

Centre for Risk Studies
23 January 2014

Advisory Board Meeting

Centre for
Risk Studies



UNIVERSITY OF
CAMBRIDGE
Judge Business School

Agenda

- 14:00** Welcome and Introductions *Dr. Andrew Coburn*
- 14:30** Report on Past Year's Activities *Dr. Michelle Tuveson*
Research Development Strategy *Prof. Daniel Ralph*
- 15:00** Discussion Topic: Centre Development Strategy
- 15:30** Coffee and Tea
- 16:00** Research Themes 1 & 2
1: Global Complex Risk Landscape *Dr. Andrew Coburn*
2: Complex Business Exposure *Simon Ruffle*
Discussion Topic – Research Themes 1 and 2
- 16:40** Research Themes 3 & 4
3: Financial Catastrophe Risk *Dr. Andrew Coburn*
4: Resilient International Supply Chains *Prof. Daniel Ralph*
Discussion Topic – Research Themes 3 and 4
- 17:20** Research Theme 5 and Research Programme Prioritization
5: Cyber Catastrophe *Simon Ruffle*
Discussion Topic – Research Theme 5 and Research Programme Prioritization
- 18:00** Closing Remarks



Centre for Risk Studies Advisory Board Meeting
23 January 2014

Past Year of Activity

Centre for
Risk Studies



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Dr Michelle Tuveson
Executive Director

Past Year of Activity at Centre for Risk Studies

Topics

- Brief background and mission
- Governance structure
 - Executive team
 - Researcher
 - External collaborators
- Strategy review
- Engagement activities
- Financial review

University of Cambridge Centre for Risk Studies



Current research tracks include:

- Emerging risks and systemic risk in insurance management
- Resiliency in International Supply Chains (RSIC)
- Financial crises and systemic risk in banking (FinCat)
- Risk governance and corporate risk strategy

Research Supporters



Thematic links between projects are complex systems and shocks – ‘complex risks’

Academic Collaborators



Cambridge Risk Framework is an approach and toolkit for researching systemic shocks

Risk Centre Scenario Project Team & Roles



Prof. Danny Ralph

Academic Director, Centre for Risk Studies
Reviewer, business supply chain aspects



Dr. Andrew Coburn

Director of External Advisory Board
Research lead; Pandemic & Civil Disorder spec



Dr. Gary Bowman

Research Associate, Centre for Risk Studies
Narratives, operational impacts; Conflict spec



Dr. Fabio Caccioli

Research Associate, Centre for Risk Studies
Financial System and Banking impacts



Dr. Roxane Foulser-Piggott

Director, Cambridge Architectural Research
Datasets; vulnerability and GIS support



Richard Hartley

Co-Founder, Cytora
Domain specialist for conflict and civil disorder



Samantha Cook

Chief Scientist, Financial Network Analytics
Investment Portfolio Shock Assessment



Dr. Michelle Tuveson

Executive Director, Centre for Risk Studies
Project oversight, programme coordination.



Simon Ruffle

Director of Technology Research
Technical architecture & framework; Cyber spec



Dr. Louise Pryor

Actuary and Risk Specialist, Centre for Risk Studies
Investment portfolio modelling



Dr. Scott Kelly

Macroeconomic Researcher, Centre for Risk Studies
Macroeconomic modelling



Hannah Baker

Cambridge Architectural Research
Datasets, mapping, and GIS



Josh Wallace

Co-Founder, Cytora
Domain specialist for conflict and civil disorder



Dr. Andrew Auty

Director, Re: Liability (Oxford) Ltd
Specialist on legal liabilities

Cambridge Centre for Risk Studies Governance Structure

Cambridge Centre for Risk Studies

Executive Team

- Professor Daniel Ralph, Academic Director
- Dr. Michelle Tuveson, Executive Director
- Dr. Andrew Coburn, Director of External Advisory Board
- Simon Ruffle, Director of Technology Research

Research Team

- Dr Gary Bowman, Research Associate
- Dr Fabio Caccioli, Research Associate
- Dr Scott Kelly, Research Associate
- Benjamin Leslie, Risk Researcher
- Dr Louise Pryor, Risk Researcher
- Andrew Skelton, Risk Researcher

