

Anticipating the Future Risk Management for Long-term Planning

7th and 8th December 2011 University of Cambridge - Judge Business School







Cambridge Centre for Risk Studies Gratefully Acknowledges its 3rd Annual Meeting Partners:

Sustaining Meeting Partner:









Cambridge Centre for Risk Studies 3rd Annual Meeting

Anticipating the Future: Risk Management for Long-term Planning

7 - 8 December 2011

Cambridge Judge Business School

Meeting Overview:

The annual meetings of the Cambridge Centre for Risk Studies are designed to encourage debate and provoke thought across conventional boundaries, around issues of societal and corporate risk. The 3rd Annual Meeting of the Cambridge Centre for Risk Studies examines how risk is likely to change in the future, emerging risks, and the increasing uncertainties of planning for the longer term. The natural tendency in planning is to assume that recent history is a good guide to future trends, or that today's situation will continue for the foreseeable future. And yet there are many examples, in many periods and fields, of sudden unexpected changes in direction from historical preceding trends. This conference will examine the challenges of planning for the future, in particular developing business strategy and government policy over longer term horizons.

Meeting Themes:

Unsustainability – We Can't Go On Like This

This session examines the evidence that at some point, various current trends are not likely to continue, particularly where discontinuity may be abrupt, unexpected or catastrophic. It presents views of future risk that challenge current assumptions to suggest that major changes to our present way of life will be inevitable.

Speculations on the Future

This session provides views on the future landscape of societal and commercial risk, how information about history informs our projections of the future. It considers geo-political change and the constraints and uncertainties around making long range forecasts.

Future - Proof Decisions

Given an uncertain future, and the possibility of discontinuities in current trends, what are the right long term strategies for optimising outcomes? This session explores strategies for establishing government policy, managing businesses, and planning other enterprises for many years into the future.

Imagining and Doing the "How"

Future uncertainty must not paralyze us into inaction. This session presents some potential implementations for long term risk management and systems that can be adopted today to prepare for the threats and shocks that might occur over several decades into the future.



Organising Committee Chair: Michelle Tuveson, Cambridge Centre for Risk Studies

Organising Committee:

Andrew Coburn, Risk Management Solutions Andrew Freeman, Risk Advisor & Author Paul Glasserman, Columbia Business School Danny Ralph, Cambridge Centre for Risk Studies Simon Ruffle, Cambridge Centre for Risk Studies Nick Watkins, British Antarctic Survey Ruth Whaley, Regulatory Fundamentals Consulting, LLC

Anticipating the Future: **Risk Management for Long-term Planning**

Day 1: Wednesday 7 December 2011

09:00 - 09:30 **Coffee & Meeting Registration** 09:30 - 09:40 Welcome and Introduction by Cambridge Centre for Risk Studies Team

Plenary Session 1: Unsustainability

This session examines the evidence that at some point, various current trends are not likely to continue, particularly where discontinuity may be abrupt, unexpected or catastrophic.



09:40 - 10:20 The Future of Risk Dr Robert Muir-Wood, Chief Research Officer, **Risk Management Solutions**



10:20 - 10:45

Environmental and Social Risks in Finance: The Equator Principles and Emerging Good Practices Andre Abadie, Managing Director, Global Environmental & Social Risk Management, JP Morgan

Plenary Session 2: Speculations on the Future – Geo-Political Change

This session provides views on the future landscape of societal and commercial risk, how information about history informs our projections of the future, and the constraints and uncertainties around making long range forecasts.



11:30 - 12:10

The Rise of China in Historical Perspective Professor Brendan Simms, Professor in the History of European International Relations, University of Cambridge, Department of Politics and International Studies



12:10 - 12:35

Arctic Geopolitics: How Do Nations Balance National and Common Interests? Professor Paul Berkman, Fulbright Distinguished Scholar & Research Professor, University of California, Santa Barbara



10:45 - 11:10 **Changing Demographics: Longevity**

Plenary Session Chair: Professor Peter Guthrie

Professor of Engineering for

Department of Engineering

Sustainable Development, University of Cambridge,

Risk and Ageing Mark Twigg, Executive Director, Cicero Consulting

> **Plenary Session Chair: Dr David Reiner**

Senior Lecturer, University of

Cambridge Judge Business School

11:10 - 11.30 Coffee & Tea



12:35 - 13:15

Panel Discussion: Geo-political Change: Dialogue on Globalization, Sovereignty, and Balance









Professor Brendan Simms, Professor in the History of European International Relations, University of Cambridge, Department of Politics and International Studies



Professor Jaideep Prabhu, Jawaharlal Nehru Professor of Indian Business & Enterprise, University of Cambridge Judge **Business School**





Plenary Session 3: Future-proof Decisions and Recommendations

Given an uncertain future, what are the right long term strategies for optimising outcomes? This session explores strategies for government policy, managing businesses, and planning other enterprises for many years into the future.



