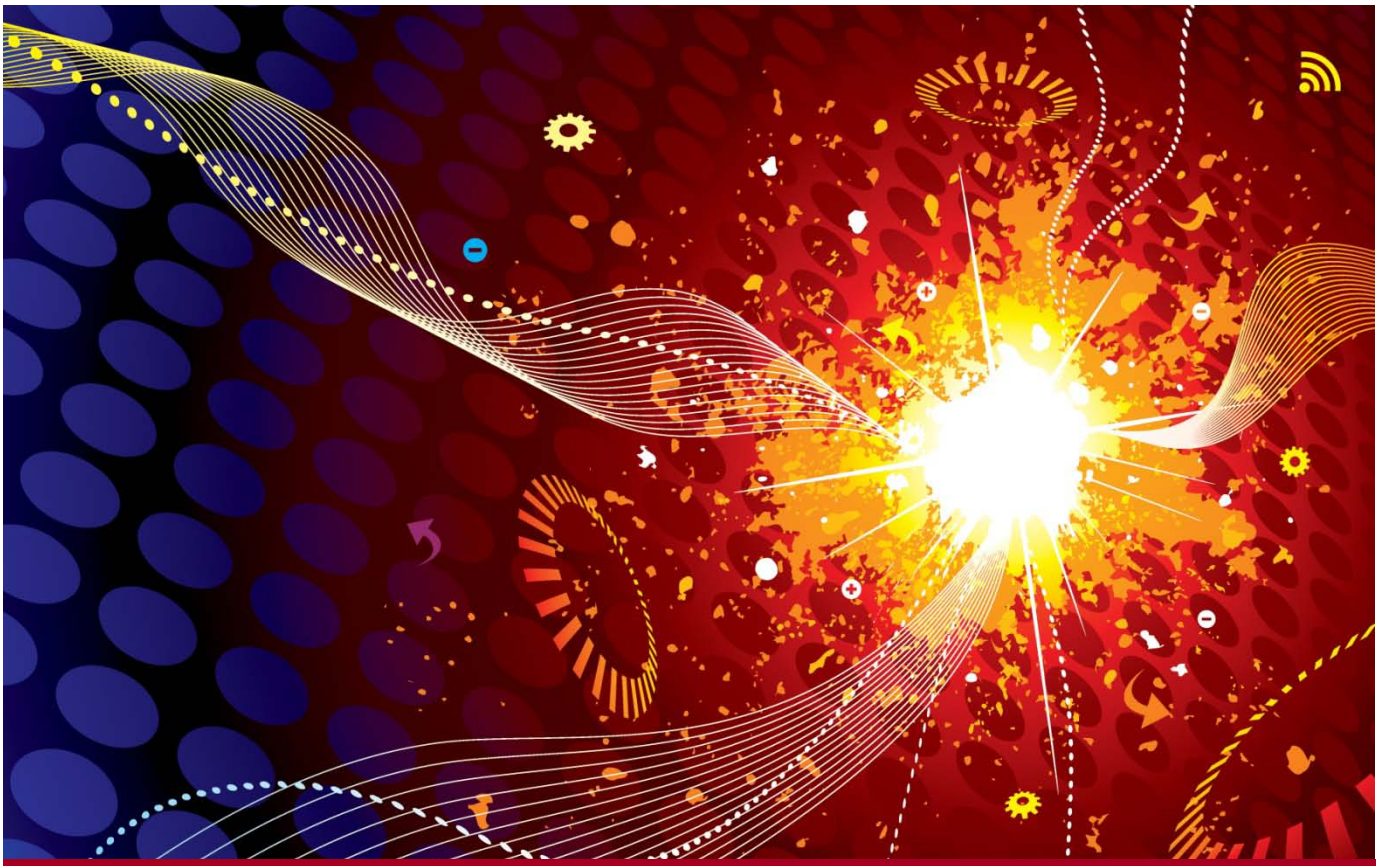
Centre for
Risk Studies

UNIVERSITY OF CAMBRIDGE
Judge Business School



Cambridge Centre for Risk Studies Advisory Board Meeting

Thursday 23 January, 2014
University of Cambridge – Judge Business School

Centre for
Risk Studies

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Participants at the Cambridge Centre for Risk Studies Advisory Board Meeting

Executive Team at the Cambridge Centre for Risk Studies

Professor Danny Ralph, Academic Director, Cambridge Centre for Risk Studies
Dr Michelle Tuveson, Executive Director, Cambridge Centre for Risk Studies
Dr Andrew Coburn, Director of the External Advisory Board, Cambridge Centre for Risk Studies and Senior Vice President, RMS
Simon Ruffle, Director of Technology Research, Cambridge Centre for Risk Studies

Members of Advisory Board

Phil Brice, Corporate Risk Manager, Treasury, BP
Dr Mike Maran, Chief Science Officer, Catlin
Marco Moretti, Associate Principal, McKinsey & Company
Peter Nakada, Managing Director, RMS
Professor Tso-Chien Pan, Professor and Executive Director, Institute of Catastrophe Risk Management, Nanyang Technological University, Singapore
Dr Rainer Sachs, Head of Group Accumulation and Emerging Risks, Munich Re
Dr Paul Sanderson, Deputy Head, Economic Performance and Environment, Economic and Social Research Council
Alan Smith, Global Head of Risk Strategy and Chief of Staff, Global Risk, HSBC
Matthew Swibel, Director, Corporate Sustainability, Lockheed Martin
Dickie Whitaker, Director, Financial Services Knowledge Transfer Network

Academic Advisors and Guest Attendees

Andrew Freeman, , Risk Fellow, Cambridge Centre for Risk Studies & Managing Director, Cambridge Research Associates Ltd
Professor Stelios Kavadias, Director of Research, Judge Business School, and Margaret Thatcher Professor of Enterprise Studies in Innovation & Growth
Professor Frank Kelly, Professor of the Mathematics of Systems, Statistical Laboratory, University of Cambridge, and Master of Christ's College, Cambridge
Professor Edmond Lo, Deputy Director, Institute of Catastrophe Risk Management, Nanyang Technological University, Singapore and Associate Professor, School of Civil and Environmental Engineering
Professor John Rees, Risk Research Coordinator, UK Research Councils (RCUK)
Professor David Spiegelhalter, Winton Professor for the Public Understanding of Risk, University of Cambridge

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Meeting of the Advisory Board of **Cambridge Centre for Risk Studies**

Date: Thursday 23 January 2014; 2pm to 6pm

Meeting Location: University of Cambridge Judge Business School
Trumpington Street, Cambridge CB2 1AG

Board Dinner: Peterhouse College, 7 pm for 7:30 pm
Trumpington Street, CB2 1RD

Event Overview:

Members of the Advisory Board of the Cambridge Centre for Risk Studies are invited to provide guidance to the executive committee on calibrating the Centre's research agenda priorities for the forthcoming year and beyond. The meeting will comprise a review of recent progress in the research activities of the Centre and a discussion of next year's research priorities.