Advisors and Fellows

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

Consultants & Collaborators

- *Full list in brochure*

Administration

- Louise Gutteridge,
Operations Manager

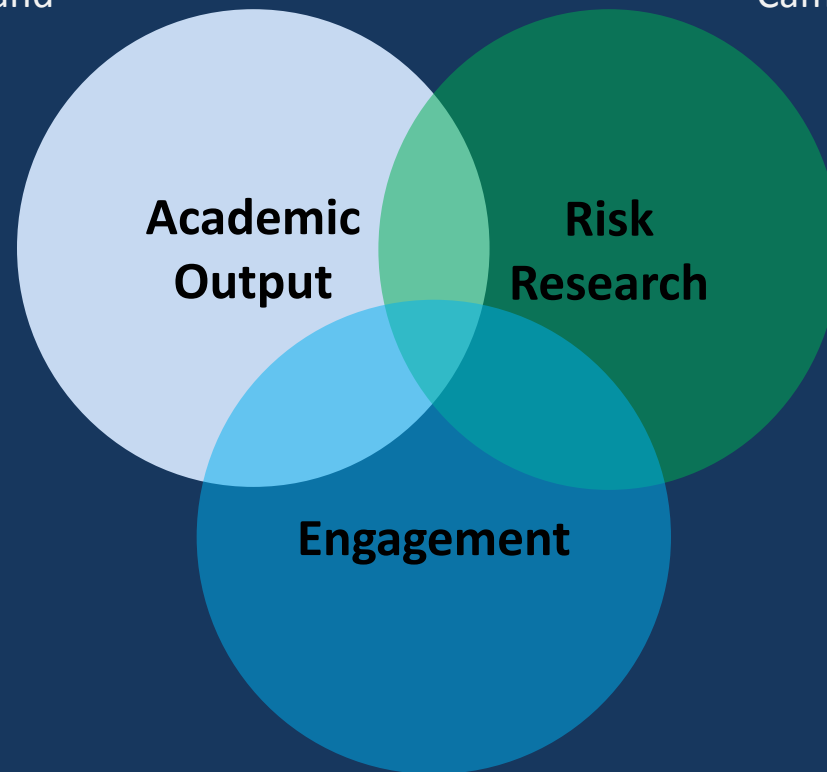
Centre's Strategy Review

Academic Output

Contributing to Business School
Teaching programmes and
Journal Publications

Risk Research

Developing the
Cambridge Risk Framework
and methodological
advances



Academic
Output

Risk
Research

Engagement

Engagement

Collaborating with business and government leaders

Cambridge Centre for Risk Studies

Past 5 Years: Strategy Review

2009	2010	2011	2012	2013
Start-up Year <ul style="list-style-type: none"> • 1st Risk Summit • Develop CU relationships • Establish Centre brand • Acclimate to JBS 	Fundraising Year <ul style="list-style-type: none"> • Develop corporate relationships • 2nd Risk Summit • Fundraising Phase 1: General sponsorship and research • Form academic partnerships 	Research Planning Year <ul style="list-style-type: none"> • Fundraising for research • Technology Plan – Hire Director • Hire Research Associate • 3rd Risk Summit • Bespoke corporate engagements 	Risk Framework Year <ul style="list-style-type: none"> • Research publications • Research based meetings • Aspen Crisis & Risk Forum • Academic conference submissions & attendance • Develop Centre's Working Paper Series • Develop Cambridge Risk Framework website 	Framework Population <ul style="list-style-type: none"> • Hire additional research staff • Cambridge CRO Council events • Research based meetings • MBA activities; Risk Prize • Awards from ESRC & British Academy • Academic conference submissions & attendance • 4th Risk Summit

Outreach and Dissemination Activities



2009
Managing the Risk of Catastrophic Failure in Complex Systems



2010
The Human Dimension of Risk: Perception, Behaviour and Decision-Making in Risk Management



2011
Anticipating the Future: Risk Management for Long-Term Planning



2013
Risk and Strategy: Return versus Resilience



Engagement and Events

■ Engagement

- Cambridge CRO Council Discussions
- Centre's Annual Risk Summits
- Aspen Crisis and Risk Forum
- Co-branded workshops and meetings

■ Risk Research

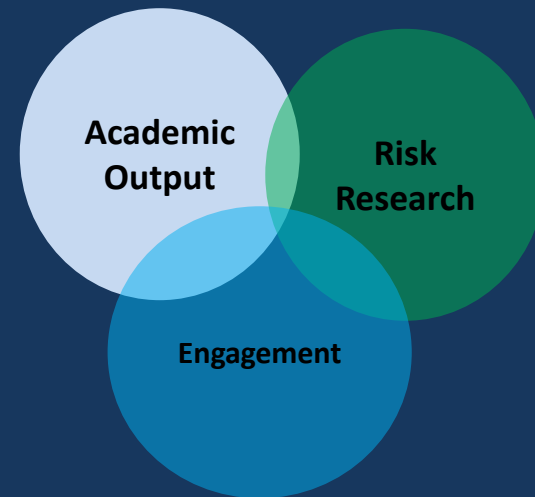
- Supply chain
- Cyber-security
- Financial Catastrophe