14:15 - 14:40

The Energy Outlook to 2030: Global Trends and What Can Bend Them? Dr Alexander Naumov, Macro Economist, **BP** Group Economics



14:40 - 15:05

Operational Risk, Scenario Analysis, and External Events: A Regulatory Perspective Dr Peter McCormack, Senior Risk Specialist - Risk Frameworks and Governance, Risk Specialist Division, **Financial Services Authority**



15:30 - 16:00 Coffee & Tea



15:05 - 15:30 Measuring and Mitigating Operational Risks in Engineered Cyber-physical Systems Dr Ned Allen, Senior Fellow & Chief Scientist, Lockheed Martin, Aeronautics

Dr Emily So

CURBE

Lecturer, University of

Cambridge, Department

Plenary Session 3 Continued: Future-proof Decisions and Recommendations



16:00 - 16:10 A Debrief: Key Developments on Climate for Corporates in 2011 Katharine Thoday, Programme Manager, Cambridge Programme for Sustainability Leadership



16:10 - 16:35 **Future Climate Change: Perspectives** from the Polar Regions and Impacts to

Global Policy Dr Emily Shuckburgh, Head of the Open Oceans Research Group, British Antarctic Survey & UK Department of Energy

16:35 - 17:15

Panel Discussion and Open Forum: Profiles of the Future and Emerging Risks Philip Brice, Moderated by:

Chairman of Advisory Board, Institute for Catastrophe Risk

Management, Nanyang Technological University, Singapore & Emeritus Professor of Stanford University



Mark Gilbert, London Bureau Chief, Bloomberg News



Plenary Session Chair: Professor Haresh Shah





Rowan Douglas, CEO, Willis Global Analytics & Chairman, Willis Research Network



Dr Emily Shuckburgh, Head of the Open Oceans Research Group , British Antarctic Survey & UK Department of Energy



Dr Miles Elsden, Head of Defence and Security, UK Government Office for Science



Neil J Smith, Manager, Emerging Risks & Research Exposure Management, Performance Management, Lloyd's

17:30 - 19:00 Drinks Reception Cambridge Judge Business School Common Room



19:15 - 22:00

Meeting Dinner at Christ's College, Cambridge Christ's College Welcome: Professor Peter Landshoff, Christ's College Fellow, Christ's College Fellow, Unversity of Cambridge, DAMTP

Anticipating the Future: **Risk Management for Long-term Planning**

Day 2: Thursday 8 December 2011

09:00 - 09:30 **Coffee & Meeting Registration**



09:30 - 09:35

Welcome and Introduction Professor Danny Ralph Academic Director, Cambridge Centre for Risk Studies & Professor of Operations Research, Cambridge Judge Business School

Plenary Session 4: Imagining and Doing the "How"

This session presents some potential implementations for long term risk management and systems that can be adopted today to prepare for the threats and shocks that might occur over several decades into the future.



09:40 - 09:50

A Debrief: The Foreseer Project - Linking Energy, Water and Land Resource Future Grant Kopec, PhD Candidate, University of Cambridge, Department of Engineering



09:50 - 10:10

How Can the Risk of Global Food Supply/Demand Difference be Mitigated through Innovations in Crop Insurance?

Professor Haresh Shah, Chairman of Advisory Board, Institute for Catastrophe Risk Management, Nanyang Technological University, Singapore & Emeritus Professor of Stanford University



10:10 - 10:30

Solar Flare Risks: Consequences on Satellites and **Global Communications Systems** Nafiz Karabudak, Senior Manager, Lockheed Martin Corporation, Technology Initiatives







Cambridge Centre for Risk Studies' Systemic Shock Framework Dr Andrew Coburn, Senior Vice President, Risk