The Centre for Risk Studies focuses on impact-oriented research relating to the analysis, assessment, and mitigation of business and societal risks. Research activities have a common theme of the interaction of complex systems and catastrophe risk. A major part of the ongoing research programme is the development of the Cambridge Risk Framework – a structure for improving the resilience of modern international corporations by understanding the global landscape of risk and exploring how it affects the interconnections of their international business.

The past year has seen the research activity of the Centre grow significantly. The taxonomy of macro-catastrophe threats first published by the Centre in 2011 has been refined and adopted by a growing community of users. A number of emerging risk threat categories have been explored, including geopolitical conflict, human pandemic risk, cyber catastrophe, and social unrest, and these have been developed into scenarios for use in stress testing and improving risk resilience. Techniques have been developed for assessing their impacts on physical and networked assets, macroeconomics and investment portfolios. The research track on resilience of supply chain networks has progressed with exploration of quantitative modelling. The year also marks the commencement of our new research programme into financial catastrophe risk.

Objectives:

The objective of the Advisory Board meeting is to review current research activities, provide advice on priorities for next year's research agenda, and help set the longer term objectives.

Members of the Advisory Board are requested to provide guidance on strategy, research activities, industry and academic contacts, and suggestions for pursuit of research activities.

Research Showcase Agenda

Research Showcase - Thursday 23 January 2014

Venue: Castle Teaching Room, Judge Business School

09:00	**Registration and Coffee**
09:30	**Welcome** *Professor Daniel Ralph, Academic Director, Centre for Risk Studies*
09:40	**Overview of CRS Research Agenda 2014** *Dr Andrew Coburn, Director of the External Advisory Board, Centre for Risk Studies*
10:00	**Scenarios for risk management: Example of Geo-Political Conflict** *Dr Gary Bowman, Research Associate, Centre for Risk Studies*
10:45	Questions and discussion
11:00	Coffee Break
11:15	**Macroeconomic modelling, international connectivity and enterprise networks** *Dr. Scott Kelly, Research Associate, Centre for Risk Studies*
11:35	**A research framework for complex risks: Example of cyber catastrophe risk** *Simon Ruffle, Director of Technology Research, Centre for Risk Studies*
11:55	**Understanding financial catastrophe risk** *Dr. Fabio Caccioli, Research Associate, Centre for Risk Studies*
12:15	**Summary discussion** *Professor Daniel Ralph, Academic Director, Centre for Risk Studies*
12:45	End
13:00	Lunch

Advisory Board Meeting Agenda

Advisory Board Meeting - Thursday 23 January 2014

Venue: Castle Teaching Room, Judge Business School

14:00 **Welcome and Introductions**
Dr Andrew Coburn, Director of External Advisory Board, Cambridge Centre for Risk Studies

14:30 **Report on Past Year's Activities**
Dr Michelle Tuveson, Executive Director, Cambridge Centre for Risk Studies

Research Development Strategy
Professor Daniel Ralph, Academic Director, Cambridge Centre for Risk Studies

15:00 **Discussion Topic: Centre Development Strategy**
Balance of Engagement, Research, and Academic Output: What should be the relative balance of emphasis and focus of the Centre over the next few years?

15:30 Coffee and Tea

16:00 **Research Themes 1 & 2**
Research Theme 1: Global Complex Risk Landscape
Dr Andrew Coburn, Director of External Advisory Board, Cambridge Centre for Risk Studies

Research Theme 2: Understanding Complex Business Exposure
Simon Ruffle, Director of Technology Research, Cambridge Centre for Risk Studies

Discussion Topic – Research Themes 1 and 2

16:40 **Research Themes 3 & 4**
Research Theme 3: Financial Catastrophe Risk
Dr Andrew Coburn, Director of External Advisory Board, Cambridge Centre for Risk Studies

Research Theme 4: Resilient International Supply Chains
Professor Daniel Ralph, Academic Director, Cambridge Centre for Risk Studies

Discussion Topic – Research Themes 3 and 4

17:20 **Research Theme 5 and Research Programme Prioritization**
Research Theme 5: Understanding the threat of Cyber Catastrophe
Simon Ruffle, Director of Technology Research, Cambridge Centre for Risk Studies

Discussion Topic – Research Theme 5 and Research Programme Prioritization
Prioritization and relative importance of the different research themes for resource allocation.

18:00 **Closing Remarks**

19:00 **Advisory Board Dinner**
Peterhouse College, Trumpington Street, Cambridge CB2 1RD

Research Development Strategy

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.

The Executive Team is looking for feedback from the advisors on overall strategy, guidance on prioritisation of different tracks of activity, and tactical suggestions to help with execution of initiatives.

2014 marks the fifth year of operation of the Centre for Risk Studies and sees us engaged in a full programme of research and engagement with industry sponsors, tackling key issues in managing risk faced by businesses today. We have built a vibrant, interdisciplinary research team and are developing new methodologies that will result in high-quality academic output in the years to come.

A Focus on Complex Risk

The Centre for Risk Studies originated in a convergence of interests between research into complex systems, and research into catastrophe risk analysis. Being located in Judge Business School has enabled the Centre to apply these interests to the business community.

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 networks of interrelationships in complex and non-intuitive ways. Complex risk has become more important to international businesses as companies improve productivity through globalized networks and increasingly intricate financial and economic relationships. The management and governance of complex risk has attracted interest and support from several sectors of the business community, including the financial services industry, the energy sector, and major corporations. It has relevance to government policy and is of interest to many thought-leaders and advisors. 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, including the Risk Summits, individual seminars, smaller workshops, and other meetings, in which business leaders and other stakeholders discuss their 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 level 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, growing in activity over the past couple of years (described below). 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 publication. As a business school Centre, the objective is to publish in high quality management journals and elsewhere. The current research programme is intended to produce high quality management science publications.

Discussion Topic: Centre Development Strategy

Balance of Engagement, Research, and Academic Output

The strategy of the Centre for Risk Studies has been to use engagement to develop a research programme, which is intended to generate academic output. The three activity areas compete for resources. Impact and academic prestige are not always easy to reconcile. What should be the relative balance of emphasis and focus of the Centre over the next few years?

Research Programme

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 – the 'Cambridge Risk Framework' – which has been developed at the Centre for Risk Studies to address the issues of complex risk.