■ Academic Output

- MBA Elective in Risk Management; Risk Prize
- Academic journal publication related events

Academic Output -
Contributing to
Business School
Teaching
programmes and
Journal Publications

Risk Research –
Developing the
Cambridge
Risk Framework and
methodological
advances



Engagement – Collaborating with
business and government leaders



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Research Development Strategy

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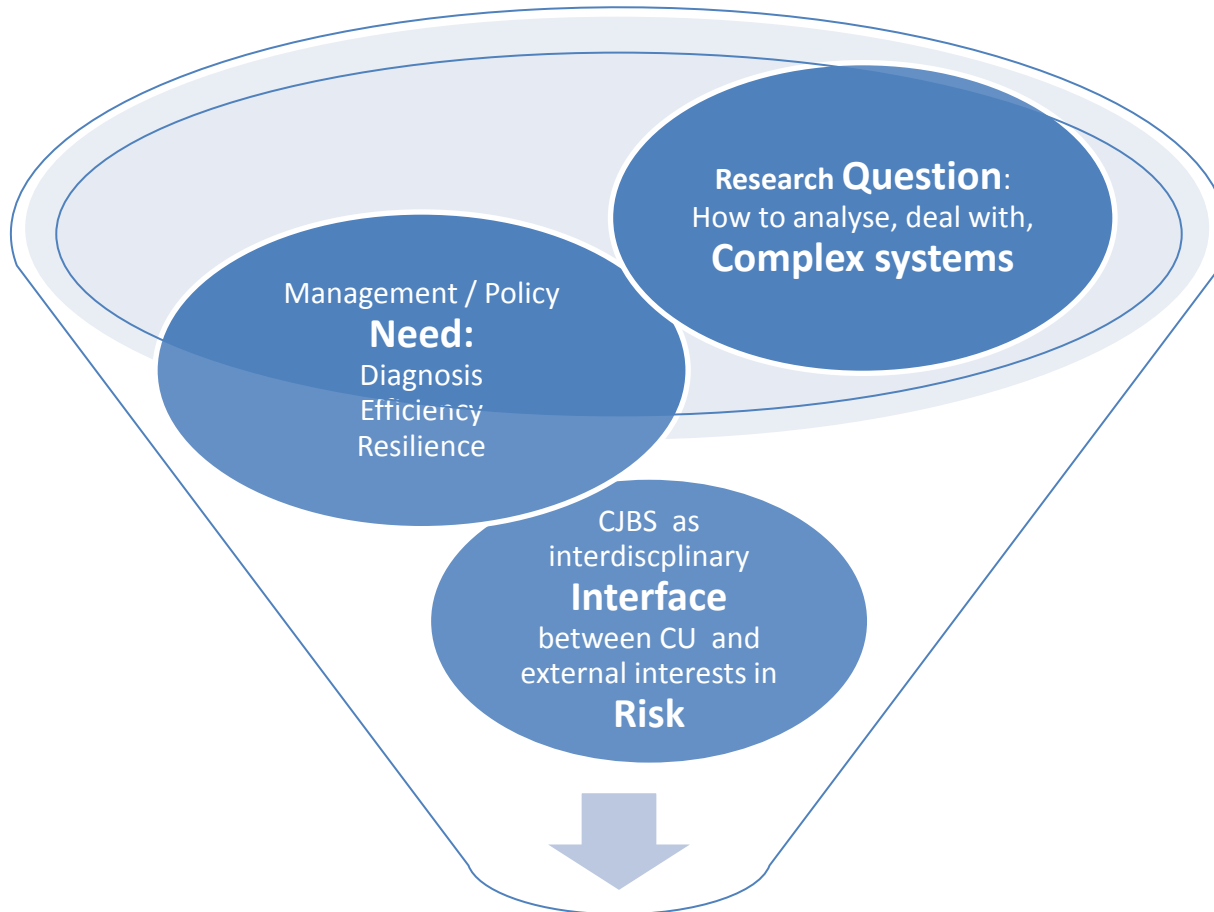
Professor Danny Ralph
Academic Director

Research Development Strategy at Centre for Risk Studies

Topics

- Overview of Centre's research strategy
 - Emergence
 - 2014 themes and activities
 - Looking ahead to 2018
 - Research Staffing
- Publication goals
 - Centre's Working Paper Series
 - Academic journal ambitions
- Recent additions
 - MBA programme participation
 - Cambridge-McKinsey Risk Prize