Plenary Session Chair: Professor David Spiegelhalter

Understanding of Risk,

Geo-engineering Technologies for Mitigating

Dr Hugh Hunt, Senior Lecturer, University of

Cambridge, Department of Engineering

University of Cambridge

Winton Professor of the Public

10:30 - 10:50

10:50 - 11:10

Climate Impacts

Management Solutions & Director of External Advisory Board, Cambridge Centre for Risk Studies



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

11:10 - 11.30 Coffee & Tea

Plenary Session 5: Risk Research Focus Group Discussions



11:35 - 13:00

11:30 - 11:35

Introduction to Risk Research Tracks & Focus Group Discussions Michelle Tuveson, Executive Director, Cambridge Centre for Risk Studies

Risk Research Tracks: Focus Group Discussions and Information

13:00 - 14:00 Lunch 14:00 - 15:30

Risk Research Focus Group De-briefs and Discussion

15:30 - 15:45 Closing

Track 1: Threat Assessment Track 2: Systemic Risk **Track 3: Using Scenarios** What are the shocks we might expect over the Defining the "System" in macro-economic Using scenarios as stress tests in business next decade? Horizon scanning and decisions and policy-making. The applications systemic risk, such as the international identifying emerging risks for systemic shock banking network, supply chains, and and challenges of making scenario testing scenarios. infrastructure systems. relevant to regulation and risk management. Chair: Dr Dougal Goodman,



Chair: Alan Smith, Chief of Staff and Global Head of Risk Strategy, HSBC



Co-Chair: Dr Gary Bowman, Research Associate, Cambridge Centre for **Risk Studies**

Chief Executive, The

and Technology

Foundation for Science



Co-Chair: Adrian Leonard, PhD Candidate, Cambridge Centre for Risk Studies & University of Cambridge Department of History



Chair: Peter Nakada, Managing Director, Risk Management Solutions



Co-Chair: Nina Andreeva, PhD Candidate, University of Cambridge Judge Business School

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Cambridge Risk Research Overview

The research programme of the Centre for Risk Studies explores systemic risk and improving resilience through the management of societal and economic risk. The Centre coordinates a multidisciplinary and international programme of research, with industry supporters shaping the direction and application of research outputs. The Centre's research interests broadly cover the following areas:

- Corporate Risk Governance
- Economic and Financial Risk
- Environmental Risk and Climate Change
- Catastrophe Risk Management for Natural and Man-Made Perils
- Health-Related Societal Risk
- Developing Risk Management Policy

Current Projects in the System Shock Research Programme

International Supply Chain Resilience – Maritime Network Shocks

This project is part of the systemic shocks research with specific application for international companies with dependencies on trading networks, cargo shipping and air travel. Ocean-going shipping lies at the heart of the international economy, serving more than 90% of global trade through transportation of cargo.



The Malacca Straits into Singapore is one of the most congested shipping channels in the world. Credit: marinetraffic.com and Google Maps.

Various historical case studies of disruption of maritime traffic informs scenarios of potential future shocks to the global shipping system. A sample case study examines the rise of pirate attacks in the Malacca Straits from 2000 to 2005. The Strait is a critical global choke point between the Indian Ocean and the South China Sea, with millions of barrels of oil and millions of tonnes of cargo passing through each day. After 2001, the frequency of piracy attacks in the Straits forced insurance rates to rise and threatened the viability of the route – leading shippers to use alternate lanes and create new hub ports. Ultimately, political enforcement solutions kept this critical oceanic highway open, but the piracy shock levied significant costs.

Energy Investment Risks

The capital intensive nature of energy production, together with long timescales for returns and non-storability of electricity, accentuates the challenges that uncertainty brings to the deregulated electricity industry. Financial hedging of risk is limited. For example, the economic viability of a plant may be more sensitive to regulatory issues, such as revisions to corporate tax regimes or the functioning of the carbon emissions market, than to more widely appreciated uncertainties like fuel prices and the rate of progress of new technologies. The goal of this research is to embed risk into planning, e.g., to step beyond traditional risk neutral valuations by accounting for risk aversion, and to provide a longer term industry view by understanding market and regulatory structures.

Measuring Risk: Credit Estimation and Ratings

This research explores credit rating models to better understand the impacts of future externalities and their ratings implications. Traditional credit models based on accounting measures provide an incomplete picture of a firm's prospects and risks. Off-balancesheet risks such as regulation, corporate governance, environmental factors, consumer sentiment, and natural resource usage have yet to be adopted within the accounting and credit modelling system. Additionally, this research explores whether companies are sufficiently provisioning capital for asset retirement obligations and accidents that are not covered by insurance. Companies within the mining, industries and power sectors are likely candidates for analysis given the significant operating costs and potential impacts of natural resource usages to these companies. This research seeks to understand if modelling the usage of natural resources provides better future cost projections and refines the credit rating analysis process and rating for companies.