Cambridge Risk Framework

The Cambridge Risk Framework is an approach to evaluating complex risk, involving

- Developing a 'Taxonomy of Threats': Understanding the broad spectrum of potential causes of events that could impact an international business process or the global economic system. A threat definition (minimum thresholds of consequences) is used for inclusion, and a systematic approach taken to threat identification through historical and scientific source review. Threats are grouped by cause and categorized hierarchically.
- Compiling a review of the 'state-of-knowledge' for selected threat types by literature review with the identification of a Subject Matter Editor to provide expert insight. Threat evaluation is standardised across threat types by considering the frequency-severity distribution of the global magnitude of threats that can be expected, and benchmarking relative importance by assessing the severity of event with, e.g. 1% annual probability of exceedance – a '1-in-100' event.
- Definition of a scenario for a threat class of interest that illustrates an example of the severity of an event with a benchmark probability (e.g. 1% annual probability of exceedance) for use as a stress test. A scenario consists of a detailed narrative, a timeline, a 'footprint' of geographical, sectoral or other impact, and a standardised data structure for estimating initial impact within the footprint.
- Assessing the impact consequences of the scenarios in how they affect specified categories of assets, liabilities and economic business sectors. This has entailed developing models of how consequences flow through business networks, and macroeconomic and financial systems.
- Representation of global business systems as different networks of activity, using a standardised graph theory representation of networks and imposing a uniform data architecture. Compiling data on the global networks of the macroeconomy enables models and scenarios to be applied.

Research Platform

A cloud-based research platform for the Cambridge Risk Framework has been developed, for data compilation, model development and research output: http://www.CambridgeRiskFramework.com

Research Themes

Research themes explored through the Cambridge Risk Framework are described in more detail in the next pages of this briefing:

1. Global Complex Risk Landscape: Establishing a comprehensive taxonomy of future large scale threats, tracking 'Emerging Risks', and developing stress-test scenarios.
2. Understanding Complex Business Exposure: Compiling data on the interconnectivity of the business world, and exploring their propensity for and vulnerability to cascading failure
3. Financial Catastrophe Risk: Using the Cambridge Risk Framework to explore the stability and potential for cascading failure and phase changes in financial networks
4. Resilient International Supply Chains: Developing metrics of loss, 'efficient resiliency', and benefits of strategic improvements to global supply chains and business relationships.
5. Understanding the threat of Cyber Catastrophe: Developing a more rigorous framework for the evaluation of extreme cyber risk, as one of the most significant threat classes in the taxonomy.

Discussion Topic – Research Programme Prioritization

Prioritization and relative importance of the different research themes for resource allocation.

Research Theme 1: Global Complex Risk Landscape

Establishing a comprehensive taxonomy of future large scale threats, tracking 'Emerging Risks', and developing stress-test scenarios.

Cambridge Threat Taxonomy

The Cambridge threat taxonomy (http://cambridgeriskframework.com/taxonomy) is a compilation and categorization of threats of complex risks based on historical research to identify causes of social and economic disruption over the past thousand years. 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.

Feedback suggests that this is a useful checklist, but would be more useful if standardised risk metrics could be applied across the threat categories, to compare and prioritise threats against different types of exposure and interests.

The threat taxonomy could potentially benefit from closer integration with alternative approaches of generating threat scenarios, such as a bottom-up systems approach (Munich Re CARE system), or an expert judgement approach (World Economic Forum).

We welcome suggestions to improve the usefulness of the taxonomy, and ways of extending its adoption as a common structure among business and other potential users.

Threat Profiles

For a number of threat categories, a state-of-knowledge review is provided as a threat profile – a Centre for Risk Studies publication. During the past three years, threat profiles have been produced for six threat categories. Potential Subject Matter Editors have been identified for a number of other threat categories. We would like to complete a first-order benchmarking of the frequency and severity of the full range of threats, perhaps at the level of the 12 main threat classes. We would also welcome partnerships with experts in a wide range of fields to populate more categories of threat. Where a threat of interest merits more detailed research, e.g. cyber risk, it becomes a specific research theme.

Stress Test Scenarios

Published threat profiles provide context for scenarios for use in stress testing business systems. During 2013 a methodology was developed for assessing scenario impacts. Scenarios were developed for four threats (geo-political conflict; pandemic; cyber-catastrophe; social unrest), currently being completed and written up for publication. Candidates for additional scenarios are being considered for 2014. Feedback suggests that developing a larger suite of stress test scenarios to help test an organisation's resilience to a representative range of threats would be a useful objective.

Emerging Risks

Several of the threats are rapidly changing. Reviewing and monitoring 'emerging risks' is a growing practice in business risk management. Developing indices to track each threat that could be linked to consequence analysis via scenarios is a potential area of future enhancement, particularly with threats across the spectrum of geo-political risk and financial and economic threats.

Discussion Topic – Research Theme 1

What areas should we prioritise in developing the research theme of understanding the global complex risk landscape? How could we improve the usefulness of the framework, and improve its adoption among business and other potential users?

Research Theme 2: Understanding Complex Business Exposure

Compiling data on the interconnectivity of the business world, and exploring their propensity for and vulnerability to cascading failure.

Compiling a Global Network Database

The research platform includes a Network Manager module for the management of networks, data entry, mapping, visualization and the analysis of systems. It consists of a standardised but flexible data architecture and suite of analytical routines. During 2013, we began populating this with public-domain data on the main inter-relationships of the global economy, including datasets such as:

- World City Database (5000 cities)
- Demographic & economic data for all countries of the world
- Inter-country Trade Relationships (I/O) by 35 economic sectors
- International banking and financial networks
- Enterprise relationships, suppliers, and creditors for major global companies
- Sample supply chain networks for major corporate businesses
- Manufacturing hubs and industrial outputs
- Air Transportation Network, major airports and air traffic patterns
- International Shipping & Cargo Network, major ports and shipping traffic patterns
- Transoceanic Telecommunications Network
- Oil & Gas Supply Chain
- Military power structure, naval, army and air force bases

These systems form the 'substrate infrastructure' of the global economy. The analysis of these relationship datasets provides an understanding of the interconnections and correlations that drive the global economy, and the potential for cascading failure and contagion spreading from disruptive events. These datasets provide the foundation for analysis of several of our research themes, and enable the assessment of macroeconomic consequences of event scenarios.

Analysis of Systems of Systems

Network mathematics and graph theory provides a suite of tools for categorising networks and assessing their vulnerabilities and resilience to shocks. Research is ongoing into the characteristics, topologies, and properties of these networks to provide insights of use for business risk management.

Developing Network Models

Each type of network has its own behaviour and characteristics. Simulating their performance and assessing how they are likely to behave when shocked requires domain-specific models. The research platform provides a capability of developing models that operate on these networks, and also allows the plugging in of third party models. Simple models have been developed for contagion through a banking network, and the disruption of an international supply chain. Development of simulation models is a key part of the research agenda for 2014, for financial catastrophe, supply chain risk, and scenario disruption.

Additional Network Datasets

Research is currently ongoing to explore the potential for gathering and modelling complex exposure data, such as creditor relationships between major enterprises, financial correlations and implied relationships. Defining the 'Cartography of Finance' is a key objective in 2014.

Discussion Topic – Research Theme 2

Where are the efforts to compile a network database of most value in supporting the Centre for Risk Studies research agenda and most likely to yield interesting insights for high quality academic outputs?

Research Theme 3: Financial Catastrophe Risk

Using the Cambridge Risk Framework to explore financial crises, phase changes in the financial system, and to better understand financial instability.

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 a research programme to contribute to the understanding of financial catastrophe risk.