Emergence of Cambridge Risk Centre



Systemic risk
How firms /organisations

- understand
- manage

} risk

Emergence of Centre's Research Strategy

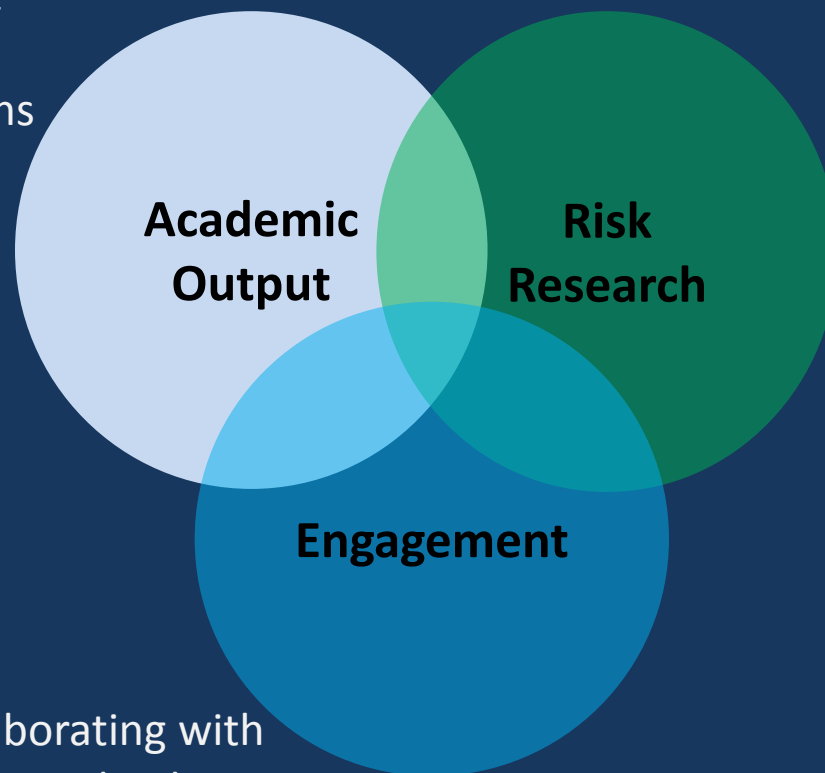
Academic Fit

Business School's

- *Deep Engagement*
- Teaching
- Journal Publications

Risk Research

Cambridge Risk Framework
and methodological
advances



Engagement – Collaborating with
business and government leaders

- Shorter term *Impact*
- Longer term *Direction*

2014 CRS Research Programme Themes



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 stability, contagion, and crises in financial networks



4. Insurability of International Supply Chains

- Developing metrics of loss, ‘efficient resiliency’, and benefits of improvements to global supply chains and business networks.








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 threats in the taxonomy.

Shorter Term Prioritization of Our Supporters

We'll be asking you to fill in your prioritization during this meeting



	BP	Catlin	ESRC	FS-KTN	HSBC	Lockheed Martin	McKinsey & Co.	Munich	NTU	RMS
 Global Complex Risk Landscape										
 Understanding Complex Business Exposure										
 Financial Catastrophe Risk										
 Resilient International Supply Chains										
 Understanding the Threat of Cyber Catastrophe										