Corporate Risk Governance

At the sector level, risk research in corporate governance relates to board-level structures and processes, firm performance, executive pay and incentives, and mergers and acquisitions. Within the firm, research addresses the broad question of effective structures and operational processes including metrics, compliance, reporting and information feedback loops. Understanding the link between operations and governance requires knowledge of institutional norms, some from external bodies like regulators and rating agencies, organisational culture and – looking up to the board level – leadership. We highlight an area that is developing rapidly to the benefit of boards: reverse stress testing, which is used to push the assessment of robustness or resilience of an enterprise beyond the reconstruction of familiar scenarios.

Cambridge Risk Framework

Taxonomy of Macro-Threats

A framework for categorising socio-economic threats and collecting structured data



The system shock research programme is being developed on our website at http://systemshock.org.uk/ . We invite comments and suggestions on the taxonomy of macro-threats and other components of the project. Please register on the site to provide feedback and be kept informed of project developments.

Overview and Project Background

The Centre for Risk Studies arises from shared interests by the participants in exploring areas of intersection between

- · Catastrophe modelling and extreme risk analytics
- Complex systems and networks failures

The Centre strives to advance the scientific understanding of how systems can be made more resilient to the threat of catastrophic failures

- Complexity science and network mathematics are being used to assess the non-linear behaviour of networks
- Real-world examples of networks are being identified where data can be obtained
- Involvement of leading academics in complexity and networks

Objectives of System Shock Project

To develop 'coherence' (realism) in impact assessment of shocks on business, social and economic systems

- Ensure that the consequences of scenarios can be evaluated consistently with known processes and laws
- Understand the mechanisms of how shocks impact the networks of relationships of trade, business and macro-economics

To develop a rigorous framework for horizon-scanning to identify potential threats of socio-economic catastrophe

- Develop a taxonomy of macro-threats
- · Document the state of knowledge about each threat

To identify a set of scenarios that can be used as stress tests that are

- Consistent
- Objective, transparent and evidence-based
- · Useful in business decisions

Cambridge System Shock Research Programme

A Shock to the System

The Research Programme of the Centre for Risk Studies

The University of Cambridge Centre for Risk Studies is coordinating an innovative research programme into systemic risk: the impact of macro-catastrophes on the global networks and systems that underpin modern society.

The research framework explores the wide range of potential causes of systemic shock, to develop methodologies and data structures for analyzing how different types of shocks cause economic losses and societal disruption, and to create techniques for simulating the propagation of a shock through economic and financial networked systems.

The approach uses representations of economic relationships and financial networks as complex systems and applies complexity theory to explore the broader impacts of localised destruction and disruption on trading partners, investment flows and international financial markets. Complexity science and catastrophe theory provide an underlying mathematical and scientific basis for studying phenomena associated with tail events, catastrophic failures and their effects on the wider community. The research programme has three principal tracks:

- **Taxonomy of Shock Threats** Development of a catalogue and information resource on potential causes of macro-catastrophes.
- Systems at Risk

Representations of economic and social networks, business systems, assets and their inter-relationships.

Shocking the Systems

Understanding how shocks affect economic and social networks: developing methodologies for impact assessment, quantitative models, and analytical tool-kits. Developing coherent shock tests is a major objective of the *Shock to the System* research programme. Coherence requires that the systems behave realistically and in accordance with known principles.

Modeling shocks on networks is a relatively young science. This research programme explores the mathematical models and inference systems that may be useful in estimating the impact of shocks on socio-economic outcomes.

Helping to Define the "System" in Systemic Risk

Threat Scenarios



Network Response



Business Impacts



Threats

- Regional Conflict
- Financial Shocks
- Trade Disputes
- Geopolitical Conflicts
- Political Violence
- Natural Catastrophes
- Climatic Catastrophes
- Environmental Catastrophes
- Technological Catastrophes
- Disease Outbreaks

Networks

- Air Travel Network
- Trading Networks
- Shipping Network
- Banking Network
- Business Travel Network
- Energy Supply Network
- Communications Network
- Business Supply Chains

Systems

- Global Economy
- Macro-Economic Systems - GDP
 - Employment
- Investment Assets
 - Equity Market
 - Fixed Income Market
 - Exchange Rates
- Business Operational Systems
 - Profitability
 - Continuity Metrics

Evaluating the Full Range of Potential Shocks

Network Modelling Approaches for Economic Systems

Real world systems, such as a banking network, a business supply chain and international trading relationships can be considered as 'networks'. The mathematics of networks can be used to understand how to develop resilient systems for business and finance. 'Resilience' requires understanding the performance of networks and how they change when shocked,.

