

Cambridge Centre for Risk Studies

Advisory Board Meeting

Tuesday, 13 January 2015

2015 ADVISORY BOARD MEETING

Centre for
Risk Studies



**UNIVERSITY OF
CAMBRIDGE**

Judge Business School

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Research Showcase Agenda

Research Showcase – Tuesday, 13 January, 2015

Venue: Lecture Room 2, University of Cambridge Judge Business School, Trumpington Street, Cambridge, CB2 1AG

09:00 **Registration & Coffee**

Session 1: Cambridge Risk Framework

09:30 **Welcome & Review of Research Activities in 2014**
Professor Danny Ralph, Academic Director, Centre for Risk Studies

09:50 **Developing Frameworks for Managing Cyber Catastrophe Risk**
Éireann Leverett, Senior Risk Researcher, Centre for Risk Studies

10:00 **Cambridge Risk Framework – Developments and Objectives**
Simon Ruffle, Director of Technology Research & Innovation, Centre for Risk Studies

10:30 Coffee and tea break

Session 2: Catastronomics

11:00 **Understanding the Economic Consequences of Catastrophes**
Dr Scott Kelly, Senior Research Associate, Centre for Risk Studies

11:20 **Macroeconomic Modelling**
Jaclyn Zhiyi Yeo, Risk Researcher, Centre for Risk Studies

11:40 **Impact of Scenarios on Investment Portfolios**
Jennifer Copic, Risk Researcher, Centre for Risk Studies

Session 3: Financial Catastrophes – “FinCat”

12:00 **Contagion Modelling of Financial Crises**
Dr Olaf Bochmann, Research Associate, Centre for Risk Studies

12:20 **Financial Catastrophe Risk Research**
Dr Andrew Coburn

13:00 **Lunch**
Common Room, Cambridge Judge Business School

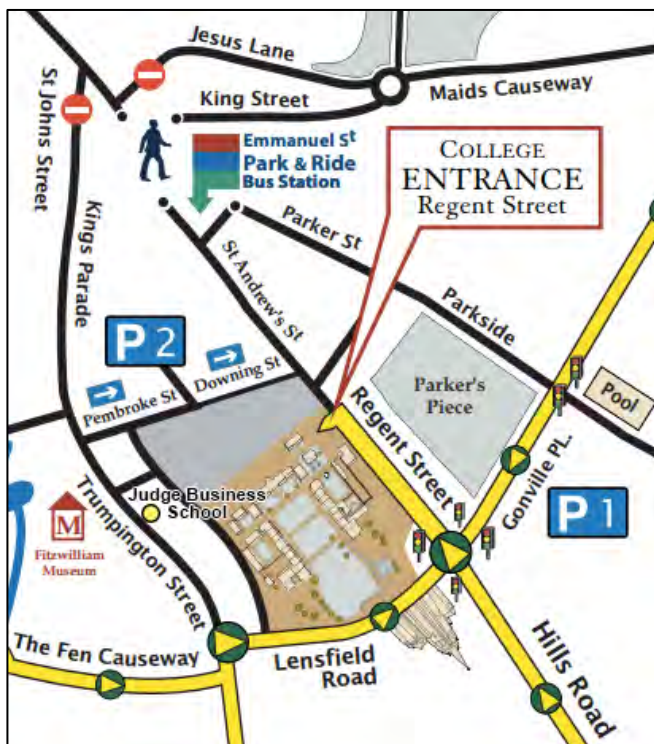
Advisory Board Meeting Agenda

Advisory Board Meeting – Tuesday, 13 January, 2015

Venue: Room 2.01, University of Cambridge Judge Business School, Trumpington Street, Cambridge, CB2 1AG

- 14:00** **Welcome and Introductions**
- 14:30** **Report on Past Year's Activities**
- 14:45** **Centre Development Strategy**
- 15:00** **Discussion Topic: Centre Development Strategy**
- 15:30** Coffee and tea break
- 16:00** **Research Agenda 2015**
Research Programme Overview
 - A. Multi-Threat Economic Risk
 - B. Financial Catastrophe Risk
 - C. Cyber Catastrophe Risk
- 17:30** **Round-Up**
- 18:00** **Closing Remarks**
- 18:30** **Drinks**
West Lodge, Downing College, Regent Street, Cambridge, CB2 1DQ
- 19:30** **Dinner**
Maitland Room, Downing College

Directions to Downing College



Downing College entrance is located on Regent Street and is roughly a 10-12 minute walk from the Cambridge Judge Business School.

Turning right after exiting CJBS, continue on **Trumpington Street** until you reach Pembroke College. Turn right on **Pembroke Street** and follow the road until it meets **St Andrew's Street**. Turn right again and continue down this road until you reach Downing College on the right-hand side. St Andrew's Street becomes **Regent Street** at the halfway point and the college entrance is directly opposite Parker's Piece.

Alternatively, after leaving CJBS make a left and continue to the small roundabout turning on to **Lensfield Road**. Turn left on Lensfield Road and walk until you meet **Regent Street** and Hills Road at a set of four traffic lights. Go left on Regent Street and the college will be on your left-hand side.

Both the West Lodge and Maitland Room are accessed through E Staircase. Continue straight from the college entrance and cross to the far side of the main quadrangle. Turn right and E Staircase will be on right-hand side.



Participants at the Cambridge Centre for Risk Studies Advisory Board Meeting and Research Showcase

Executive Team at the Centre for Risk Studies

Professor Danny Ralph, Academic Director
Dr Michelle Tuveson, Executive Director
Dr Andrew Coburn, Director of the Advisory Board
Simon Ruffle, Director of Technology Research & Innovation

Attending Members of Advisory Board

Russell Bean, Head of Financial Institutions Underwriting, Talbot Underwriting Ltd.
Nick Beecroft, Head of Emerging Risks & Research, Lloyd's
Dr Siddhartha Delal, Chief Data Scientist and Senior VP of Advanced Research and Technology, AIG
Jason Futers, Head of Emerging Risks Innovation, RMS
Anna-Marie Greenaway, VP Science and Technology, BP Plc
Dr Sven Heiligtag, Principal, McKinsey & Company
Dr Mike Maran, Chief Science Officer, Catlin
Dr Rainer Sachs, Head of Group Accumulation and Emerging Risks, Munich Re
Dr Paul Sanderson, Deputy Head, Economic Performance and Environment, ESRC
Alan Smith, Global Head of Risk Strategy and Chief of Staff, HSBC Holdings PLC
Matthew Swibel, Director, Corporate Sustainability, Lockheed Martin

Academic Advisors and Guest Attendees

Brad Fischtrom, Managing Director, Head of Scenario Development and Stress Testing, AIG Property Casualty
Matthew Grant, Group Executive and Global Client Development, RMS
Professor Stelios Kavadias, Margaret Thatcher Professor of Enterprise Studies in Innovation & Growth and Director of Research, Cambridge Judge Business School

Non-Attending Members of the Advisory Board

Professor Lord John Eatwell, Professor Emeritus of Financial Policy, Fellow in Financial Policy Director of Centre for Finance and Policy, University of Cambridge
Professor Doyne Farmer, Professor of Mathematics, Oxford University
Professor Frank Kelly, Professor of the Mathematics of Systems, Statistical Laboratory, University of Cambridge, and Master of Christ's College, Cambridge
Andrew Freeman, Risk Fellow, Cambridge Centre for Risk Studies & Managing Director, Cambridge Research Associates Ltd
Professor Tso-Chien Pan, Professor and Executive Director, Institute of Catastrophe Risk Management, Nanyang Technological University, Singapore
Professor John Rees, Risk Research Coordinator, UK Research Councils (RCUK)
Professor David Spiegelhalter, Winton Professor of the Public Understanding of Risk, Centre for Mathematical Studies, University of Cambridge

Strategy of the Centre for Risk Studies

The Advisory Board meeting is an opportunity for the Executive Team to share their management strategy for the Centre for Risk Studies, to define research agenda objectives, and to obtain guidance from the advisors on future prioritisation of activities, specifically overall strategy, guidance on prioritisation of different tracks of activity, and tactical suggestions to help with execution of initiatives.

A Focus on Complex Risk

The Centre for Risk Studies originated from an overlap of specialised research interests into both complex systems and catastrophe risk analysis. Being located in Judge Business School has enabled the Centre to apply these interests to the business community and to structure an appropriate multi-disciplinary team.

The research of the Centre maintains a focus on 'complex risk' – i.e. processes where loss occurs through the disruption of business systems and cascades through interrelated networks in complex and non-intuitive ways. The management and governance of complex risk has attracted interest and support from several sectors of the business community and government policy-makers, including the financial services industry, the energy sector, and major corporations. It poses a wide range of analytical and methodological challenges for the academic community to tackle. These different stakeholders form the community served by the Centre for Risk Studies.