High

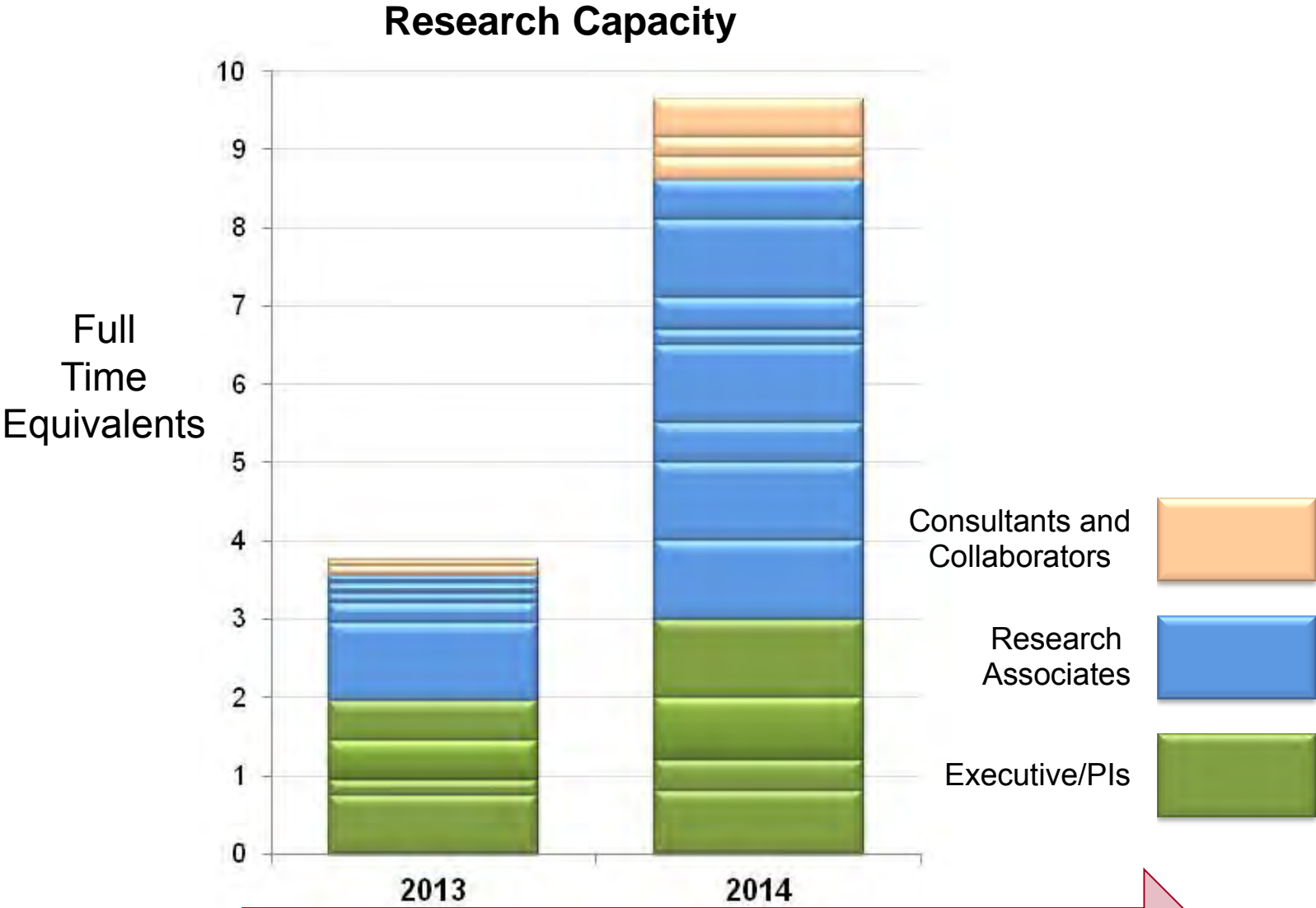


Moderate



Of Interest

Size of Research Team Deployed



An issue is sustainability of growth beyond 2014

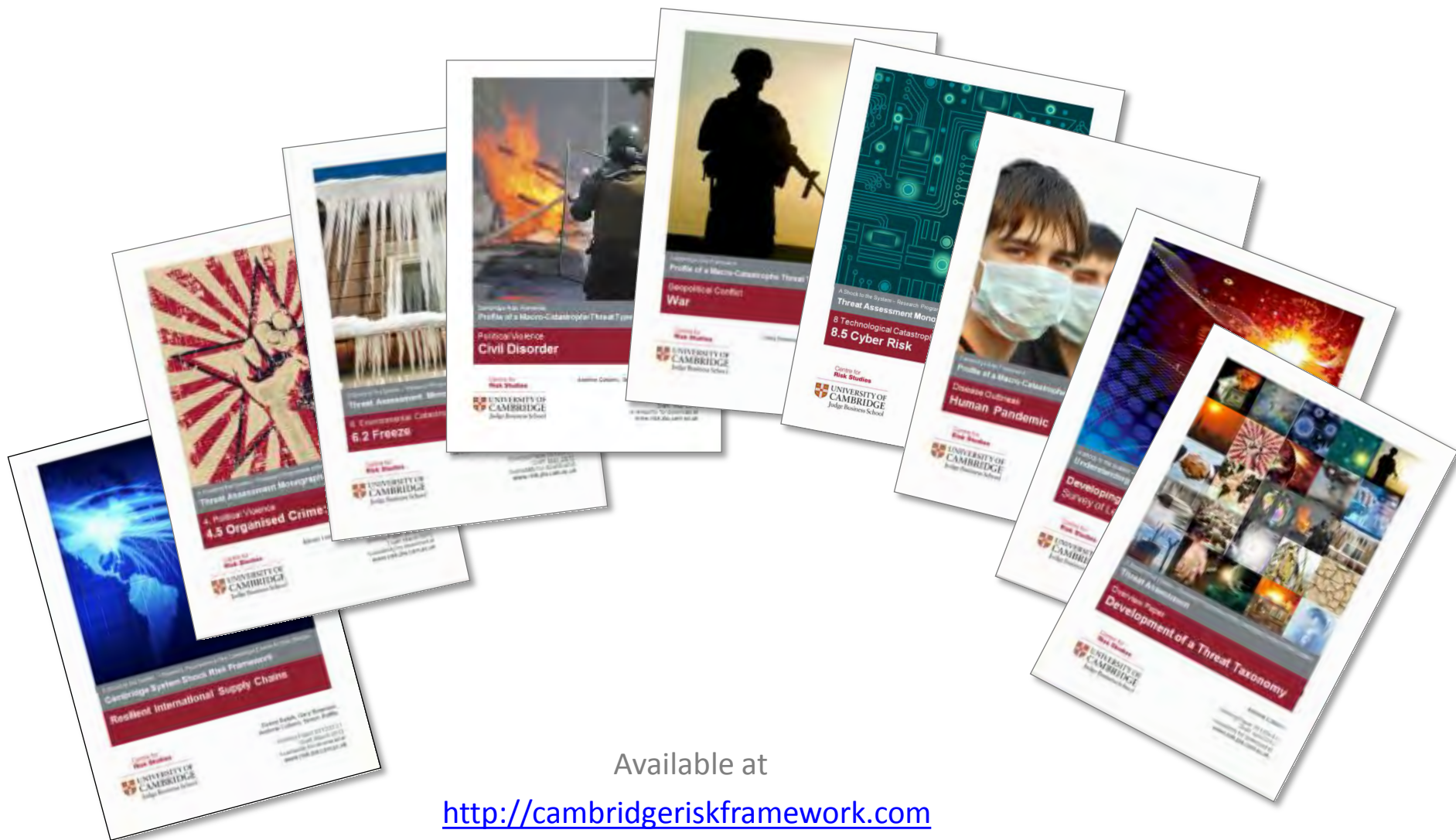
Publication Goals at the Centre for Risk Studies