Conventional models and normal expectations of market behaviour no longer hold during periods of extreme financial crisis. Understanding the conditions that give rise to a crisis, the frequency and severity that future crises might be expected, and the processes that can propagate a crisis through the international financial markets are being explored using the Cambridge Risk Framework, simulating financial shocks through networks of connectivity of banks and economic institutions.

This research theme kicked off in 2013 with the hiring of a research associate, Dr. Fabio Caccioli, to focus in financial catastrophe risk

Survey of leading opinions on research agenda

In 2013, this research theme began with an initial survey and an April workshop attended by a number of thought leaders to review the state of the art of current research activities and collect leading opinions on research priorities. The workshop produced a set of recommendations around the need for a practitioner-oriented model of financial catastrophe.

Long-perspective 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 back to 1500. This catalogue will provide inputs into the assessment of frequency and severity of future financial shocks.

Scenarios of exogenous and endogenous financial shocks

The stress test scenarios of geopolitical conflict, pandemic and other threats developed during 2013 helped formulate a methodology for propagating exogenous shocks through the financial system. Purely exogenous shocks of this type appear to be less significant in the history of financial crises than endogenous causes of correlated behaviour. In 2014, we would like to develop scenarios for endogenous triggers, including an asset bubble collapse and a sovereign default.

Contagion in financial networks

The non-linear behaviour of the financial economy as a tightly-coupled complex system are explored through models that simulate illiquidity contagion in banking networks. The Centre for Risk Studies is benchmarking different contagion models and assessing best-of-class techniques for adoption in improving understanding of financial catastrophe risk.

Discussion Topic – Research Theme 3

What should be the main priorities for research into financial catastrophe risk in 2014 and beyond? How can we phase the research to produce useful outputs before we have finished a potential lengthy process to develop a complex model?

Research Theme 4: Resilient International Supply Chains

Developing metrics of loss, 'efficient resiliency', and benefits of strategic improvements to global supply chains and business relationships.

New views of supply chain risk

The succession of shocks to global businesses from disruption to their international supply chains is causing a re-examination of priorities in management science. For years the focus of management improvement to supply chains has been on minimizing cost and stripping out redundancy. There is increasing recognition that levels of resilience provide safety margins to safely absorb the impacts of shocks. Assessing the right level of resiliency – i.e. 'efficient resiliency' – is not well-understood.

Models of supply chain risk and resilience

During 2013 a simplified agent-based supply chain risk model was developed using the Cambridge Risk Framework to simulate the systemic consequences of disruptive scenarios on an international network of manufacturing supply output and transportation to fulfil orders from distribution centres. Delayed fulfilment from a scenario is quantified as loss, allowing comparison of strategies to improve resilience. The stress test scenarios developed in 2013 (geopolitical conflict, pandemic, cyber) are being used to test the resilience of representative configurations of supply chains.

Partnering with other expertise in supply chain risk management is being explored.

Strategies to improve resilience

The operations management literature provides a number of options for increasing the resilience of a supply chain operation – carry greater inventory, diversify suppliers, diversify production, and transportation contingencies. The costs and benefits of the improvements of resilience from these different strategies in the event of a disruptive shock can be compared to achieve 'efficient resiliency'.

2013 saw the Centre presenting thought-pieces on supply chain risk, configurations, and resilient strategies at a number of international conferences and insurance industry gatherings.

Insurability of supply chain risk

Supply chain insurance appears to be a nascent market that could benefit from better understanding, tools, data, and methodologies for assessing risk. Insurers have expressed interest in the opportunity to develop a larger market but are concerned that the risk is difficult to quantify, underwrite, diversify, and manage their accumulations safely. Surveys of corporate risk officers suggest that they would like to obtain more insurance cover to enhance their range of supply chain risk management options, but believe that current insurance offerings are poorly matched to their needs.

In April 2014, we propose to host a workshop on the Insurability of Supply Chain Risk, attended by 30 invited representatives of insurers and corporate risk managers to explore the potential to develop better risk analysis tools to support this potential market. The workshop will help frame the research agenda for the Centre for Risk Studies to assist with improving the insurability of supply chain risk.

Enterprise networks and typical supply chain configurations

A typical issue that confronts researchers and risk managers is that supply chains are complex so mapping a specific example out in detail is difficult. Different approaches are being researched to simplifying the data needed to describe a supply chain. Using publicly available data on enterprises and their key counterparts may help construct an 'enterprise network' that can assist. Another approach includes defining typical configurations of supply chains for certain economic sectors.

Discussion Topic – Research Theme 4

What should be the main priorities for research into supply chain risk in 2014 and beyond? How might a blend of partnering and pioneering achieve these goals?

Research Theme 5: Cyber Catastrophe Risk

Developing a more rigorous framework for the evaluation of cyber catastrophe risk, as one of the most significant threat classes in the taxonomy. We define cyber catastrophe risk as being information technology failure events that cause simultaneous severe loss to large numbers of enterprises.

Cyber as an emerging risk

A number of corporate risk managers and government policymakers have identified cyber risk as an important 'emerging risk'. Supporters of the Centre for Risk Studies have prioritised cyber catastrophe risk for the development of a stress-test scenario. The initial state-of-knowledge survey of cyber risk expertise carried out by the Centre in 2013 as part of the development of our threat profile for the threat taxonomy, identified that although there is a wealth of expertise in the subject matter, there is little in the way of established framework for the assessment of risk in a comparable way with other threats and better understood societal hazards.

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 past frequency and severity of events. The framework adapted security assessment techniques to propose a vulnerability scale for different sectors of the economy and for individual enterprises. This framework provides a method of assessing the likelihood of future loss from cyber attacks for use in risk analysis.

Stress test scenario for cyber catastrophe

Partnering with expertise from the Cambridge Computer Laboratories enabled us to postulate scenarios for information technology failure events that cause simultaneous severe loss to large numbers of enterprises. To be commensurate with other scenarios of the Risk Centre, we want to set the severity of the stress test event at around a 1% annual probability of exceedance. The history of cyber attacks is only a few decades so there is no single precedent that indicates what the severity of a 1-in-100 event would be today, so this is an area of expert judgement and extreme value estimation.

We plan to elicit more expert inputs into this evaluation process through a broader, open survey.

A number of hypothetical cyber catastrophe scenarios of this severity have been identified and one is being taken forward to estimate consequences in more detail, for a stress test scenario publication. Further cyber catastrophe scenarios might be added to the development in 2014.

Mapping of the cyber economy

Losses from a hypothetical cyber catastrophe scenario are being developed through a precedent study of past cyber and accidental IT disasters. Large loss incidents are categorised and adapted to specific economic sectors. Loss estimation techniques are in development.

To estimate the potential impact of an IT catastrophe requires an understanding of the current contribution of IT to the current economy. This is a current activity 'mapping the cyber economy', entailing a compilation of structured data on the major enterprises of the global economy and their IT applications and interrelationships.