The Centre's strategy for developing thought leadership around complex risk has been:

- **Engagement** – an active programme of events in which academics, business leaders and other stakeholders discuss risk-management issues. Over the past several years the Centre has established a reputation for thought-provoking meetings that tackle leading edge issues, attracting senior executives and influential attendees. Engagement has been the principle method of identifying supporters and ensuring that research is aligned with the issues of most importance to the community served by the Centre.
- **Risk Research** – a number of inter-related tracks of investigation have been developed and are described in the following sections. Research involves the proposal of methodological advances, the structuring of conceptual frameworks, compilation of data, and the development of models to explore issues. Research that is aligned with real-world business problems is valued by the University in terms of its 'impact'.
- **Academic Output** – the quality of a research centre is ultimately judged by its academic output, in terms of peer-reviewed publications. The current research programme is intended to produce high quality management science publications as well as contribute to the MBA and MPhil teaching curriculum.

2014: Demonstrating Impact

At the beginning of 2014, the Advisory Board suggested the Centre be more proactive in disseminating its research outputs and to demonstrate such outputs have business value by creating a community of subscribers. The Centre has been active throughout 2014 with a programme of dissemination and community-building, detailed in this report, has made us confident that the research is relevant and has real impact.

Full Research Programme

A full research programme has been pursued in the past year, expanding the active research team and working in a number of challenging areas. Achievements include methodology breakthroughs, conceptual innovation, and development of new tools and approaches that have attracted positive peer review and external attention.

Executive Education in Risk Management

The Centre is expanding its engagement activities with the business community by developing an offering for executive education through a partnership with the Cambridge Judge Business School Executive Education and Leadership, Ltd. The executive level programme in risk management is expected to broaden the corporate engagement profile at the Centre and promote research activities through its 'deep engagement' opportunities.

Academic Output

The Centre contributes to the educational priorities of CJBS and engagement with the students through its MBA elective in Risk Management and the award of the McKinsey Risk Prize. A research project focussing on the network structure of an organisation and employing agent-based modelling methodologies is being explored at the Centre. Given the more theoretical nature of this research, we expect the planned academic programme to require sustainable and longer-term funding from a funding body such as the Research Councils.

Dissemination Activities 2014

During 2014, and as a result of the guidance from the Advisory Board at the beginning of the year, the Centre has put more emphasis on the ‘adoption’ of its ideas and research into its stakeholder community. This has involved increased dissemination of our research outputs and engagement with our findings in order to test how end-users apply research results and to understand how to improve the usefulness of our research.

The Centre’s dissemination strategy involved packaging the research outputs into self-published reports and creating a multi-channel process for publicizing and distributing them.

Dissemination involved hosting a series of seminars throughout the year, lunchtime London Risk Briefings -- media outreach including generating spin-off articles and press releases -- and the development of a social media community. To enable this process we hired an Editorial Associate (Tamara Evan). The outreach campaign was greatly assisted by a Senior Advisor of Insurance & Risk Media (Lee Coppack) and a Social Media Strategy Manager (Diane Lanigan), both volunteers. The Business School assisted with resources from its Media Relations department (Charles Goldsmith) and Online Services (Peter Graham and Ruth Newman).

Metrics of Impact

Initial metrics from the dissemination exercise show a strong level of interest in the research activities of the Centre. The Centre’s reports have had several thousands of downloads from our website. Supporters of the research have requested co-branded versions for their own dissemination.

5th Annual Risk Summit

Our feature engagement activity is our major Risk Summit conference, attended by 150 senior executives and decision-makers. This year the Summit featured more content from our own research, in a pre-conference Special Topics Seminar.

Seminars

Specific topic seminars included *Emerging Risks Scenarios* in March, *Insurability of Supply Chain Risk* in April, and *Financial Risk and Networks* in September. All seminars were fully subscribed. Satisfaction scores by attendees were exceptionally high (4.48 out of 5 for Emerging Risk Scenarios, and 4.71 for the Financial Risk and Networks seminar). Feedback on content usefulness has been high, as shown in these charts.

Media Campaign

The Centre’s work has featured in 15 articles in the press during 2014 (10 in the past three months), listed later in this report.

Social Community

A concerted campaign to engage using social media has seen the launch of a new blog, *Viewpoints*, and an increased profile for the Centre’s activities on Twitter, LinkedIn, and other channels.

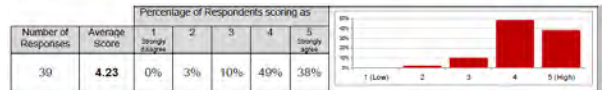
London Risk Briefings

As many of our user community are in London, we have started hosting monthly lunchtime briefing meetings in Leadenhall Street in the City of London (courtesy of Catlin Ltd.), which have been very well subscribed and a useful way of building up contact with business users, journalists and policy-makers.

Attendee Feedback Summary Emerging Risk Scenarios Seminar March 2014

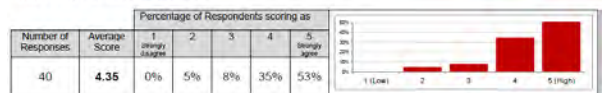
Improving Understanding

The material presented was useful in improving my understanding of issues that affect my business or professional activities



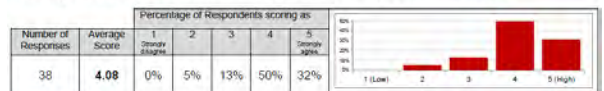
Dissemination to Others

The material presented is likely to be of interest to colleagues and I will pass on presentations from the seminar to others in my organization or elsewhere



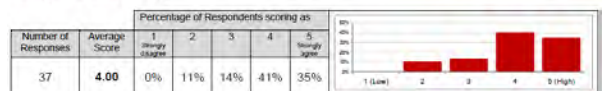
Personal Decisional-Making

I am likely to incorporate material from the research presented here into my future business decisions



Organization Value

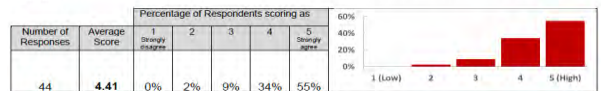
The scenarios, framework and taxonomy of threats may be directly useful in helping my organisation structure risk management actions in future



Attendee Feedback Summary Financial Risk & Networks Seminar Sept 2014

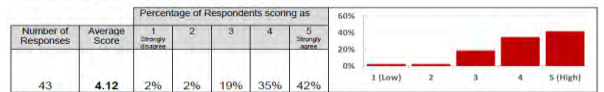
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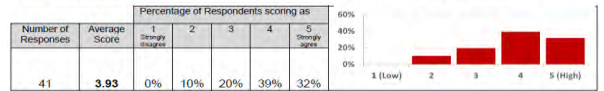
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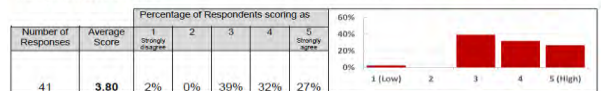
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Meeting of the Advisory Board of Cambridge Centre for Risk Studies



Emerging Risk Scenarios Seminar, March 2014



Workshop on Insurability of Supply Chain Risk, April 2014



Scenario Reports published, June 2014



Blog channel, September 2014



Financial Risk & Networks Seminar, September 2014



5th Risk Summit: Flagship Risk Centre Conference, June 2014



Growing the Risk Centre's social media community



London Risk Briefings – lunchtime seminars in the City

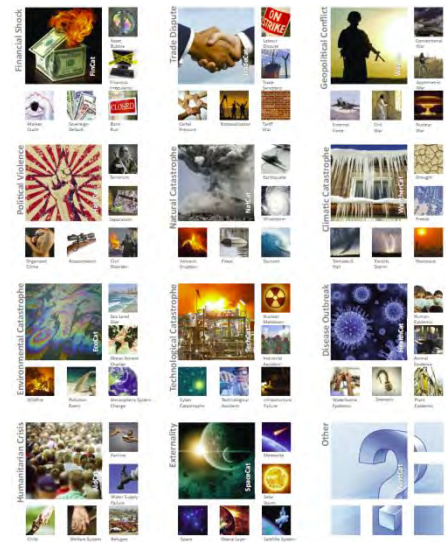
Research Achievements 2014

2015 marks the sixth year of operation of the Centre for Risk Studies. The past year has been an important one for the Centre, in making significant progress in research and methodology, applying network analysis techniques and macroeconomic modelling to shock events. Major progress was made in financial crisis and cyber risk research, and the methodology of our Cambridge Risk Framework.

Developing the Cambridge Risk Framework 2010-2013

The research programme of the Centre for Risk Studies focusses on business applications of management science to reduce risk. A number of interlinked research themes are being explored. They share a common approach and risk analysis framework to complex risk – the ‘Cambridge Risk Framework’.