Publication goals

- Centre's Working Paper Series is venue for
 - Risk Framework research output, cross disciplinary
 - Risk related working papers from academic disciplines
- Academic journal ambitions aimed at management
 - Recognised journals (e.g., from INFORMS, AoM, Economics)
 - Recognised practitioner reviews (e.g. HBR, Sloan Mgmt. R.)
- Cambridge Risk Framework book series
 - Currently in discussion with publishers

Risk Centre 2013 Outputs

Cambridge Risk Framework papers



Available at

<http://cambridgeriskframework.com>

CJBS MBA and Wider Programme Participation

■ CJBS MBA

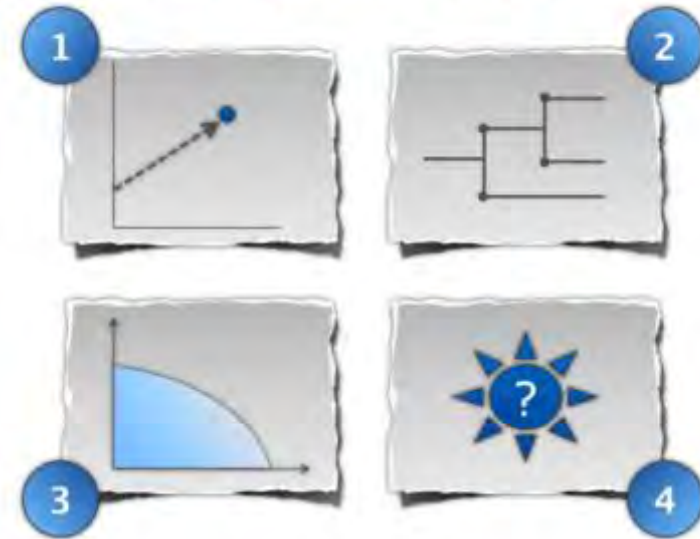
- elective “Risk Management and Strategic Planning”
- Faculty and guest speakers
- Topics include
 - Project and Enterprise Risk Management
 - Scenario planning process

■ Cambridge-McKinsey Risk Prize

- Student paper prize: Awarded at Risk Summit
- Coordinated with MBA elective
- Themes include: risk governance, risk in strategy, risk modelling, risk metrics

