MODELLED EVENT: 'HURRICANE GUY FAWKES'

As the events of the 'Halloween Blackout' were playing out on the US's Eastern Seaboard, a storm was brewing off the African coast that would become one of the costliest hurricanes ever to hit the United States. The hurricane made landfall in the Caribbean islands of Barbuda and Saint Martin as a Category 4 storm, passing south of the island of Anguilla to strike the Bahamas as a Category 5 storm. On Sunday, November 6th, it became the first Category 5 storm to hit Miami. Following landfall there, 'Hurricane Guy Fawkes' entered the Gulf of Mexico as a Category 4 storm, then made landfall in Louisiana, 120 miles east of Houston, Texas, passing south of central Houston to enter Mexico as a Category 1 storm. The storm finally dissipated on November 14th.

The hurricane caused widespread destruction, in the form of wind, storm surge and flood damage across Florida, Louisiana, the Bahamas, Lesser Antilles and Mexico. More than 100,000 homes were destroyed, while 1.8 million buildings and many offshore energy platforms were damaged. 'Hurricane Guy Fawkes' was responsible for a total industry loss of $125-175 billion. Our participants were responsible for $6.8 billion (£4.9 billion) or 4.5% of total insured losses.



LIQUIDITY STRESS: REINSURANCE EVENT

While the insurance industry started to deal with the after-effects of the 'Halloween Blackout', reports started to emerge of an unrelated accounting or model validation scandal in the reinsurance industry.

During the hours 'Hurricane Guy Fawkes' was ripping through Florida, Louisiana and Texas, a major reinsurer CEO was ousted by its Board amidst reports of potential default and delays in reinsurance payments and rating agency reviews.

The failure of a major reinsurer made it likely that 10% of all reinsurance recoveries related to 'Hurricane Guy Fawkes' would not be paid and that a further 10% of reinsurance claims related to the hurricane would suffer a five-week delay before payment.

At the same time, the impact of the cyber-attack of 'Halloween Blackout' resulted in a recalibration of future reinsurance capacity, with a maximum of 10% of 'Halloween Blackout's' gross loss available as cyber reinsurance cover for the next 12 months.

EXECUTION OF THE DRY RUN

The dry run was executed over a two-week period starting 31st October. The exercise included two major touch points which were designed to share scenario events with the participating organisations as they unfolded. In addition, the exercise included (up to) three opportunities for participants' submissions and further optional touch points during the simulation.

Prior to this two-week period, participants received data templates (and associated instructions) and shared their existing business plans – spanning underwriting, capital and liquidity forecasts – to create the base case with which all subsequent plans were compared (see Exhibit 16).

Participants were provided with incremental gross loss ratios. The quality and accuracy of companies' internal financial models are stress tested in other forums and it was assumed that these did not need to be tested further in this exercise.

At the beginning of each week, participants were provided with information regarding the events of the week along with the incremental gross loss ratio that each should apply to their premiums at the highest level. The information regarding the events was shared in the form of archived blogs, summarised timelines, impact maps, industry articles, news reports, and RMS web pages and updates. This information was intended both to make the events feel real and to help participants allocate losses to the appropriate business lines when calculating their net impact. Participants could refer to Lloyd's of London and University of Cambridge's Centre for Risk Studies' Business Blackout Report (July 2015) for additional context regarding the 'Halloween Blackout', and to RMS web pages prepared specifically for the exercise that detailed the impact of 'Hurricane Guy Fawkes'.

Each week, participants submitted updated business plans to reflect the impact of that week's events on their 2016 and 2017 forecasts. The first submission was made on Day 3 of the dry run to enable the PRA and Lloyd's to provide feedback to the participants on the week's events. The submissions were made at up to three different levels – the Group, the UK Regulated Entity, and Lloyd's. Some participants submitted for a third time in Week 3 to reflect the additional time they needed to complete any remodelling of their solvency capital requirement and other capital requirements.

The information submitted was made anonymous by indexing it to a base case. Following Week 1's submissions and the final submission, it was then shared with the PRA (at the Group and UK Level) and Lloyd's. Interim feedback provided by the PRA and Lloyd's was forwarded to participants at the start of Week 2 of the exercise.