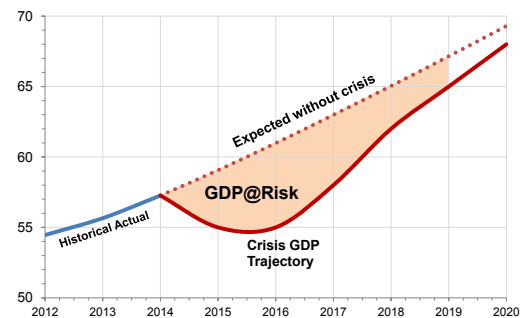
Over the past few years the research has progressed from identifying a ‘Taxonomy of Threats’, to compiling a ‘state-of-knowledge’ for several of the threat types, and the exploration of the consequences of a stress test scenario for a number of selected threats. A key contribution of the research was the standardisation of scenario selection (e.g. 1% annual probability of exceedance as a ‘1-in-100’ event) for emerging risks. In 2013 an innovative methodology was developed to assess the different facets of scenario impact, ranging from direct loss, to macroeconomic consequences, to investment portfolio effects. This involved developing techniques of network analysis, including gathering and visualizing data on the interconnectivity of the global economy.



Cambridge Taxonomy of Threats

GDP@Risk: A new metric for comparing different types of shocks

In 2014 the research explored the similarities and contrasts between shocks from different types of threats, initially using the four scenarios and their variants analysed in detail in 2013. This work resulted in the definition of a metric – ‘GDP@Risk’ loss of economic output – to measure the severity of shocks from widely different causes. This metric has been well received and has proven to be a useful and versatile benchmark for assessing the magnitude of catastrophes on the macroeconomy. It has enabled historical events to be recalibrated and compared with hypothetical events, and to allow comparison of widely different types of threat events. It provides a financial measure that can be used to assess the value of investment in risk management.



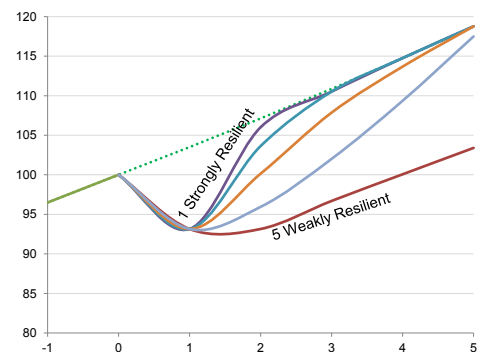
GDP@Risk – measuring economic output loss

Catastronomics: the economics of catastrophe

Assessing the macroeconomic impact of catastrophes led to a programme of research to explore how shocks cause output loss, how different types of threat influence specific macroeconomic variables, and how these flow through the economic system, which factors affect the severity of the initial shock and what processes determine how quickly the economy recovers.

An important exercise, our world city risk project, tested a much wider range of threats to show that GDP@Risk estimation techniques could be extended to more classes of catastrophe.

Modeling the economic impact of catastrophes is a key area of focus for the research. In October of 2014, the Centre responded to concern about the potential economic impact of the Ebola outbreak with an analysis and rapidly-published working paper on the potential ‘catastronomics’ of outlooks for the epidemic.



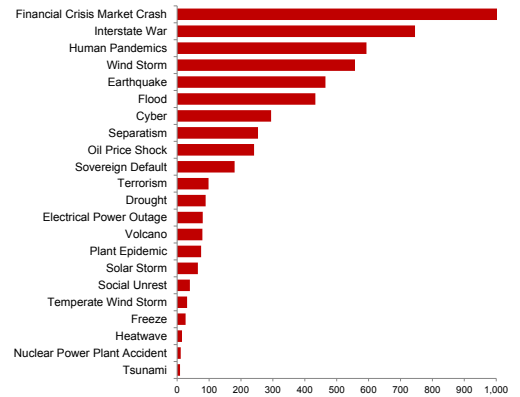
‘Catastronomics’: resilience of an economy determines recovery speed and affects total GDP@Risk

Risk Atlas: Frequency, Severity and Geography of Threats

An objective of the Cambridge Risk Framework is to develop a quantitative assessment of the likelihood of all of the systemic shock threats to the global economy.

A first order analysis of this was achieved by applying GDP@Risk assessment techniques to derive economic output loss at city level for the most significant 300 cities of the world, responsible for over half of global GDP.

This required a very significant data compilation exercise on cities, threat maps, and historical precedents for 23 different threats. The resulting model provides the first holistic estimates of future catastrophe cost from each of the major threats in our taxonomy for the global economy. We believe this is a major advance in the field of catastrophe studies and provides a platform for 2015 research.

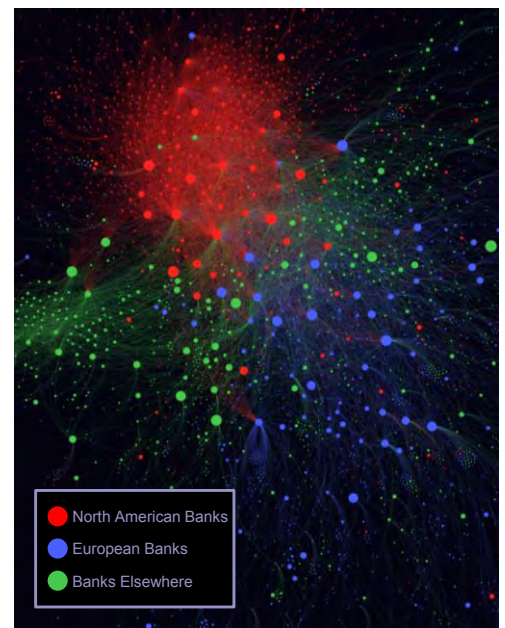


Expected loss by threat type to global economy GDP@Risk (\$Bn) over next 10 years

Financial Catastrophe Risk

Financial crises represent a major class of threat in the taxonomy and the Centre maintains a research track on financial catastrophe risk. In 2014 the Centre developed a model of the global financial system to explore the propagation and consequences of crises. The model was developed through compilation of multiple databases and sources of information on financial institutions and currently incorporates over 18,000 banks across the world. It is the first known 'practitioner' model outside of regulatory central banks to attempt to model the world's entire banking system.

This model helped to extend the scenario analysis methodology developed for 'exogenous' shocks – external events – in 2013, to represent 'endogenous' internal failures in the financial system such as asset price bubbles and sovereign defaults. The FinCat research theme explored the development and propagation of several financial scenarios for use as structural stress tests. The Centre developed techniques for representing how crises occur and propagate, and as a result were honoured to convene a key conference of researchers and practitioners in the nascent field of financial network analysis, and to be invited on to the editorial board of the new *Journal of Network Theory in Finance*.



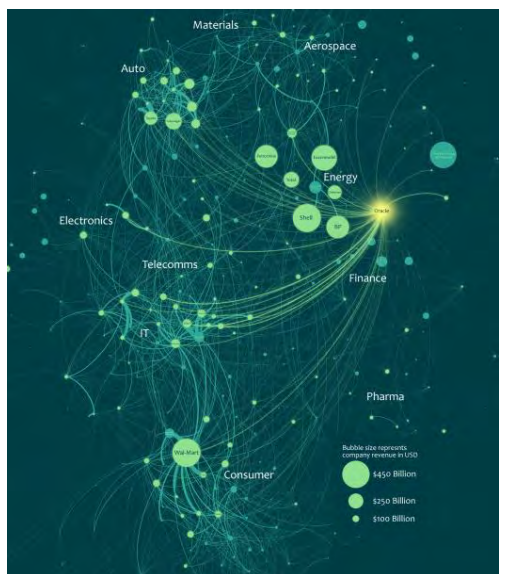
Cambridge Model of Global Financial System

Cyber Catastrophe Risk

The emerging threat of cyber disruption is a specific research theme at the Centre. The Centre's particular focus has been on cyber catastrophe – the potential for systemic loss across many organizations. In 2014, the research developed a model of the cyber economy and ways to quantify impacts using standard industrial classes as well as consequences for the public sector and critical infrastructure. Presenting cyber scenarios online as a digital exploration tool has been well received. Our research proposing 'Systemically Important Technology Enterprises' (SITEs) as a correlation concept has been influential and widely cited, particularly by the insurance industry looking for accumulation techniques and exposure management for cyber insurance. New scenarios are currently in development.

Interconnected Corporate Risk

Research into the risk of business disruption to international corporations included hosting a workshop on Supply Chain Risk and its Insurability as well as applications of Revenue@Risk models for balance sheet risk recognition as promising avenues for 2015.