Many real-world networks are complex diagrams of nodes and links, consisting of clusters around hubs ('high-order nodes') and localised sub-systems ('Components'). Risk management for networks consists of:

- Design: Creating or modifying the network architecture, considering the costs of nodes and links
- **Defense:** For a given configuration of network, 'defending' nodes and links by investing in making them harder to degrade in an attack

By measuring the **Value Functions** for a network, strategies can be optimised to defend against an 'attack' that degrades or removes nodes or cuts links.

The research programme on systemic shocks aims to use real-world data to draw out business resilience strategies from network theory.



Topology of Global Banking Network After: Minoiu, Camelia, Reyes & Javier; 2010; *A network analysis of global banking: 1978-2009*; IMF Working Paper

How the March 2011 Tohoku Catastrophe Affected Japan's Trading Partners in the Rest of the World



The Tokohu catastrophe in Japan compounded a magnitude 9.0 Mw earthquake, with the 20 metre tsunami that followed it, and an INES6 meltdown of the Fukushima nuclear power plant. Reconstruction costs and productivity losses are estimated at over \$200 Bn, at a time that Japan is already crippled by debt. A major consequence of the nuclear disaster has been the political fall-out of nuclear energy production. The implications for global energy strategies continue to unfold. The disaster caused lengthy disruption to Japanese economic productivity, with power cuts continuing for many months. Japan contains many manufacturing 'choke-points' of specialist supplies for global brands. Tracking the consequences of this system shock provides data to understand how future shocks from other different types of threats may ripple through the economic systems and commercial supply chains of the world, and provides insights into more resilient planning and risk management strategies.

Cambridge Centre for Risk Studies' Team Biographies



Dr Gary Bowman is a Research Associate in the Centre for Risk Studies, Cambridge Judge Business School. Specialising in scenario planning, organisational sensemaking and strategy, Gary has taught at the Universities of Strathclyde and St Andrews, and has consulted for a variety of public and private sector institutions on scenario-based

strategic planning. He holds an MA and PhD from the School of Management, University of St Andrews.



Dr. Andrew Coburn is a member of the senior management team of Risk Management Solutions, Inc. (RMS), the world's leading provider of catastrophe risk analytics for the insurance and financial services industry. Dr. Coburn is one of the leading contributors to the creation of catastrophe models that over the past 20 years have become an accepted part of business

management in financial services and in public policy making for societal risk. Dr. Coburn has extensive experience in developing models and using them for business decision support. Dr. Coburn is Director of the External Advisory Board for the Cambridge Risk Centre. He earned a PhD from Christ's College, Cambridge.



Professor Peter Landshoff is Director of Community Engagement at the Centre for Risk Studies. Peter was head of the University of Cambridge's School of the Physical Sciences when he retired in 2004 from his Professorship of Mathematical Physics. His research had been on the physics of quarks. He played a leading role in the creation of a number of new projects in the

University. Peter has been working to improve transport information systems and has become involved with a number of organisations that are trying to have a positive influence on the way the East of England is developing: the regional civic societies, the regional RSA, and Cambridge Past, Present & Future.



Professor Danny Ralph is a Founder and Academic Director of the Cambridge Centre for Risk Studies, 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 Judge Business School. His research interests include optimization methods, equilibrium models for electricity markets, and risk in business decision making. He is Editor-in-Chief of Mathematical Programming (Series B).



Michelle Tuveson is a Founder and Executive Director of the Cambridge Centre for Risk Studies. She has worked in the technology sector for the majority of her career, 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 organization, MITRE

Corporation. Her research interests include machine learning applications for modelling risk measurements. She has been 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 is a member of Christ's College Cambridge.



Camilla Burgess is the Events and Operations Manager at the Cambridge Centre for Risk Studies. She acts as the first point of contact for the Centre and works closely with the team, organising events and providing administrative support. Camilla has worked for the University of Cambridge for over three years. Previously, she worked at the Faculty of Education. Prior to this,

she studied at the University of Leeds and is currently studying parttime for a BSc (Hons) in Building Surveying at Anglia Ruskin University.