Discussion Topic – Research Theme 5

What should be the priorities for developing research into cyber catastrophe risk? What types of partnerships should we be seeking to explore the business applications of this research?

Biographies of Attendees

Members of 2014 Advisory Board of Cambridge Centre for Risk Studies

Philip Brice, Corporate Risk Manager, Treasury, BP

Philip Brice is the Corporate Risk Manager within BP Treasury. His responsibilities include the management of FX risks across the group, and forecasting the impact that market volatility and other events could have on the cashflows of the business. He was previously Manager of Equity Capital Markets. Prior to that he spent over 20 years in engineering, R&D and management across all segments of the company. He holds an MSc in Finance from London Business School and an MEng in Chemical Engineering from Cambridge University and is a certified ERP. Recent work includes coping with financial catastrophe risk, and looking at usefully-simple models of financial risk from non-financial factors and from market risks.

Dr Mike Maran, Chief Science Officer, Catlin

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

Marco Moretti, Associate Principal, McKinsey & Company

Marco Moretti is an Associate Principal at McKinsey & Co and part of global leadership of Risk practice for GEM (Global Energy& Materials) industry. He is leading the offering on hedging and portfolio management for power & gas in Europe. Over the years, he supported leading players in energy sector (power, gas, oil, materials) in launching and managing project initiatives on trading and risk management. Marco leaded many internal efforts to develop solutions (models and procedures) to assess energy commodity risk and optimize hedging strategies. He is also involved in multiple training initiatives on energy trading and risk management for private institutions. Before joining McKinsey he was a Manager in Accenture maturing deep expertise in treasury & trading projects in banking sector. Marco is graduated cum laude in Management (Economia Aziendale) at Roma Tre University

Peter Nakada, Managing Director, RMS

Peter runs RMS's Capital Markets and LifeRisks groups. RMS Capital Markets provides products and services for the transfer of catastrophe risk to the capital markets. He has led the evolution of this group from providing modelling for catastrophe bond issuances, to providing a portfolio management software platform for insurance-linked securities. RMS LifeRisks provides a state-of-the-art modelling platform for analysing excess mortality and longevity risk, as well as transferring these risks to the capital markets.

Peter's background has focused on how to bring risk quantification, technology, and management science together to help financial institutions make better risk-return decisions. Before joining RMS, Peter was a co-founder of ERisk, a firm that provided risk and capital management software and consulting to the banking industry. Before that, he was a partner in Oliver, Wyman's risk management practice, where he spearheaded the firm's expansion into risk and capital management consulting for the Property & Casualty insurance sector.

Peter began his risk management career as a portfolio manager with Prudential Insurance Company, where he was part of the early wave of engineers moving into quantitative finance. Peter has a BA in Engineering Sciences from Harvard College, an MS in Engineering Management from Stanford University, and is a CFA charterholder.

Professor Tso-Chien Pan, Professor and Executive Director, Institute of Catastrophe Risk Management, Nanyang Technological University, Singapore

Tso-Chien Pan is the Executive Director and Founding Director of Institute of Catastrophe Risk Management (ICRM) at Nanyang Technological University, Singapore. He is the former Dean of the College of Engineering at NTU. Professor Pan specialises in the analysis and design of structures against dynamic loading. Over the years, he has carried out many research projects in the area of dynamic structural response to shock and blast loading, as well as earthquake excitations. As Founding Director, Professor Pan is leading the development of ICRM, a university-wide research institute, to look into the effects of natural and man-made disasters on the society.

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 and on developing academic engagement with the financial services sector at the ESRC, which he joined in 2009. Paul began his career as an academic economist but subsequently held senior roles in research, risk management and business planning in a variety of positions in both the private and public sectors: these included 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

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, 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 and 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 recognized 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 M.B.A. from the University of Maryland. He is an independent director of Cornerstone Capital Inc.

Dickie Whitaker, Director, Financial Services Knowledge Transfer Network

Dickie Whitaker has 30 years experience in the Re(In)surance business and for the last 20 years has specialised in risk and innovation and linking academia, government and finance. Dickie has written and presented extensively on these subjects and has operated globally having worked in both London and New York. He has co-founded and works for The Lighthill Risk Network, Financial Services Knowledge Transfer Network, Oasis Loss Modelling Framework, Oasis Palm Tree and FiNexus.

Executive Committee of Cambridge Centre for Risk Studies

Professor Daniel Ralph, Academic Director, Cambridge Centre for Risk Studies, University of Cambridge Judge Business School & Professor of Operations Research

Professor 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 University of Wisconsin. He was a faculty member of the Mathematics & Statistics Department at University of Melbourne before coming to Cambridge for a joint appointment in the Engineering Department and Cambridge Judge Business School. Danny's research interests include optimisation methods, equilibrium models for electricity markets, and risk in business decision making. He is Editor-in-Chief of Mathematical Programming (Series B).

Dr Michelle Tuveson, Executive Director, Cambridge Centre for Risk Studies

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. Michelle 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 a number of corporations and boards as well as a frequent conference speaker. Dr Tuveson has worked in corporations within the technology sector for the majority of her career, most recently 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. She is involved in risk governance research associated with the role of the Chief Risk Officer and hosts roundtable topic discussions. She was awarded by the Career Communications Group, Inc. as a Technology Star for Women in Science, Technology, Engineering and Maths (STEM). She has degrees from the Massachusetts Institute of Technology, Johns Hopkins University, and the University of Cambridge. She is a member of Christ's College Cambridge.

Dr Andrew Coburn, Director of the External Advisory Board, Cambridge Centre for Risk Studies and Senior Vice President, RMS

Andrew Coburn is the Director of External 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 currently coordinating the research programme on System Shock at the Centre for Risk Studies, involving managing the risk of shocks to networks. 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.

Simon Ruffle, Director of Technology Research, Cambridge Centre for Risk Studies

Simon Ruffle is Director of Technology at the Cambridge Centre for Risk Studies and researches and consults on computational methods for the assessment, management and representation of risk. Simon's main activity in the Centre focusses on the Cambridge Risk Framework where he is developing an open source technology architecture to support research into how complex global socio economic networks behave under extreme systemic macro shock conditions. His current research tracks are in the area of threat taxonomy, cyber risk, supply chain resilience and financial catastrophe.

Academic Advisors and Guest Attendees

Andrew Freeman, Risk Fellow, Cambridge Centre for Risk Studies & Managing Director, Cambridge Research Associates Ltd

Andrew Freeman is a Risk Fellow at the Centre for Risk Studies. In addition, he is Managing Director of Cambridge Research Associates, an independent research and risk advisory company, and Director, Demos Finance, part of the Demos think tank. In addition, he is an Independent Risk Advisor and Author. He was formerly the Executive Director of the Center for Financial Services at Deloitte Services LLP and was responsible for the development of the Center's research platforms and key activities. Andrew's focus is on building relationships with strategic clients and leading the development of a firm's intellectual capital on financial services industry issues. Before joining Deloitte, Andrew was a Senior Knowledge Expert in Risk at McKinsey & Company. Prior to that, Andrew was an award winning financial journalist for more than two decades at The Economist and the Financial Times. He has authored several books.