SITE systemic risk in the cyber economy

Research Programme 2015

The research programme of the Centre for Risk Studies focusses on business applications of management science to reduce risk. A number of interlinked research themes are being explored. They share a common approach and risk analysis structure – the ‘Cambridge Risk Framework’, which enables a range of threats, scenarios, and consequences to be analysed on networks of business and economic relationships. In 2015, we propose to continue development in several research areas.

Research Application Areas

Research application areas explored through the Cambridge Risk Framework are described in more detail in the next pages of this briefing. For 2015, we envision focussing on three primary research application areas:

- A. **Multi-Threat Economic Risk:** Understanding and quantifying the risk to the economy and international business activities from catastrophe scenarios from all of the threat types in our taxonomy.
- B. **Financial Catastrophe Risk:** Using the Cambridge Risk Framework to explore the consequences of financial shocks for practitioners managing tail risk in the financial services and investment industry.
- C. **Cyber Catastrophe Risk:** Developing a more rigorous framework for the evaluation of systemic cyber risk as one of the most significant emerging risk threat classes in the taxonomy.

Developing the Cambridge Risk Framework

In addition to pursuing specific research application area, we propose to continue developing the Cambridge Risk Framework, allocating some resources to enabling the framework, improving methodologies, compiling datasets, developing the research platform and toolkit, and exploring other application areas for the research.

Methodology Development: Catastronomics

The economic consequences of major catastrophic shocks of different types are not well understood. The Centre has strong relationships with economists and specialists in macroeconomic analysis. In 2015 we propose to devote specific internal resources to improving methodologies of catastronomics and how economic shocks translate into market impacts on asset values in an investment portfolio.

Additional Application Areas

In addition to our major application areas, we address research topics that are aligned with our objectives of populating the Cambridge Risk Framework in particular threat specializations, or otherwise used in business decision-making. Topics currently include how climate change risk might affect investment portfolio strategies; improving risk assessments of geopolitical instability; macroeconomic consequences of extreme natural catastrophe events. We also encourage our research associates to pursue their own research topics for part of their time.

Research Platform Infrastructure

The Cambridge Risk Framework makes use of a cloud-based research platform for data compilation, model development, and research output: <http://www.CambridgeRiskFramework.com> This platform is currently being enhanced to improve its usefulness in the research and presentation of outputs, including enabling research development partners to interact with data and analytics developed at the Centre.

Understanding Complex Business Exposure

We propose to continue populating the Cambridge Risk Framework with datasets about the international economy, business interconnectivity, elements at risk from shocks, and threat information. These datasets represent ‘complex business exposure’ – counterparty relationships, trading flows, supply chains, market dependencies, transportation and communication lines – that are vulnerable to the disruption of business processes. Developing a useful data architecture for this exposure and publishing data schemas for improved adoption of representations of complex business exposure is an important objective for 2015.

Research Application Area A: Multi-Threat Economic Risk

In 2015, we propose to extend our 2014 work on world city risk to parameterize a representation of the frequency, severity, and geography of all the threats in the Cambridge Threat Taxonomy. This will provide a simplified probabilistic event set of potential catastrophe scenarios that could cause severe losses for the world economy (e.g. global GDP@Risk of over \$1 trillion) over the next decade. The analysis will provide objective measures of scenario losses and inform a range of risk management decisions.

Cambridge Threat Taxonomy

The Cambridge Threat Taxonomy (<http://cambridgeriskframework.com/getdocument/4>) is a compilation and categorization of threats of economic disruption observed over the past thousand years or currently theorized by respected authorities. First developed in 2010, version 2.0 of the taxonomy was published in 2012 after a peer-review process and refinement. It identifies 12 major classes of threats and 55 individual threat categories.

In 2014, 23 of these threat types were parameterised by geography, frequency, and severity for simplified localized scenarios applied to major cities of the world. This demonstrated that it was tractable to parameterize a broad range of threats and model their economic consequences. The threat types include financial and market crises, geopolitical conflicts and political instability, natural catastrophes and extreme weather events, technological and environmental catastrophes, disease outbreaks, and space-related threats. The analysis will compare loss from each of these causes, and put for example, geopolitical risk in context relative to NatCat.

Enhancing Scenario Definitions

In 2015, we propose to extend the work to identify those scenarios that will impact multiple regions and cities and to consider the network implications of city-to-city economic linkage that propagate economic consequences to associated cities, and to assess the potential for one threat type to trigger or exacerbate other scenarios in a cascade of consequence.

Identify Trillion Dollar Events

Events that have a global GDP@Risk over five years of more than \$1 Trillion are substantial macroeconomic events, affecting markets and investments internationally. The stress test scenarios that the Centre has analysed in detail have ranged from \$2 Trillion to \$32 Trillion. The objective of the analysis will be to identify all potential events with a global GDP@Risk of \$1 Trillion and above.

Granular Insights

The research will generate a rich dataset of analysis output on scenarios, their likelihoods, and their consequences, that can be interpreted in a number of different ways, including comparing the risk from different threat types, geographical mappings of risk, and observations about the expected frequency and severity of economic disruption from all of the causes. Output could inform risk capital models to improve tail risk decisions.

Market Impact and Investment Portfolio Effects

The methodology of Risk Centre scenario development makes it possible to translate the macroeconomic consequences of a scenario into the impacts on the assets in an investment portfolio. Scenarios of interest, identified from their macroeconomic effects, will be selected for investment portfolio impact assessment.

Direct Losses, Insurance Loss, and Other Consequences

The Cambridge Risk Framework data architecture includes scenario attributes that can be used to generate additional loss analysis, such as revenue reduction, property loss, human injury, insurance claims, and other outputs. The initial parameterization of the scenarios will be for their macroeconomic consequences. If successful, the scenarios can be enhanced in the future to generate additional loss metrics. This will make it possible, for example, to compare underwriting loss with market loss, and to calibrate correlation assumptions.

Corporate Balance Sheet Risk

This research application area aligns with current interest in identifying and quantifying risk on corporate balance sheets, and explicitly recognizing '1-in100' scenarios. We expect the research activities to contribute significantly to this rapidly-growing area of interest.

Research Application Area B: Financial Catastrophe Risk

The impact of financial crises on our major institutions and on our economic system has become a major concern for regulators, policy-makers, and practitioners. The design and application of regulatory stress tests to banks has been controversial but is set to become standard practice. The Centre's research looks to provide coherent and structural models of extreme financial crisis scenarios, appropriately reflect the systemic dynamics of the interconnected financial system, and to position scenarios in a probabilistic context, for use by practitioners managing tail risk in the financial services and investment industry. The Centre's 6th Risk Summit in June will be themed around stress testing.

Understanding Financial Catastrophe Risk

Many businesses, financial institutions, and investors are grappling with improving their understanding of market risk after the 2008 financial crash. The Centre for Risk Studies has been running a research programme to contribute to the understanding of financial catastrophe risk for the past two years. Last year we compiled a model of the global financial system and developed scenarios of different types of endogenous financial crises so as to explore the consequences and impacts on investment portfolios.

Model of the Global Financial System

We propose to continue the development of the Cambridge model of the global financial system and to improve the data on relationships between institutions and the modelling of contagion mechanisms for financial crises (Interbank lending; fire-sales of commonly-held assets; cross shareholding; rollover risk, etc.). This will improve the modelling of financial catastrophe scenarios, and help us understand whether there are limits and constraints to the severity of crises, how resilient the system is as a whole, and how systemic behaviour may change under new conditions, such as regulatory constraints, industry consolidation, or institution behaviour. We propose to add shadow-banking to the model and to explore the linkage between finance and the economy.

Financial Catastrophe Scenarios

We intend to further develop and analyse a range of different causes of financial catastrophe scenarios commenced last year, including a global property crash, sovereign default cascade, high inflation spiral, and changes in reserve currency. We intend to better contextualize these threats with likelihood assessments and historical precedents. We also intend to contribute to the debate on stress test scenario design and to publish our studies to illustrate a coherent narrative for scenario implementation.

Investment Portfolio Impacts

We are currently developing the modelling of how financial crises affect the returns on asset types in investment portfolios. Improvements envisioned in 2015 include better estimates of corporate and sovereign default rates, interest rate changes, and inflationary consequences.

Historical Catalogue of Financial Crises

Fully understanding the past is an essential element of understanding financial catastrophes. The Centre for Risk Studies is partnering with the Centre for Financial History at University of Cambridge to develop a catalogue of financial crises to help assess the frequency and severity of future financial shocks.

Indicators and Early Warning Systems

We propose to examine the historical and theoretical evidence for early warning indicators of financial crises. We will review potential leading indicators of systemic risk and explore the business value of early warning.

Economic Transition States

The relationship between catastrophes and economics includes the state of the economy when a crisis occurs. Understanding the various states of the economy in terms of clustering of macroeconomic variable values is an area of research interest. We intend to verify whether it is possible to model and track of economic phases, with reference to macroeconomic modelling and by reviewing historical phases of the economy, statistical correlation of variables, and phase transition probabilities.