Jemma Green is a Vice President at J.P. Morgan, overseeing Environmental & Social Risk for the Investment Bank globally. Within her current role, Jemma reviews and advises clients on transactions in high risk sectors such as mining, oil and gas, forestry, power, carbon and heavy industries in terms of environmental and social performance, mainly in emerging markets. Jemma is a candidate

for the Master of Studies for Sustainability Leadership in the Cambridge Programme for Sustainability under the supervision of Professor Daniel Ralph at the Cambridge Centre for Risk Studies.



Adrian Leonard is a PhD candidate in the Faculty of History studying under Professor Martin Daunton, supported by the Cambridge Centre for Risk Studies and the Centre for Financial History at Newnham College. Adrian's project for the Centre for Risk Studies will investigate and analyse the development of risk

modelling, the systems used to calculate future financial liabilities arising from or affected by uncertain events. His main area of interest is marine insurance in Britain and the British Empire from the seventeenth to nineteenth centuries.



Simon Ruffle is Director of Technology for the Cambridge Centre for Risk Studies. Simon focuses on methods for the computation of risk including cloud-based open source technologies, supply chain network modelling and visual representation of extreme global risk. His experience includes development of systems for geospatial risk pricing for primary insurance,

catastrophe modelling for reinsurance, and analysis tools for placing catastrophe bonds in the capital markets. Simon is a graduate of St Catharine's College, Cambridge.



Dr Ruth Whaley is Director of Corporate Development for the Cambridge Centre for Risk Studies. Ruth is based in New York and is Senior Consultant at The Regulatory Fundamentals Group (RFG), which provides advisory services on the impact and implementation of regulatory change for financial service companies. For the past 10 years she was the Chief Risk Officer of MBIA,

member of the Executive Committee and managed credit, market and operational risk across the firm. Earlier positions included corporate banking at UBS and Citibank in leveraged finance and energy. Ruth is an alumnus of Cambridge and Harvard University, and a Barbara Bodichon Fellow at Girton College.

Cambridge Centre for Risk Studies A Year in Review



Cambridge Risk Debates in Association with Bloomberg

Perspectives on the Future of the Energy Sector: Energy Investment and Insurance Risks

London

Cambridge Centre for Risk Studies and Bloomberg hosted a stimulating debate on the future of energy investments and insurance risks in light of recent global crises. A diverse panel of academics and industry leaders openly debated the future risks associated with nuclear energy expansion after Fukushima, geo-politics, new energy, business continuity, and "super" models.







Cambridge Systemic Risk Research Kick-off Meeting

New York City

Top issues around modelling systemic risks for the financial industry were discussed to support the kick-off activities of the Cambridge Risk Centre's research project. Coherent stress testing for robust financial risk management emerged as a key focus area for the first year's efforts. Discussants also included research collaborators at Columbia Business School, Deloitte, and RMS.



Cambridge Centre for Risk Studies' Programmes for Resilience in Resource Risk Management

"System - of - Systems" Thinking - Better understanding the limitations to key resource needs through improved systems methods and gaining insights through security of supply perspectives.



Foreseer - Future Resource Pathways Project at University of Cambridge

The BP funded Foreseer project at the University of Cambridge is creating an online tool to visualise the influence of future demand and policy choices on the coupled physical requirements for energy, water and land resources in a region of interest. The current prototype is based on scenarios to 2030 in the region of California. The Centre for Risk Studies is one of the University of Cambridge partners in this project which also involves partners from Engineering, Applied Mathematics, Geography and Plant Sciences. Foreseer is the University of Cambridge contribution to BP's Environment and Sustainability Challenge, a project which is investigating the influence of resource stress on the future global energy system, and which is coordinated across 13 universities and 4 continents.





Cambridge Centre for Risk Studies as Academic Partner at NTU-ICRM's 2nd International Symposium on Catastrophe Risk Management

Singapore

This conference addressed the key theme of public-private partnerships, within the context of managing potential risks of climate change on food and water security.