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

Professor Kavadias is Director of Research at 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.

Professor Frank Kelly, Professor of the Mathematics of Systems, Statistical Laboratory, University of Cambridge, and Master of Christ's College, Cambridge

Frank Kelly is Professor of the Mathematics of Systems in the University of Cambridge, and Master of Christ's College. He was elected a Fellow of the Royal Society in 1989, and a Foreign Associate of the National Academy of Engineering in 2012. His main research interests are in random processes, networks and optimisation. He is especially interested in applications to the design and control of networks and to the understanding of self-regulation in large-scale systems.

From 2003 to 2006 he served as Chief Scientific Adviser to the United Kingdom's Department for Transport, and in 2010-11 as a non-executive director of Autonomy plc. He was chair of the Council for the Mathematical Sciences from 2010 to 2013, and is a member of the RAND Europe Council of Advisors.

Professor Edmond Yat-Man Lo, Deputy Director, Institute of Catastrophe Risk Management, Nanyang Technological University, Singapore and Associate Professor, School of Civil and Environmental Engineering.

Associate Professor Edmond Lo obtained his Ph.D. degree in Civil Engineering (Hydrodynamics) from the Massachusetts Institute of Technology in 1985, and his Master of Science and Bachelor of Science degrees in Mechanical Engineering from the California Institute of Technology in 1980. He joined NTU in 1996 as Head of the Division of Environmental and Water Resources Engineering (2005-08) and Chair of the School of Civil and Environmental Engineering (2008-2011). He is now also Deputy Director of the Maritime Institute at NTU.

Edmond's current research programmes are aimed at the understanding of urban water flows including tropical reservoirs flows and their implications on eutrophication, and urban flooding. Recent research projects included being Team Leader and PI, "Establishment of a real time control, alarm, and management system for Marina Bay" and Co-PI, "Flood Risk Simulation Model for Jakarta, Indonesia". He is now looking to extend the flood risk work to other S.E. Asian cities with a particular view of how flood resiliency evolves as urban cities develop.

Professor John Rees, Risk Research Coordinator, UK Research Councils (RCUK)

John Rees is the UK Research Councils (RCUK) Risk Research Coordinator and leads the RCUK Risk Research Network. He is the current chair of the UK Collaborative for Development Sciences Disaster Research Group, and is a visiting Professor of Petrophysics at Leicester University. Previously he was the Natural Environment Research Council (NERC) Natural Hazard Theme leader, and Head of Corporate Policy and Science Coordination at the British Geological Survey (BGS), where he has been based for most of his career. He has worked extensively on coastal and marine hazards, urban risks – largely in Africa, Latin America and Asia, and bridging the science-policy gap. He has authored over 100 papers, books and major reports and was one of the co-recipients of the 2012 Lloyds Science of Risk prize. He has been called-upon to provide advice or evidence to many UK and international scientific panels, Government Policy Reviews and Select Committees. Prior to joining BGS he was educated in Sussex, at Sheffield University and at Trinity College Dublin before working for a period in industry.

Professor David Spiegelhalter, Winton Professor for the Public Understanding of Risk, University of Cambridge

David Spiegelhalter, FRS OBE, is Winton Professor for the Public Understanding of Risk at the University of Cambridge. His background is in medical statistics, particularly the use of Bayesian methods in clinical trials, health technology assessment and drug safety, and led the statistical team in the Bristol Royal Infirmary Inquiry and also gave evidence to the Shipman Inquiry. In his post, he is attempting to improve the way quantitative aspects of risk and uncertainty are discussed in society. He presented the BBC4 documentary 'Tails you Win: the Science of Chance", and in 2011 competed in Winter Wipeout on BBC1. He is an Honorary Fellow of the Institute for Risk Management, an Honorary Fellow of the Royal College of Physicians, was elected Fellow of the Royal Society in 2005 and awarded an OBE in 2006 for services to medical statistics.

Current Team and Resources

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

Research Team

Dr Gary Bowman, Research Associate, Centre for Risk Studies
Gary is a Research Associate in the Centre for Risk Studies. He has held academic positions at the Universities of St Andrews and Strathclyde, and has consulted for numerous private and public sector institutions on scenario-based strategic planning.

Dr Fabio Caccioli, Research Associate, Centre for Risk Studies
Fabio is a Research Associate at the Centre for Risk Studies, working on financial catastrophe risk, systemic risk and financial stability.

Dr Scott Kelly, Research Associate, Centre for Risk Studies
Scott Kelly is a post-doctoral research associate in the Centre for Risk Studies. He holds research posts in the Centre for Climate Change Mitigation Research (4CMR) in the Department of Land Economy. He is a Junior Research Fellow of Darwin College.

Dr Louise Pryor, Risk Researcher, Centre for Risk Studies
Louise is Risk Researcher at the Centre for Risk Studies and also an independent consultant on risk and software development. Louise is researching financial and networking risk models at the Centre.

Andrew Skelton, Risk Researcher, Centre for Risk Studies
Andrew Skelton is an affiliate of the Centre for Risk Studies and holds a research post at the Centre for Climate Change Mitigation Research (4CMR) in the Department of Land Economy at the University of Cambridge.

Ben Leslie, Risk Researcher, Centre for Risk Studies
Ben Leslie is a mathematician specialising in network mathematics and complexity science. Ben is developing network models and assisting with developing analytics for the assessment of risk in supply chains and the interconnectivity of enterprises in the cyber economy.

Currently recruiting

- Research Associate for research programme into business supply chain risk and financial stability

Associates

Andrew Freeman, Risk Fellow
Dr Ruth Whaley, Senior Advisor, Corporations and Boards
Dr Alan Punter, Risk Associate

Consultants and Collaborators

Institute for Catastrophe Risk Management, Nanyang Technical University, Singapore
Columbia Business School, New York
Oxford Economics Ltd.
Dr Kimmo Soramaki, CEO, Financial Networks Analytics Ltd.
Dr Samantha Cook, Chief Scientist, Financial Networks Analytics
Dr Roxane Foulser-Piggott, Director, Cambridge Architectural Research Ltd.
Hannah Baker, Cambridge Architectural Research Ltd.
Richard Hartley, Co-Founder, Cytora Ltd.
Joshua Wallace, Co-Founder, Cytora Ltd.
Dr D'Maris Coffman, Director of the Centre for Financial History, University of Cambridge
Dr Duncan Needham, Centre for Financial History, University of Cambridge
Dr Adrian Leonard, Centre for Financial History, University of Cambridge
Dr Rob Watson, Cambridge Computer Labs, University of Cambridge
Dr Richard Clayton, Cambridge Computer Labs, University of Cambridge
Dr Frank Stajano, Cambridge Computer Labs, University of Cambridge
Eireann Leverett, I/O Active Ltd.
Andrew Auty, Re: Liability (Oxford) Ltd.
Dr Gordon Woo, RMS Inc.
Dr Mary Chang, RMS, Inc.
Dr Ivan Ureta, College of Economics and Political Science. Sultan Qaboos University, Oman
Antonios Pomonis, independent Consultant