Commercial Working Group

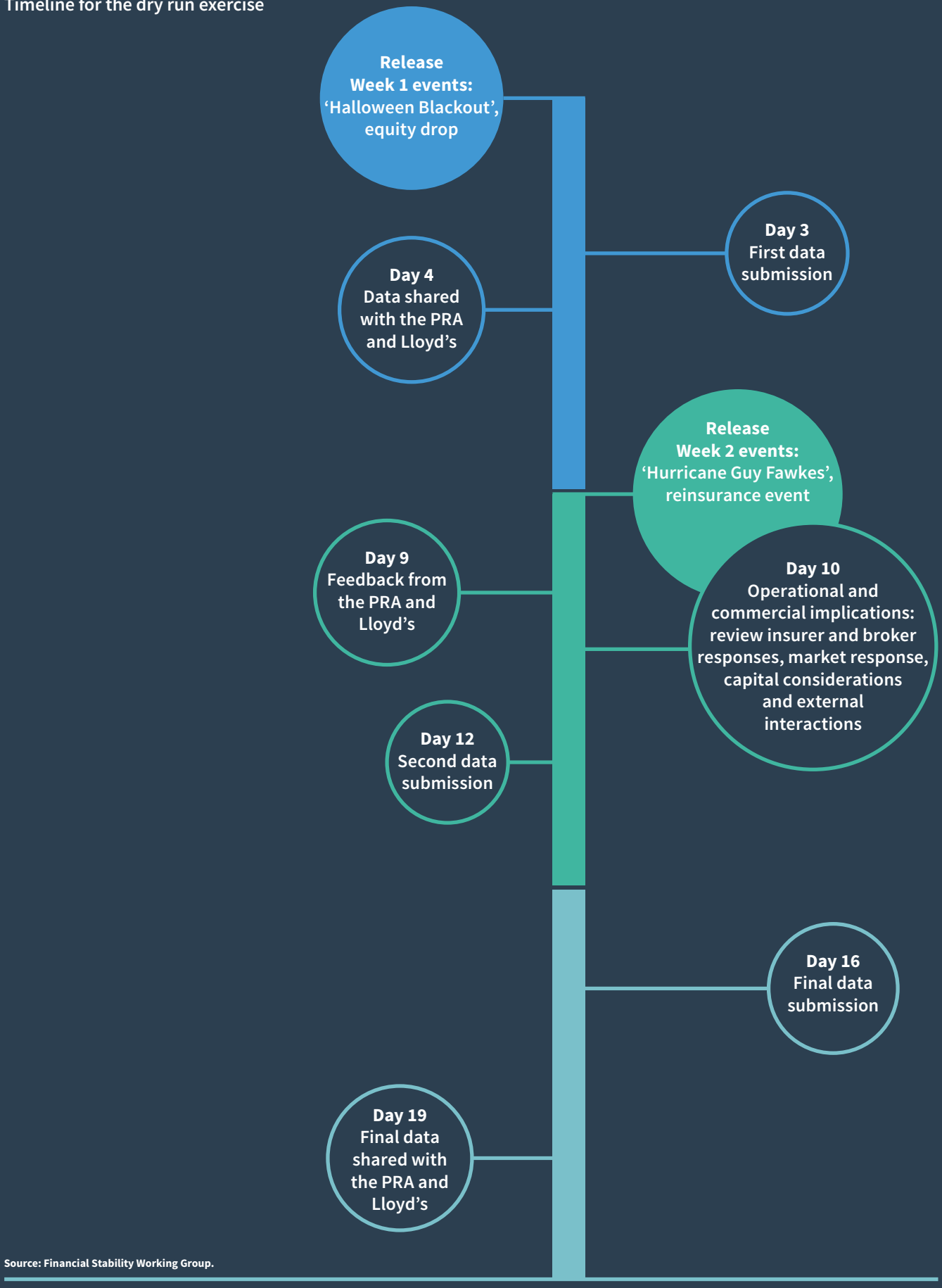
A separate working group was established to explore the commercial and operational impact that such a market-turning set of events would have on the London Market.

Participants in the Commercial Working Group had two objectives. Firstly, to understand how the London Market could best respond as a whole during such circumstances to provide reassurance and certainty while also maintaining the London Market's competitive advantage. Secondly, to recommend best practice responses to the various market participants, suggesting areas where dialogue would be required with other stakeholders during such a period, including with regulators the government and policyholders.

The group convened five times. This included conducting three extended workshops to discuss the submissions written by individual participants on five key topics: the market, (re)insurer and broker responses to a market-turning event, their responses to capital requirements, and their perspective on external interactions.

The findings of this group are set out, together with the learning and outcomes from the financial stability aspects of the exercise, in Chapters 4 and 5.

Exhibit 16
Timeline for the dry run exercise



Source: Financial Stability Working Group.

Sources

1. Swiss Re, Natural catastrophes and man-made disasters in 2015, Swiss Re Sigma, 2016.

2. Insurance Information Institute: http://www.iii.org/fact-statistic/terrorism and http://www.iii.org/graph-archive/96122, sourced December 8th, 2016.

3. W. C. Thompson, Jr., City of New York Comptroller, The Fiscal Impact of 9/11 on New York City, September 2002: http://comptroller.nyc.gov/wp-content/uploads/documents/impact-9-11-year-later.pdf.

4. R. Hartwig (Special Counsel, Insurance Information Institute, New York), International Association for the Study of Insurance Economics "The Geneva Association", Insurance and September 11 One Year After: Impact, Lessons and Unresolved Issues: https://www.genevaassociation.org/media/586501/insurance-and-september-11-one- year-after.pdf.

5. G. Makinen, US Government and Finance Division, Congressional Research Service Report for Congress, The Economic Effects of 9/11: A Retrospective Assessment, September 27th, 2002.

6. Marsh, 10 years after Hurricane Katrina: Lessons in Preparedness, Response and Resilience, August 2015.

7. The White House, The Federal Response to Hurricane Katrina: Lessons Learned, February 2006: https://georgewbush-whitehouse.archives.gov/reports/katrina-lessons-learned.

8. Insider Quarterly, Under starter's orders, Autumn 2009: http://www.insiderquarterly.com/under-starter-s-orders.

9. Aon Benfield, 2012 Reinsurance Market Outlook, January 2012.

10. Prudential Regulation Authority, Dealing with a market turning event in the general insurance sector, Consultation Paper CP32/16, September 2016.

11. Prudential Regulation Authority, Dealing with a market-turning event in the general insurance sector, speech by Chris Moulder, Director of General Insurance, Bank of England, September 29th, 2016.

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