The Symposium highlighted key areas associated with food and water security:

- The impacts of extreme weather on food and water resources
- Mitigation and adaptation strategies for security of supply
- Financial & Insurance Instruments for Catastrophe Risk
 Management
- Recent natural disasters and implications to risk
 management

Cambridge Centre for Risk Studies A Year in Review



Cambridge Risk Event in Association with Sotheby's Institute of Art

Exploring Risk and Uncertainty: Metaphors from the Art Market

London

This research-based conference investigated the nature of risk and uncertainty using metaphors from the art market with an aim to draw novel inferences and develop insights relevant to both the art world and other fields.

This conference further developed the themes covered in the Centre's Second Annual Meeting around culture, governance, and the social component of risk. Amongst many aspects, this included perception and rationality in markets, role of sentiment indicators from media, effects of certainty and confidence on valuations, and behavioural models in decision theory. Risk and its influence on creativity and innovation is a central perspective of the Centre's research programme.

In recent years, art has become big business in ways not seen since the Dutch golden age. Once the preserve of a small elite, the explosive growth of the art world has brought it to international attention and created opportunities for incumbents and new entrants. The market for art has increased in both size and scope with the expansion of emerging economies and the global widening of income distributions. The parallel growth of the financial markets has driven the evolution of art as an asset class and an investment option. As well as challenges, the growth of the art market has offered exciting opportunities for the creation of both economic wealth and symbolic and cultural capital. These changes have also introduced new forms of uncertainty, volatility and risk to the art world and its participants.



Cambridge Centre for Risk Studies & Department of Engineering Student Journal Club

Decision Making under Uncertainty - Methodologies from Signal Processing & Forecasting

This jointly sponsored journal club will bring students from the engineering and business communities together to review seminal literature around decision theory in the context of signal and information processing.



Cambridge Risk Centre an Academic Partner at Morningstar's European Investment Conference

Energy and Investment: A European Perspective

Vienna

The "20-20-20" European Renewable Energy Directive has prompted moves to low carbon energy production. Due to the intermittency of renewable sources like solar and wind energy, a massive investment in the European Union power grid and in an equally massive shift in grid management, from decentralised to centralised pricing and dispatch, are needed. What are challenges and risks? Increased linkages and complexity pose technological and political threats. Progress at the European level is essential:

- 1. Setting up institutions for investment.
- 2. Effective authorization for cross border projects centralised mandates?

3. Transparency and long term commitment for project financing. Institutional investors will be vital in a programme of this scale. This gives investors a lever: What are the EU-level developments in the investment environment that will make it attractive for them to participate in the low carbon challenge?

Risk Field Study: Reconstruction in China

Assessing Drivers for Positive Social Change

Cambridge Centre for Risk Studies' Director of the External Advisory Board, Dr Andrew Coburn, continues field study work of damage site in Dujiangyan, China.

As part of a team surveying the damages after the 2008 Wenchuan Earthquake in Sichuan province, Dr Andrew Coburn returns in 2011 to witness the reconstruction results and its economic and social impacts.

The Wenchuan Earthquake killed 70,000 people, injured 370,000 and left 5 million people homeless. It was the most destructive earthquake to hit China for thirty years. This summer he returned to document the extraordinary feat of completing reconstruction in just three years. The authorities in China have invested around \$150 billion in rebuilding, replacing all the homes and providing new civic amenities and transport networks across a 600 km region that is home to 16 million people.

The authorities used the opportunity to build new modern infrastructure and high-quality property to drive a new wave of economic growth. The financial stimulus to the region has boosted economic growth and created a magnet for new external manufacturing investment. As a result, buildings have been built to new seismic codes and the surroundings made less vulnerable to future shocks.



Dujiangyan, China (2008): Ruined by the Earthquake



Dujiangyan, China (2011): Completely Rebuilt

Cambridge Centre for Risk Studies A Year in Review



Cambridge Risk Centre Contributes to UK Government Planning

Blackett Review Panel for Strategic Shocks: High Impact-Low Probability Events Facing the UK

The UK's Government Chief Scientific Adviser, Sir John Beddington, convened a panel of experts in the field of Risk Management. This panel explored how the UK Government could best identify and plan for high impact / low probability 'black swan' events. Dr Andrew Coburn, The Risk Centre's Director of the External Advisory Board, and Professor David Spiegelhalter, Winton Professor of the Public Understanding of Risk, were two invited members from Cambridge for the Blackett Review. The panel brought together academics, industry, and government scientists to address the strategic issues of preparedness and the UK Government's use of risk analysis techniques to avoid strategic shock. It examined a range of issues including the national risk assessments and definitions of 'reasonable worst case' preparedness scenarios. The efforts resulted in a published set of recommendations to the UK Government Cabinet Office.