Administration

Louise Gutteridge, Events & Operations Manager, Centre for Risk Studies
Judge Business School - Finance, Legal and Administration Offices

2013 Engagement Activities of Cambridge Centre for Risk Studies

January 2013	**Re-evaluating the Role of Risk Boards in Organisations**; Chief Risk Officer Discussion Series, London; CRS in Association with SEBA International.
February 2013	**ICRM/NTU 4th Annual Meeting**; Cambridge-Singapore Research Collaboration Event. Singapore
February 2013	**Cascading Networks Workshop**, Cambridge-Singapore Research Collaboration Event; Singapore
09 April 2013	**Understanding Financial Catastrophe Risk: Developing a Research Agenda**; Centre for Risk Studies Workshop; http://www.risk.jbs.cam.ac.uk/news/events/other/2013/130409_understanding.html
9-10 May 2013	**Global Risk Management Conference: Navigating Risk in the Global Economy**; CRS is an Academic Partner for the Conference Board's Global Risk Conference, New York Marriott Downtown, New York, United States. Speakers included: Professor Daniel Kahneman, Emeritus Professor of Psychology, Princeton University & Recipient, 2002 Nobel Memorial Prize in Economic Sciences & Author, *Thinking, Fast and Slow*, Governor Tom Ridge, President and Chief Chief Executive Officer, Ridge Global, First Secretary, U.S. Department of Homeland Security, Tom Wilson, Chief Risk Officer, Allianz SE
May-June 2013	**The 2013 Cambridge - McKinsey Risk Prize**; The Centre for Risk Studies and McKinsey & Company, launched an annual risk prize for the best submission on risk management by an MBA student at Cambridge Judge Business School.
04 June 2013	**Unintended Consequences for Over-regulation**; Chief Risk Officer Discussion Series; CRS in Association with SEBA International; London. The financial services industry has undergone a turbulent six years. Widespread regulatory changes are being enacted to protect the global economy from a re-occurrence of the 2008 crisis. However, there is a risk that regulation itself will stimulate behaviour that may have unintended consequences for financial services and the wider economy. What are these consequences? Are they worse than the alternatives?
17-18 Jun 2013	**Risk & Strategy - Returns versus Resilience**; Cambridge Centre for Risk Studies 4th Annual Risk Summit Keynote Speaker: Gillian Tett, Markets and Finance Commentator & Assistant Editor, Financial Times; Dinner Speaker: David Spiegelhalter, Winton Professor of the Public Understanding of Risk, University of Cambridge. http://www.risk.jbs.cam.ac.uk/news/events/risksummits/risksummit2013.html
17-30 June 2013	**Cambridge-Singapore Research Collaboration**; Cambridge-based Exchange
July 2013	**The Role of the Board in the Era of Uncertainty**; Aspen Crisis and Risk Forum; Aspen, Colorado, United States
10 September 2013	**Global Landscape of Risks**; Co-Hosted with Munich Re; CRS in conjunction with Munich Re, hosted a workshop on emerging risks in insurance. http://www.risk.jbs.cam.ac.uk/news/events/other/2013/130910_global_landscape.html
16 September 2013	**Emerging Risks and the Cyber Challenge**; CRS Invited Speaker Presentation at Catlin Global Underwriting Conference '*Underwriting Matters*'.
21 October 2013	**Disaster Risk Reduction and Structural Performance Criteria - The Disconnect and it's Solution**; Dr George Walker, Honorary Research Fellow at Aon Benfield. CRS Understanding Risk: Lunchtime Seminar Series;

2014 Event Calendar for Cambridge Centre for Risk Studies

22 Jan 2014

Perspectives on Counterparties: Diversification Impacts on Financial Stability.

Cambridge CRO Council: Chief Risk Officer Round-table Discussions, London

Attendance by invitation only.

http://www.risk.jbs.cam.ac.uk/news/events/cro/140122_perspectives.html

23 Jan 2014

Centre for Risk Studies Advisory Board Meeting

Research strategy review by the members of the Centre for Risk Studies Advisory Board.

Deadline: 28 Feb 2014

The 2014 Cambridge - McKinsey Risk Prize

The Centre for Risk Studies, in conjunction with McKinsey & Company, is pleased to announce the 2014 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.

http://www.risk.jbs.cam.ac.uk/news/news/1312_risk_prize.html

20 Mar 2014

Emerging Risk Scenarios for Risk Management

Seminar on risk management using scenarios of emerging risks, such as cyber catastrophe, pandemics, geopolitical conflict, and social unrest.

http://www.risk.jbs.cam.ac.uk/news/events/other/2014/140320_emerging.html

9 Apr 2014

Insurability of Supply Chain Risk

Workshop on assessing and managing the risks of disruption in international supply chains and risk transfer using insurance.

Attendance by invitation only.

http://www.risk.jbs.cam.ac.uk/news/events/other/2014/140409_insurability.html

23-24 Jun 2014

Cambridge Centre for Risk Studies 5th Annual Risk Summit Conference

The Pulse of Risk: From Big Data to Business Value

In June 2014 the Cambridge Centre for Risk Studies will bring together leaders and decision makers from business, government, intergovernmental organisations, academia and NGOs to explore salient topics in risk management.

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

2013 Centre for Risk Studies Research Outputs

Working Papers

Resilient International Supply Chains

Ralph, D.; Bowman, G.; Coburn, A.; Ruffle, S.;
Cambridge Centre for Risk Studies Working paper 2013.01; January 2013.
Global supply chains are vulnerable to systemic failure. Analysing the systems that provide the apparatus for modern business activity and synthesising best practice in risk mitigation helps us identify key strategic and operational issues for supply chain management.
http://cambridgeriskframework.com/getdocument/3

Cambridge Risk Framework: A Taxonomy of Threats for Macro-Catastrophe Risk Management

Andrew Coburn, Danny Ralph, Michelle Tuveson, Simon Ruffle, Gary Bowman
Cambridge Centre for Risk Studies Working Paper 201307.20; July 2013
The objective of the Cambridge Risk Framework is to develop a systematic and evidence-based approach to threat assessment and risk management for macro-catastrophes.
http://cambridgeriskframework.com/getdocument/4

Survey of Leading Opinions: Developing a Research Agenda for Understanding Financial Catastrophe Risk

Andrew Coburn, Gary Bowman, Fabio Cacciolli
Cambridge Centre for Risk Studies Working Paper 201303.31, Draft: May 2013
Summary of recommendations for prioritisation of academic research into financial catastrophe risk resulting from a survey of leading opinions in the field.
http://cambridgeriskframework.com/getdocument/12

Cyber Catastrophe: Cambridge Risk Framework - Profile of a Macro-Catastrophe Threat Type