Research Application Area C: Cyber Catastrophe Risk

The risk of cyber disruption to technology systems is of growing importance in the current business, societal and political landscape. The Centre has focussed on cyber catastrophe risk – the potential for wide scale losses to many institutions in a single event, and has proposed correlation mechanisms that can lead to systemic cyber events. These are being explored through the development of a range of scenarios for the protection of critical infrastructure, the development of the cyber insurance market, and policy-maker strategies for involving multiple stakeholders in creating a safer society.

An innovative risk assessment framework for cyber

In 2013, the Centre for Risk Studies researched and proposed an innovative framework for the assessment of cyber catastrophe risk. This included an understanding of the cyber threat landscape resulting from different attack vectors, actors and motivations. It bypassed the vexed problem of quantifying loss from historical events by developing a categorical magnitude scale recognizing three dimensions of cyber-resultant harm: Damage, Disruption and Theft. This enabled the compilation of a catalogue of past cyber attacks to provide estimates of the frequency and severity of such events. The framework adapted security assessment techniques to propose a vulnerability scale for different sectors of the economy and for individual enterprises. This framework also provides a method of assessing the likelihood of future loss from cyber attacks for use in risk analysis.

In 2014, the potential impact of a cyber catastrophe scenario was assessed through a mapping of the ‘cyber economy’, entailing a compilation of structured data on the major enterprises of the global economy and their IT applications and interrelationships. The correlation concept of ‘Systemically Important Technology Enterprises’ (SITEs) provided a methodology for understanding the extent – and constraints – of a cyber catastrophe.

Testing correlation structures

We propose to explore the correlation structures that would enable multiple losses from a wider range of cyber scenarios. We have identified a list of candidate scenarios representing different mechanisms of loss and potential to impact large numbers of organizations and are currently exploring which would be of most interest to our community. We propose to develop additional scenarios as resources permit.

Critical infrastructure

One of the major areas of societal concern is the potential for cyber attacks on critical infrastructure. A scenario of cyber loss to the US power grid is currently under development, with a similar study on the UK power grid planned as a next step. The project explores correlation constraints and how the scale of event may depend on the resources and capability of perpetrators. The project incorporates insurance exposure to cyber attacks on critical infrastructure.

Insurance accumulation

The growing market for cyber insurance is currently constrained by insurers’ ability to estimate their probable maximum losses and to define accumulation limits for their exposure. In 2015, we propose to explore PML estimation and accumulation techniques for cyber insurance portfolio management.

Cyber event historical catalogue

The assessment of cyber risk would be improved with better data on historical cyber events. The Centre proposes to build out a more extensive database of historical events, tracking losses and economic consequences of cyber events and IT errors.

Multiple stakeholders in improving cyber safety

The research on cyber catastrophe risk proposes to explore how the risk to society can be managed better, and how the roles of different stakeholders could be optimized. Different stakeholders are involved and there are a variety of approaches to making society safer, including applying regulation, relying on enterprises investing and taking measures to protect themselves, improving the role of the security consultant industry, government security services and counter-cyber forces, insurance and financial incentives to change behaviour. The complexity of the interaction of different stakeholders increases with state-backed cyber forces, and the extension of cyber interventions as a foreign policy instrument and an instrument of proto-warfare. We propose to play an active role in the thought leadership around the societal cyber risk management.

Attendees

Members of the Advisory Board

Russell Bean



Head of Financial Institutions Underwriting, Talbot Underwriting Ltd.

Russell started his career at the Sun Alliance and between 1994 and 2002 he underwrote Professional and Financial Lines before becoming the worldwide FI product leader. He is currently the Head of Financial Institutions at the Talbot Syndicate where he oversees all aspects of the division. He is ACII qualified and sits on a number of market committees, including chairing the LMA FI panel.

Nick Beecroft



Head of Emerging Risks & Research, Lloyd's

Nick Beecroft is Manager, Emerging Risks and Research at Lloyd's. His team is responsible for providing foresight and actionable analysis on emerging risks, working with partners in the research community to provide forward-looking insight and to reduce uncertainty concerning new and rapidly changing risks. Key outputs are thought leadership reports, scenarios for stress-testing and insight to inform innovation strategy. Before joining Lloyd's, Nick spent the majority of his career as an Intelligence Officer in the Royal Air Force. Appointments included attachments to central government in a counter-terrorism role and to the British Army, where he was responsible for operational planning and mentoring of local forces on deployed operations.

Dr Siddhartha Dalal



Chief Data Scientist and Senior VP of Advanced Research and Technology, AIG

Siddhartha Dalal is the Chief Data Scientist and Sr. VP of Advanced Research and Technology at AIG focusing on technologies and research that have the potential to transform the insurance industry. As an integral part of this strategy, he concentrates on creating partnerships with external research institutions to identify key new research areas that can help AIG leapfrog the industry. He is also a member of the US Army Science Board and an Adjunct Professor at Columbia University teaching Data Mining and Machine Learning.

Prior to AIG, he was the CTO at RAND Corporation where he helped spinoff a risk analytics company, Praedicat Inc., in the casualty space. Sid's industrial research career began at Math Research Center at Bell Labs and Bellcore where he was the Chief Scientist and Executive Director. This was followed by a career at Xerox as the Vice President of Research in charge of its worldwide imaging and software services research, which resulted in the transformation of Xerox to a services company.

Recipient of several honors including Fellow of the American Statistical Association and Bellcore, Rochester Distinguished Scholar Medal, and best paper awards from ASA, ASQ and IEEE, Sid has co-authored over 100 peer-reviewed publications, patents and monographs covering the areas of medical informatics, risk analysis, image processing, stochastic optimization, data/document mining, software engineering and Bayesian methods. He has also made contributions to the area of sensors and sensor networks. Sid holds a B.S. from the University of Bombay and an MBA and Ph.D. from the University of Rochester.

Jason Futers



Head of Emerging Risk Innovation, Senior Vice President, RMS

Jason runs RMS' Emerging Risk Innovation group, responsible for the development of solutions to emerging risks, and the identification and incubation of emerging markets. Jason is responsible for the growth of key markets and territories, including RMS' LifeRisks business, and serves as Chief Executive Officer of RMS' subsidiary in Japan.

Jason has lived and worked in the UK, US and Japan, beginning his risk management career managing the reinsurance portfolio for a US-based medical insurer. Prior to RMS, Jason also worked for a UK fund manager and for a Cambridge technology company.

Anna-Marie Greenaway



VP Science and Technology, BP-Cambridge

Anna-Marie Greenaway is BP's senior representative at the University of Cambridge and leads the strategy for the joint strategic relationship encompassing research to support BP's global operations, recruitment, executive education and international research partnerships. She is a member of the Board of the BP Institute and sits on the Advisory Board of the Scott Polar Institute and the Clean Energy Centre at Tsinghua University, Beijing.

Previously, Anna-Marie spent four years in BP's Group Strategy team where she led the 2030 Energy Pathways research programme covering the US, EU, China, India and Brazil. This involved bringing together local, international and multi-disciplinary teams from across BP and incorporating external perspectives from wider industry sectors, government bodies and leading academics.

Earlier roles at BP have spanned special assignments to support Group Technology and Safety & Operations, Head of Downstream Change Leadership Capability and leading the Technical & Commercial Partnership between BMW & Castrol across Western Europe. Prior to BP, Anna-Marie's spent ten years in Retail operations, advertising and corporate communications with Exxon after joining their graduate programme in 1989 as a capital investment analyst.

Dr Sven Heiligtag



Principal, McKinsey & Company

Sven is a Partner in McKinsey & Company's Hamburg office. Sven is a leader in McKinsey's Risk Management Practice as well as in the Electric Power & Natural Gas Practice. He is responsible for all Corporate Risk topics and is leading our energy trading and risk management survey in Europe.

He has deep experience in advising clients in the energy and natural resources industries on challenges in risk management, corporate finance, strategy and organization.

Sven has a master's degree and a PhD in Chemistry from the University of Hamburg.

Dr Michael Maran



Chief Science Officer, Catlin

Dr Michael Maran graduated from St Catharine's College, Cambridge in 1983 with a bachelor's degree in Natural Sciences (having studied the biological and geological sciences) and subsequently a master's degree and PhD in Astrophysics from Queen Mary College, University of London. He is an ACII qualified Chartered Insurer with 30 years of experience in the insurance industry, and a Fellow of the Royal Astronomical Society. Mike joined the Catlin Group in 2002 and spent 10 years as Underwriter for the Space account. In 2012, he was appointed as the Catlin Group's Chief Science Officer, and is also chairman of the Group's Emerging Risks Committee.