CSaP Policy Fellows Involved in National Risk Assessments and Civil Contingency Planning

The Centre for Risk Studies hosted government officials visiting the University as part of the Policy Fellows Programme of the Cambridge Centre for Science and Policy (CSaP). The CSaP programme is intended to provide an insight into the role which the sciences and engineering can play in the formulation of public policy.

Officials involved in risk issues visiting the Centre for Risk Studies have included:

- Head of Civil Contingencies Team, Government Office for Science
- · Head of Civil Contingencies and Health and Biotechnology, Government Office for Science
- Deputy Director of 10 Downing Street Policy and Implementation Unit
- Deputy Director, Cabinet Office's Civil Contingencies Secretariat.



Risk Centre Technology Retreat - Setting the Scene for the Centre's Risk Framework

A weekend session brought Centre members together to brainstorm the next-generation, new technology architecture to address the current shortcomings in risk frameworks. A multi-disciplinary, open-source, and cloud-computing based approach was formulated to provide a consistent framework for capturing and analysing a wide variety of threats, networks and systems. Stakeholders will include industries interested in analytic capabilities with access to public and proprietary sources made available online.



Chief Risk Officer Roundtable Discussions

London

With CROs from a variety of financial services institutions, Cambridge Centre for Risk Studies was the Academic Discussant for SEBA International's CRO Dinner Discussions. The event offered the opportunity to discuss and reflect upon issues facing their respective institutions and best practices within risk management.



Highlights from the Cambridge Centre for Risk Studies' 2nd Annual Meeting

The Human Dimension of Risk – Perception, Behaviour, and Decision-Making in Risk Management

The Cambridge Centre for Risk Studies' Second Annual Conference addressed the culture, governance, and the social component of risk. Amongst many aspects, this included perception and rationality in markets, role of sentiment indicators from media, effects of certainty and confidence on valuations, and behavioural models in decision theory.

This conference addressed the theme of human interaction with risk by bringing together a wide range of disciplines, expertise, and knowledge areas. It was a forum for sharing experiences between academics, professional scientists, business practitioners, and government policy-makers.

Full meeting proceedings, including podcast interviews can be found on the Centre's website: http://www.risk.jbs.cam.ac.uk/news/annualmeetings





Cambridge Centre for Risk Studies

The Centre for Risk Studies is a multidisciplinary centre of excellence for the study of societal and economic risks. The Centre focuses on impact-oriented research relating to the analysis, assessment, and mitigation of global risks. Emphasis on relevancy to industry and government is an overarching perspective of the Centre's activities and engagements.

Cambridge Connection:

Cambridge Judge Business School is uniquely positioned to draw together disparate research programmes from across the University of Cambridge, and serve as the platform for dialogue and development with external organisations and policy-makers. The Centre drives the intellectual momentum and pools key elements from these research groups to create a coherent research unit focused on developing strategies for risk management.

Centre's Objectives:

- Integrate Cambridge University's academic offerings for public and private sector risk research
- Provide a base for coordinating and sponsoring multi-disciplinary research projects
- Establish frameworks for modelling risks and decision making
- Contribute to publications for dissemination to government, academia, and industry
- Pursue private and public sector funding

The Core Team at the Centre

The Centre is a hub for a growing network of faculty, fellows, associates and students at the University of Cambridge.



Dr Gary Bowman Research Associate



Adrian Leonard Risk Researcher



Camilla Burgess Events and Operations Manager



Professor Daniel Ralph Academic Director



Dr Andrew Coburn Director of External Advisory Board



Simon Ruffle Director of Technology



Jemma Green Risk Researcher



Michelle Tuveson Executive Director



Professor Peter Landshoff Director of Community Engagement



Dr Ruth Whaley Director of Corporate Development



Cambridge Centre for Risk Studies at University of Cambridge Judge Business School

History of the Centre

The Cambridge Centre for Risk Studies was established in 2009 as a product of several activities throughout the Cambridge community including the Cambridge Complexity Consortium with sponsorship from the business sector. The Centre is hosted by the University of Cambridge Judge Business School to provide an academic centre of excellence for the broader Risk community. The Centre is seeking capital campaign opportunities for establishing a named Professorship in Risk Studies at the University of Cambridge.





Resilience through the Management of Societal & Economic Risk

Cambridge Centre for Risk Studies

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