Simon Ruffle, Andrew Coburn, Danny Ralph, Gary Bowman
Cambridge Centre for Risk Studies Working Paper 201307.02, July 2013
This document presents a profile of the Macro-Catastrophe threat type 'Cyber Catastrophe' along with the Specification of the fictional scenario "The Sybil Logic Bomb".
http://cambridgeriskframework.com/getdocument/9

Geopolitical Conflict: Cambridge Risk Framework - Profile of a Macro-Catastrophe Threat Type

Joshua L. Wallace, Richard G Hartley, Gary Bowman, Andrew Coburn, Simon Ruffle
Cambridge Centre for Risk Studies Working Paper 201308.02; August 2013
This document presents a profile of the Macro-Catastrophe threat type 'Geopolitical Conflict' along with the specification of a fictional scenario, "Sino-Japanese Conflict in the East China Sea".
http://cambridgeriskframework.com/getdocument/17

Human Pandemic: Cambridge Risk Framework - Profile of a Macro-Catastrophe Threat Type

A. Coburn, M. Chang, D. Ralph, M. Tuveson, S. Ruffle, G. Bowman
Cambridge Centre for Risk Studies Working Paper 201303.01; Draft: March 2013
This document presents a profile of the Macro-Catastrophe threat type 'Human Pandemic' (note: this paper is a work-in-progress).
http://cambridgeriskframework.com/getdocument/8

Social Unrest: Cambridge Risk Framework - Profile of a Macro-Catastrophe Threat Type

Andrew Coburn, Joshua Wallace, Richard Hartley, Gary Bowman, Simon Ruffle
Cambridge Centre for Risk Studies Working Paper 201312.01; December 2013
This document presents a profile of the Macro-Catastrophe threat type 'Civil Disorder' (note: this paper is a work-in-progress).
http://cambridgeriskframework.com/getdocument/5

Conference Proceedings and Academic Journal Activities

Risk and Uncertainty Beyond Supply Chains

Andrew Coburn, Giovanni Giallombardo, Daniel Ralph, Simon Ruffle
Proceedings of "Informatics Rising", The Institute for Operations Research and the Management Sciences (INFORMS) Annual Conference, Phoenix, AZ Oct 2012
https://informs.emeetingsonline.com/emeetings/formbuilder/clustersessiondtl.asp?csnno=17948&mmnno=220&ppnno=65652

Bayesian Probit Models for Dichotomous Decisions Using Survey Data

Michelle Tuveson, William Fitzgerald
Working Paper, Dec 2012

Pricing Risk Under Risk Measures: an Introduction to Stochastic-Endogenous Equilibria

Ralph, D. and Y. Smeers, 2011, Working paper, Social Science Research Network; SSRN 1903897, http://ssrn.com/abstract=1903897

Can Oil Prices be a Proxy for Consumer Sentiment?

Michelle Tuveson, Daniel Ralph
Proceedings of "Informatics Rising", The Institute for Operations Research and the Management Sciences (INFORMS) Annual Conference, Phoenix, AZ Oct 2012
https://informs.emeetingsonline.com/emeetings/formbuilder/clustersessiondtl.asp?csnno=17815&mmnno=220&ppnno=63785

Evolving Risk Frameworks: Modelling Resilient Business Systems as Interconnected Networks

Alan Punter, Andrew Coburn, Daniel Ralph, Michelle Tuveson, Simon Ruffle, Gary Bowman
Proceedings of 'Think Outside the Risk', Aon Benfield Hazards Conference, Gold Coast, Australia, 22-24 September 2013
http://cambridgeriskframework.com/getdocument/15

Sentiment Component in Oil Demand Models

Michelle Tuveson, William Fitzgerald
Working Paper, Oct 2013

Application of Random Forest Learning Algorithms to Oil demand Models

Michelle Tuveson, William Fitzgerald
Working Paper, Oct 2013

Possible Futures, Present Logics: A Neo-Institutional View of the Scenario Planning Process

Gary Bowman, Ryan Parks; 33rd Strategic Management Society Annual International Conference; Atlanta, October 2013.
http://atlanta.strategicmanagement.net/tools/schedule/sessionDetails?id=222

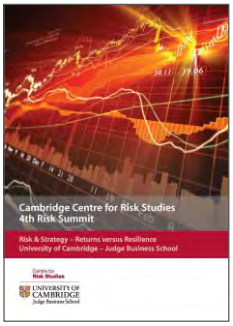
The Practice of Scenario Planning: An Analysis of Inter- and Intra-Organizational Strategizing

Gary Bowman, Southern Management Association 2013 Meeting, New Orleans, November 5-9, 2013.

Risky Capacity Equilibria in Complete Financial Markets: A Risk Analysis of Capacity Investment with Endogenous Probabilities

Ralph, D. and Y. Smeers, 2013, Working paper. Submitted for publication.

Cambridge Centre for Risk Studies 5th Risk Summit 23 & 24 June 2014



The Pulse of Risk: From Big Data to Business Value

University of Cambridge – Judge Business School

Meeting Overview

In June 2014 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 with a conference dinner at Emmanuel College, Cambridge.

This year's summit theme will explore 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.

Agenda

The agenda for the 2014 Risk Summit is currently being developed. Proposals for eminent speakers are welcomed. Please refer to Michelle Tuveson, Executive Director. Further Details and Registration (Open from February 2014)

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

Last Year's Risk Summit

Cambridge Centre for Risk Studies 4th Risk Summit: June 2013

Risk & Strategy – Returns versus Resilience

Meeting Overview

The Cambridge Centre for Risk Studies explored the inter-linkages between risk and strategy during its 4th Risk Summit. Risk is usually perceived as the threat of loss, with predominantly negative connotations. This meeting challenged these perceptions and promoted debate about opportunities inherent in a risky environment. The plenary sessions covered the science of risk, real world case studies and facilitated sessions engaging participants in the positive aspects of risk and uncertainty.

Proceedings, speakers and photos of the event:
http://www.risk.jbs.cam.ac.uk/news/events/risksummits/risksummit2013.html

Cambridge Centre for Risk Studies 4th Risk Summit Keynote and Panel Chairs

Cambridge Centre for Risk Studies Risk Summit Keynote Speaker:
Joining up the Dots; What Anthropologists Can Teach Risk Managers
Gillian Tett, Markets and Finance Commentator & Assistant Editor, Financial Times

Cambridge Centre for Risk Studies Risk Summit Keynote Speaker:
Risk and Resilience through a Network Lens
Woody Powell, Professor of Sociology, Organizational Behavior, Management Science and Engineering, and Communication (by courtesy), Stanford University

Risk Summit Day 1 Panel: Seeking Value Creation in Risk: Innovation, Creativity, and Making the Right Bets
Moderated by: David Champion, Senior Editor, Harvard Business Review

Risk Summit Day 2 Panel: Emerging Opportunities in the Midst of Crises
Moderated by: Andrew Palmer, Finance Editor, The Economist