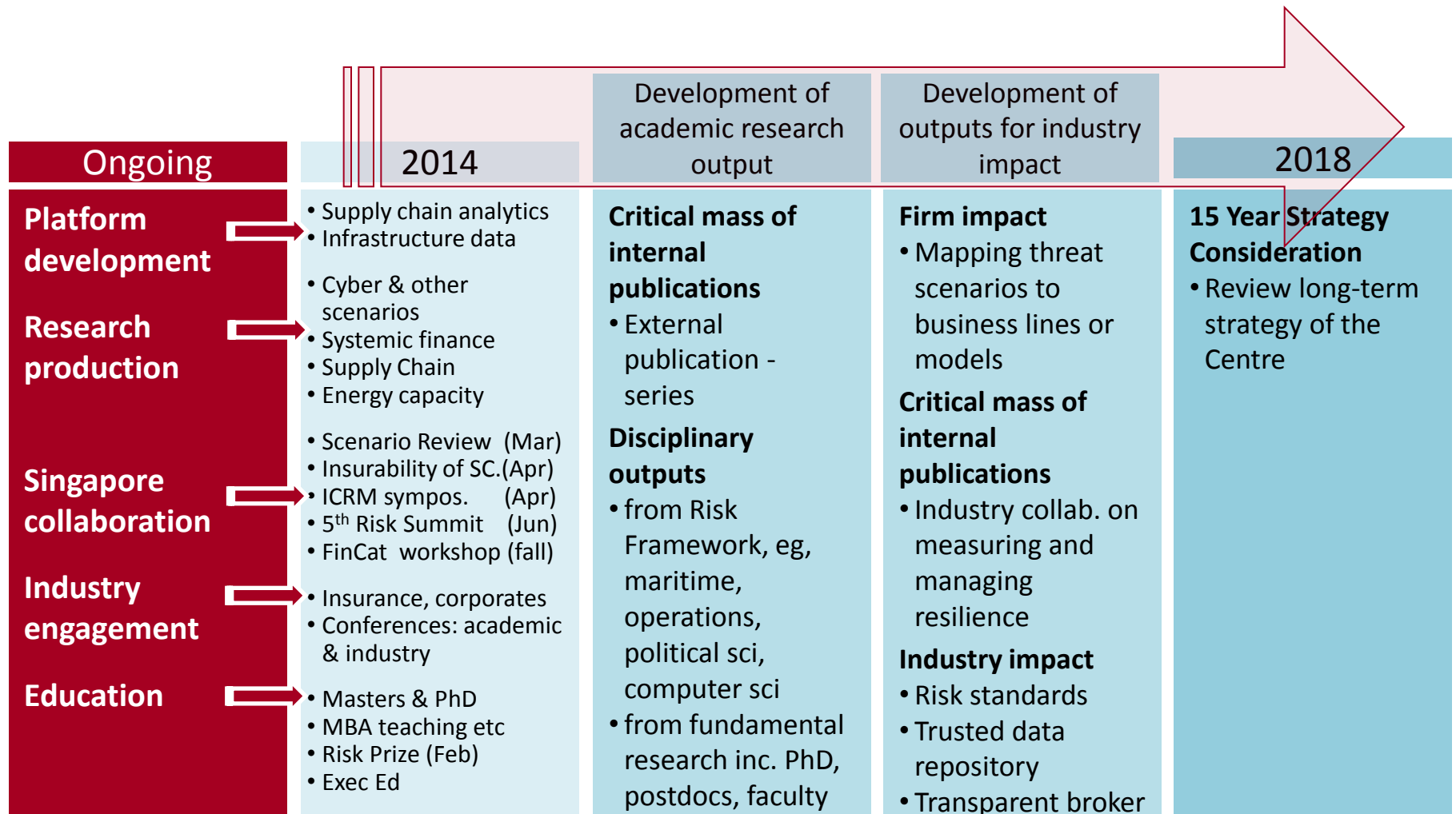


1.2 Knowledge: Levels of Uncertainty



Cambridge Centre for Risk Studies

Next 5 Years: Strategy Review



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?



Propositions

- Update risk summit concept to thematic workshops – i.e. not having a generalist risk summit after 2014
- Focus less on engagement, more on research and academic output?
- Lay the groundwork for risk governance research?



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Research Themes

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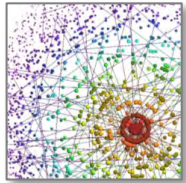
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3. Financial Catastrophe Risk

- Using the Cambridge Risk Framework to explore stability, contagion, and crises in financial networks