In this new role, Mike works with Catlin underwriters, risk modellers, actuaries and other employees to improve Catlin's risk assessment capabilities by reviewing the scientific aspects of risks. He also identifies new underwriting opportunities for Catlin created by scientific progress, and he serves as an advisor for various Catlin activities that are related to science, such as the current Catlin Seaview Survey.

Dr Rainer Sachs



Head of Group Accumulation and Emerging Risks, Munich Re

Dr Rainer Sachs heads the Group Accumulation and Emerging Risks team at Munich Re's Integrated Risk Management division, developing risk identification and quantification tools for Munich Re's global business operations. Before joining Munich Re, Rainer Sachs was working in the Credit Risk Management division at Unicredit. During his more than 10-year career in risk management, he has held various positions in financial and insurance risk management, both in Germany and Australia. Rainer Sachs's current research interests focus on modelling complex risks in insurance and the human factor in decisions under uncertainty. He holds a PhD from the University of Munich/Max-Planck-Institute for extraterrestrial Physics and a Master in cosmology from the Technical University of Munich/University of Pune (India).

Dr Paul Sanderson



Deputy Head, Economic Performance and Environment, Economic and Social Research Council

Dr Paul Sanderson leads on economics at the Economic and Social Research Council (ESRC), where he is also responsible for developing academic engagement with the financial services sector. Paul has been with the ESRC since 2009. He began his career as an academic economist but has subsequently held senior roles in research, risk management and business planning in a variety of positions in both the private and public sectors: these include posts held at the Bank of England, HM Treasury, Barclays and Nationwide.

Alan Smith



Global Head of Risk Strategy and Chief of Staff, Global Risk, HSBC Holdings PLC

Alan Smith is Chief of Staff and Global Head of Risk Strategy within the Global Risk function at HSBC where he is responsible for overseeing the Risk Appetite, Risk Governance, Risk Measurement, Scenario Stress Testing and Pension Risk infrastructures for the Group, leading a global team of 300 staff. Alan is a member of the Global Risk Management Board which oversees the running of the Risk function of 30,000 plus people across the globe.

Alan has worked with HSBC for 19 years in a variety of senior finance, risk and capital management roles in the Group Management Office, in London and the Middle East. Prior to his current role, Alan was Group Head of Economic Capital from 2005 to 2007 and before that Head of Global Finance for HSBC's Corporate Investment Banking and Markets Division, where he was a member of its ALM and Operational Risk Management Committees. Alan worked with KPMG London from 1987 to 1994, latterly within its Financial Sector Advisory practice, advising global financial institutions on capital, risk and accounting.

Alan started his career with PwC in Barbados. Alan is a Fellow of the Institute of Chartered Accountants of England and Wales and has an MBA in Finance from Cass Business School, City University in London which he attended as a Commonwealth Scholarship winner. He completed his undergraduate degree at the University of the West Indies in Jamaica.

Matthew Swibel



Director of Corporate Sustainability, Lockheed Martin

Matt directs sustainability strategy, reporting and stakeholder engagement at Lockheed Martin Corporation, which under his tenure was added to the Dow Jones Sustainability Index and became the top-ranked Aerospace & Defense prime contractor named to CR Magazine's 100 Best Corporate Citizens list. He led Lockheed Martin's inaugural report in 2012, and its first core issues assessment, formal stakeholder summits and GRI-based report in 2013. He reports to the corporate vice president - Ethics & Sustainability, and sits on the Corporate Sustainability Council, which oversees ethics & business conduct, diversity & inclusion, and sustainability policy & performance.

From 2008 to 2012, Matt was Director of Enterprise Communications, where he led a team supporting the CFO, Executive Office of the Chairman and other corporate officers. In this role, he developed and planned multiple aspects

of integrated communications including employee and supplier engagement, advertising and outreach to investors and financial/environmental media. Matt spent almost a decade as a journalist, most recently as Associate Editor of Forbes, where he co-edited the World Billionaires issue and was recognised by the Overseas Press Club for his business reporting from abroad. Prior to Forbes, he was a staff reporter at Washington Business Journal, where his coverage of marketing and web-based political fundraising each earned Maryland-DC-Delaware and Virginia Press Association awards. He taught as an adjunct professional lecturer at American University's School of Communication from 2005 to 2008. Matt graduated cum laude from American University (DC) with degrees in Communications and Sociology and earned an MBA from the University of Maryland. He is an independent director of Cornerstone Capital.

Attendees

Executive Committee of the Cambridge Centre for Risk Studies

Professor Danny Ralph



Academic Director, Cambridge Centre for Risk Studies

Professor Danny Ralph is a Founder and Director of the Centre for Risk Studies, Professor of Operations Research at Cambridge Judge Business School, and a Fellow of Churchill College.

Danny received his PhD in 1990 from the University of Wisconsin Madison. He was a faculty member of the Mathematics & Statistics Department at the University of Melbourne before coming to Cambridge University for a joint appointment in the Engineering Department and Cambridge Judge Business School.

Danny's research interests include: risk in business decision making; risk aversion in electricity markets; methods and models for optimisation problems and equilibrium systems. Specific projects undertaken in collaboration with the banking and insurance industry (Catlin, HSBC, ICBC, Lloyd's, Munich Re, Risk Management Solutions, Swiss Re) cover emerging risk scenarios, financial stress testing and a global ranking of cities by risk exposure. Engagements with other sectors include electricity consultancies (Artelys, LCP), oil and gas (Shell Exploration, Statoil) and retail (BT Retail, Gap) on decision making under high uncertainty. Public service contributions to the UK Cabinet Office, UK Industry and Parliamentary Trust, UK Office of the Government Chief Scientific Advisor, and United Nations World Humanitarian Summit.

Professor Ralph is a member of the Australian Mathematical Society, INFORMS, the Mathematical Optimization Society and SIAM. He was Editor-in-Chief of Mathematical Programming (Series B) from 2007-2013 and has served on the editorial boards of Mathematics of Operations Research and the SIAM Journal on Optimization, as well as the SIAM-MPS book series on optimisation.

Dr Michelle Tuveson



Executive Director, Cambridge Centre for Risk Studies

Dr Michelle Tuveson is a Founder and Executive Director at the Cambridge Centre for Risk Studies hosted at the University of Cambridge Judge Business School. Her responsibilities include the overall executive leadership at the Centre. This includes developing partnership relationships with corporations, governments, and other academic centres. Dr Tuveson leads the Cambridge CRO Council and she chairs the organising committee for the Cambridge Risk Centre's Annual Risk Summits. She is one of the lead organisers of the Aspen Crisis and Risk Forum. She is an advisor to the World Economic Forum's 2015 Global Risk Report and a contributor to the Financial Times Special Report on Risk Management. She is also an advisor to a number of corporations and boards as well as a frequent conference speaker.

Dr Tuveson has worked in corporations within the technology sector with her most recent position in the Emerging Markets Group at Lockheed Martin. Prior to that, she held positions with management strategy firm Booz Allen & Hamilton, and U.S. R&D organisation MITRE Corporation. Dr Tuveson's academic research focusses on the application of simulation models to study risk governance structures associated with the role of the Chief Risk Officer. She was awarded by the Career Communications Group, Inc. as a Technology Star for Women in Science, Technology, Engineering and Maths (STEM). She earned her B.S. in Engineering from the Massachusetts Institute of Technology, M.S. in Applied Math from Johns Hopkins University, and PhD in Engineering from the University of Cambridge. She is a member of Christ's College Cambridge.

Dr Andrew Coburn



Director of Advisory Board, Cambridge Centre for Risk Studies

Dr Andrew Coburn is the Director of Advisory Board at the Cambridge Centre for Risk Studies. Andrew is Senior Vice President at Risk Management Solutions, the leading provider of catastrophe risk models to the insurance industry. Andrew is the principal coordinator of the research programme on 'System Shock' at the Centre.

Andrew is one of the leading contributors to the creation of the class of catastrophe models that over the past 20 years has come to be an accepted part both of business management in financial services and of public policy making for societal risk. He has extensive experience in developing models and using them for business decision support. Andrew has also provided research inputs into government policy, such as House of Congress legislation on terrorism risk management policy and urban planning for disaster mitigation in Mexico, Metro Manila, and Southern Italy.

Simon Ruffle



Director of Technology Research & Innovation, Cambridge Centre for Risk Studies

Simon Ruffle is researching a common framework for analysing complex global systemic risk. He coordinates research in the Centre through a unified modelling software platform, a common database architecture and information interchange standards. He is developing methods for storing and applying the Centre's Stress Test Scenarios and other Risk Assessment Tools to macro-economic analysis and investment portfolio impact. He is researching how network theory can be applied to understanding the impact of catastrophes in a globalized world, including supply chains, insurance and banking.

He is involved in specific threat topics, and currently is leading the Centre's cyber threat research track. He is a member of the Centre's Executive Team and manages several external sponsor relationships

Originally studying architecture at Cambridge, Simon has spent most of his career in industry, developing software for natural hazards risk. He has worked on risk pricing for primary insurers, catastrophe modelling for reinsurers, and has been involved in placing catastrophe bonds in the capital markets. He has many years of experience in software development, relational databases and geospatial analysis and has worked in a variety of organisations from start-ups to multinationals.

Attendees

Academic Advisors and Guest Attendees

Brad Fischtrom



Managing Director, Head of Scenario Development and Stress Testing, AIG Property Casualty

Brad Fischtrom is Managing Director, Head of Scenario Development and Stress Testing for AIG Property Casualty. He is accountable for designing, quantifying and reporting realistic disaster scenarios and regulatory-driven stress tests as part of AIG's Enterprise Risk Management (ERM) framework. Brad's team is also responsible for innovation in the areas of emerging risk management and development of data and risk measurement tools for insurance risk aggregation. Prior to joining AIG in 2010, he has held positions at Towers Watson and Aon Risk Services.

Brad holds a Bachelor of Science Degree in Finance from the University of Richmond Robins School of Business, and he is an Associate in Risk Management (ARM) and Chartered Property Casualty Underwriter (CPCU).

Matthew Grant



Group Executive, Global Client Development

Matthew is responsible for RMS' worldwide sales, model product strategy, capital markets, emerging markets and corporate marketing. Matthew founded the RMS European office in 1996, and has been a leading advocate for the use of catastrophe modeling and risk assessment within the insurance and reinsurance markets since 1992. Prior to joining RMS, Matthew was involved in risk assessment and emergency planning for the nuclear, chemical, and offshore industries. He holds a degree in mechanical engineering.

Professor Stelios Kavadias



Director of Research, Judge Business School, and Margaret Thatcher Professor of Enterprise Studies in Innovation & Growth

Professor Kavadias is Director of Research and Margaret Thatcher Professor of Enterprise Studies in Innovation and Growth at Cambridge Judge Business School and oversees the research activities across the Centres of the Business School. Stelios is a member of the Operations subject group and his research interests cover the effectiveness of new product development (NPD) decisions with a particular focus on the decisions that concern: (i) the strategy implementation through the appropriate resource allocation rules and the definition of the "right" portfolio of new projects and products; (ii) the R&D ideation, search and experimentation process both at a firm level and the project team level; (iii) the effects of the organisational design and the associated incentive schemes on the product development outcome. At a broader level, he is seeking to understand the challenges that arise during the planning and execution phases of the innovation process, always with an operational/managerial perspective.

Previously Professor Kavadias was the Steven A. Denning Professor of Technology & Management, as well as an Associate Professor of Operations Management, at the College of Management at Georgia Tech. He has also been a Batten Fellow at the Batten Institute of Innovation and Entrepreneurship at the Darden School of Business.

Current Team and Resources at the Centre for Risk Studies

Executive Team

Professor Daniel Ralph, Academic Director

Dr Michelle Tuveson, Executive Director

Dr Andrew Coburn, Director of External Advisory Board

Simon Ruffle, Director of Technology Research & Innovation

Research Team

Dr Scott Kelly, Senior Research Associate

Scott leads the macroeconomic modeling and catastrophics studies at the Centre, and oversees the financial catastrophe research. Scott also holds a research post in the Centre for Climate Change Mitigation Research (4CMR).

Éireann Leverett, Senior Risk Researcher

Éireann is managing cyber risk research projects at the Centre. He conducts research that focuses upon technological disasters and the economic impacts of computer security failures or accidents.

Dr Louise Pryor, Senior Risk Researcher

Louise is Senior Risk Researcher working on the Cambridge Risk Framework. She is also an independent consultant on risk and software development. Louise is researching financial and networking risk models at the Centre.

Dr Olaf Bochmann, Research Associate

Olaf works on the financial catastrophe modelling research at the Centre, where he is responsible for the development of the model of the global financial system. Olaf has experience in agent-based modeling of contagion.

Jennifer Copic, Research Assistant

Jennifer's research is on financial and organisational networks. She holds a BS in Chemical Engineering from the University of Louisville and a MS in Industrial and Operations Engineering from the University of Michigan.

Jaclyn Zhiyi Yeo, Risk Researcher

Jaclyn works on macroeconomic modelling and systemic shocks, and recently graduated with an MPhil from the University of Cambridge in Sustainable Development.

Dr Duncan Needham, Risk Researcher

Duncan works on financial history for the Centre. Duncan is also Director of the Centre for Financial History at the University of Cambridge and a Research Fellow at Darwin College, Cambridge.

Tamara Evan, Editorial Associate

Tamara is the Editorial Associate for the Centre for Risk Studies and oversees the completion, production and final delivery of the Centre's research publications and risk scenario reports.

Ganchi Zhang, Risk Affiliate

Ganchi Zhang is currently working towards the Ph.D. degree in the Signal Processing and Communications Laboratory at the University implementing Bayesian modelling for the Centre's studies.

Associates

Dr Fabio Caccioli, Research Affiliate

Dr Andrew Skelton, Research Affiliate

Lee Coppack, Senior Advisor, Insurance & Risk Media

Diane Lanigan, Social Media Strategy Manager

Andrew Freeman, Risk Fellow

Dr Alan Punter, Research Affiliate

Dr. Andrew Chaplin, Research Affiliate

Administration

Crystal Mbanefo, Events and Operations Manager

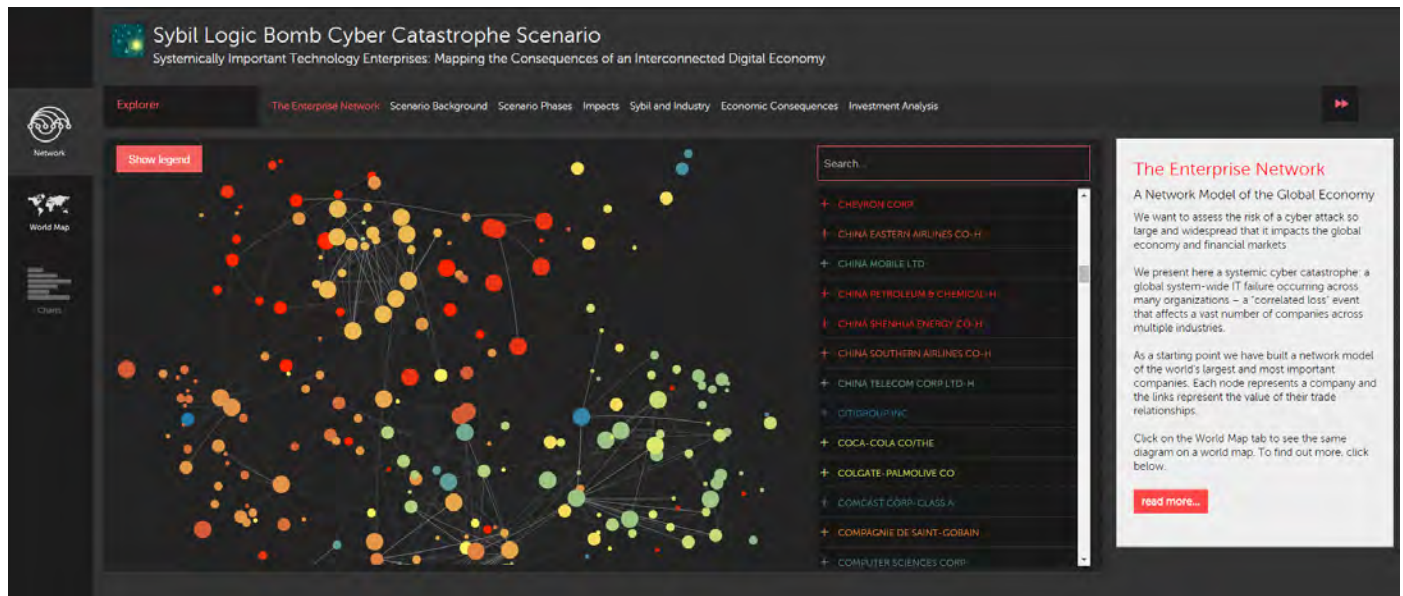
2015 Planned Event Calendar for the Cambridge Centre for Risk Studies

15 January	<p>Cambridge CRO Council "Leading Ideas in Risk" Roundtable, Lansdowne Club, London <i>Through the Financial Crime Lens: Impacts and Risks to the Global Economy</i></p> <p>Globalisation has increased opportunities for the globalisation of crime as evident within the financial crime arena. This has posed big challenges for businesses. This roundtable will be comprised of senior risk executives from a variety of sectors within the financial services industry to allow for a broad-based discussion.</p>
22 January	<p>Social Unrest Risk Briefing, Leadenhall Street, London</p> <p>Defining a Risk Test Scenario for managing the business risks posed by youth uprisings and political instability.</p>
19 February	<p>Geopolitical Conflict Risk, Leadenhall Street, London</p> <p>Defining a Risk Test Scenario for managing the business risks posed by war and territorial disruption.</p>
Deadline: 3 March	<p>The 2015 Cambridge - McKinsey Risk Prize</p> <p>The Centre for Risk Studies, in conjunction with McKinsey & Company, is pleased to announce the 2015 annual risk prize. An award will be made for the best submission on risk management by a current student at the University of Cambridge Judge Business School.</p>
12-17 Apr	<p>Executive Education in Risk Management: Aspiring Chief Risk Officer Programme</p> <p>Delivery of a leading edge programme for risk professionals covering salient and timely topics based on the Centre's external engagements with risk experts across a wide range of sectors and institutions.</p>
22-23 June	<p>Cambridge Centre for Risk Studies 6th Annual Meeting, Cambridge Judge Business School</p> <p>Cambridge Centre for Risk Studies will bring together leaders and decision makers from businesses, governments, intergovernmental organisations, academia and NGOs to explore salient topics in risk management. The summit will be held at the University of Cambridge Judge Business School, followed by a conference dinner at one of the University colleges.</p> <p>This year's summit theme will be 'Risk Testing: Stressing the Boundaries', and will explore the construct and application of stress testing in business management and financial planning.</p>
July	<p>Aspen Crisis and Risk Forum, Aspen, CO</p> <p>Cambridge Centre for Risk Studies with its partners in business and academia will address governance issues faced by boards. This forum explores the growing demands on directors to make risk management among their top priorities.</p>

2014 Centre for Risk Studies Research Outputs

Sybil Logic Bomb Cyber Catastrophe Scenario Digital Exploration Tool, November 2014

Systemically Important Technology Enterprises: Mapping the Consequences of an Interconnected Digital Economy
 Now live at: <http://sybil.cambridgeriskframework.com/>



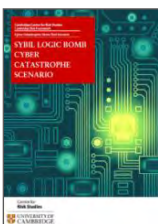
Published Works



Emerging Risks: **China-Japan Geopolitical Conflict Stress Test Scenario**

Bowman, G.; Caccioli, F.; Coburn, A.W.; Kelly, S.; Ralph, D.; Ruffle, S.J.; Foulser-Piggott, R.; 2014, **Stress Test Scenario: China-Japan Conflict**

This report provides a review of geopolitical conflict as a threat to modern business, and a stress test scenario of a conflict in Southeast Asia for use in business and policy-making.



Emerging Risks: **Sybil Logic Bomb Cyber Catastrophe Stress Test Scenario**

Ruffle, S.J.; Bowman, G.; Caccioli, F.; Coburn, A.W.; Kelly, S.; Leslie, B.; Ralph, D.; 2014, **Stress Test Scenario: Sybil Logic Bomb Cyber Catastrophe**

This report provides a risk framework for considering systemic cyber threats and a stress test scenario of a cyber catastrophe for use in business and policy-making.



Emerging Risks: **São Paulo Virus Pandemic Stress Test Scenario**

Coburn, A.W.; Bowman, G.; Caccioli, F.; Chang, M.; Kelly, S.; Ralph, D.; Ruffle, S.J.; 2014, **Stress Test Scenario: São Paulo Virus Pandemic**

Infectious diseases continue to pose a major societal threat. This report proposes a stress test scenario of a pandemic for use in business and policy-making.



Emerging Risks: **Millennial Uprising Social Unrest Stress Test Scenario**

Bowman, G.; Caccioli, F.; Coburn, A.W.; Hartley, R.; Kelly, S.; Ralph, D.; Ruffle, S.J.; Foulser-Piggott, R.; Wallace, J.; 2014, **Stress Test Scenario: Millennial Uprising Social Unrest Scenario**

This report proposes a stress test scenario of a widespread uprising, fueled by youth unemployment, for use in business and policy-making.

Working Papers

Ebola Contingency Scenario



Kelly, S.; Coburn, A.W.; ***Ebola Contingency Scenario: Analysis of Economic Impact of Upper Bound Ebola Projections for US and Europe – Cambridge ‘Contingency’ Scenario developed for business preparedness planning***; Working Paper 201411.01; Cambridge Risk Framework series

This working paper presents a ‘Contingency’ scenario for the economic impact of possible Ebola outbreaks in the United States and Europe, based on upper bounds of published epidemiological projections from the West Africa epidemic of 2014. This scenario is offered as a contribution to improving business resilience.

Financial Catastrophe: Asset Bubble Collapse Stress Test Scenario (expected April 2015)

Financial Catastrophe: Sustained High Inflation Stress Test Scenario (expected April 2015)

Financial Catastrophe: Sovereign Default Crisis Stress Test Scenario (expected April 2015)

Financial Catastrophe: De-Americanization of the Financial System Stress Test Scenario (expected April 2015)

Cambridge Risk Atlas: World City Risk 2025 (in collaboration with Lloyd’s)

Press Features

Business Insurance: “**Catastrophe modelers developing cyber risk technologies to assess exposures**”, Bill Kenealy, 4 January 2015

Reuters and The New York Times: “**Risk modelers look to clarify cyber risk costs**”, Luciana Lopez, 19 December

The Actuary: “**Cyber Catastrophe**”, Andrew Coburn, Simon Ruffle and Louise Pryor, 4 December

Insurance Linked: “**Perspectives - Dr Andrew Coburn, Cambridge University, Centre for Risk Studies**”, 1 December

The Telegraph: “**Stress-testing the world economy for pandemics, cyber-attacks and war**”, Marion Dakers, 24 November

Business Weekly: “**Cambridge Stress Test series covers pandemics to cyber sabotage**”, Kate Sweeney, 21 November

Cambridge Judge Business School: “**Cambridge Stress Test Series’ launched with four timely risk reports**”, 20 November

Business Reporter: “**Interconnectivity of economic risk: Our global financial system as a living organism**”, Andrew Coburn, 11 November

Post Online: “**Ebola virus: Ebola survival guide**”, Francesca Nyman, 18 November

“**The circulatory system of finance**”, Andrew Coburn, 24 October

“**Ebola ‘fear’ threatens to cause disruption in developed countries**”, Francesca Nyman, 30 October

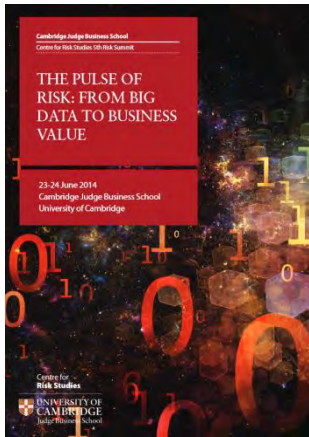
InsuranceREM: “**Catastrophe models for the 21st century**”, Christopher Cundy, 2 October

BNA: “**Hypothetical scenarios of cyber security catastrophes might aid insurance companies**”, Ali Qassim, 27 May

Financial Times: “**Diversity is the way to avoid cyber collapse**”, Michelle Tuveson and Simon Ruffle, 24 April

Lloyd’s: “**Cassandras and catastrophics**”, 25 March

Cambridge Centre for Risk Studies 6th Risk Summit 22 & 23 June 2015



2014 Risk Summit proceedings

Risk Testing: Stressing the Boundaries

University of Cambridge Judge Business School

Meeting Overview

From 22-23 June 2015, the Cambridge Centre for Risk Studies will bring together leaders and decision makers from businesses, governments, intergovernmental organisations, academia and NGOs to explore salient topics in risk management. The summit will be held at the University of Cambridge Judge Business School, followed by a conference dinner at one of the University colleges.

This year's summit theme will be "**Risk Testing: Stressing the Boundaries**", and will explore the construct and application of stress testing in business management and financial planning.

Agenda

The agenda for the 2015 Risk Summit is currently in development. Proposals for eminent speakers are welcomed. Please refer to Dr Michelle Tuveson, Executive Director. Registration opens March 2015.

For further details see the event page: <http://www.risk.jbs.cam.ac.uk/news/events/risksummits/risksummit2015.html>

Last Year's Risk Summit

June 2014 - "The Pulse of Risk: From Big Data to Business Value"

Last year's summit theme explored implications of "Big Data" and its opportunities and risks to businesses. The democratisation of information access has provided enormous opportunities for individuals and organisations while creating growing debate on its consequential use. Big data holds potential for research, innovation and productivity, while posing complex questions of ownership, value, aggregation, and the broader benefits to society.

Proceedings, speakers and photos of the event:

www.risk.jbs.cam.ac.uk/news/events/risksummits/risksummit2014.html



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Centre for
Risk Studies



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