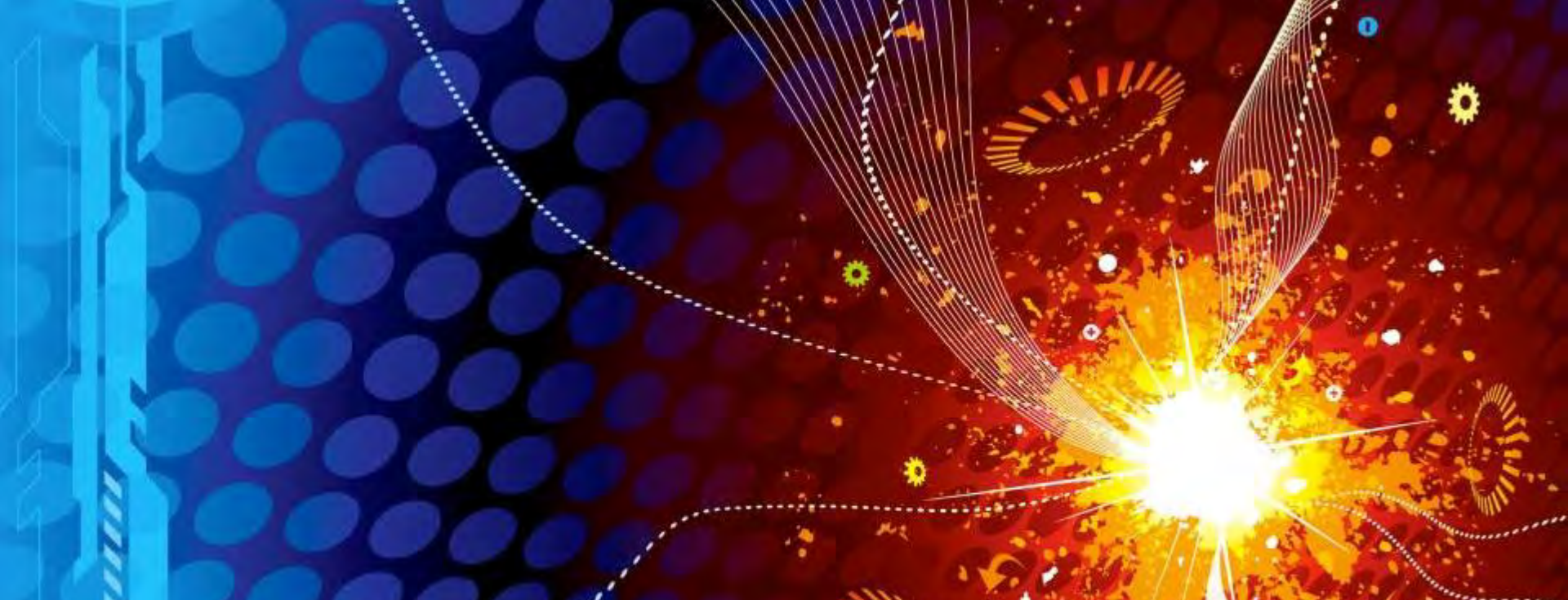
4. Insurability of International Supply Chains

- Developing metrics of loss, ‘efficient resiliency’, and benefits of improvements to global supply chains and business networks.



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 threats in the taxonomy.



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Research Theme 1
Global Complex Risk Landscape

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Dr. Andrew Coburn

Director of External Advisory Board
Centre for Risk Studies

Cambridge Risk Framework

Threat Taxonomy

Financial Shock

FinCat




Asset Bubble



Financial Irregularity



Market Crash



Sovereign Default



Bank Run

Trade Dispute

TradeCat




Labour Dispute



Trade Sanctions



Cartel Pressure



Nationalization



Tariff War

Geopolitical Conflict

WarCat




Conventional War



Asymmetric War



External Force



Civil War



Nuclear War

Political Violence

HaveCat




Terrorism



Separatism



Organized Crime



Assassination



Civil Disorder

Natural Catastrophe


NatCat





Earthquake



Windstorm



Volcanic Eruption



Flood



Tsunami

Climatic Catastrophe

WeatherCat




Drought



Freeze



Tornado & Hail



Electric Storm



Heatwave

Environmental Catastrophe

EcoCat




Sea Level Rise



Ocean System Change



Wildfire



Pollution Event



Atmospheric System Change

Technological Catastrophe

TechCat




Nuclear Meltdown



Industrial Accident



Cyber Catastrophe



Technological Accident



Infrastructure Failure

Disease Outbreak

HealthCat




Human Epidemic



Animal Epidemic



Waterborne Epidemic



Zoonosis



Plant Epidemic

Humanitarian Crisis

AidCat




Famine



Water Supply Failure



Child Poverty



Welfare System Failure



Refugee Crisis

Externality

SpaceCat




Meteorite



Solar Storm



Space Threat



Ozone Layer Collapse



Satellite System Failure

Other

NextCat




Can We Understand ...

Various types of emerging risks:



Pandemics



Social Unrest



Geopolitical Conflicts



Cyber

And assess their potential to cause:

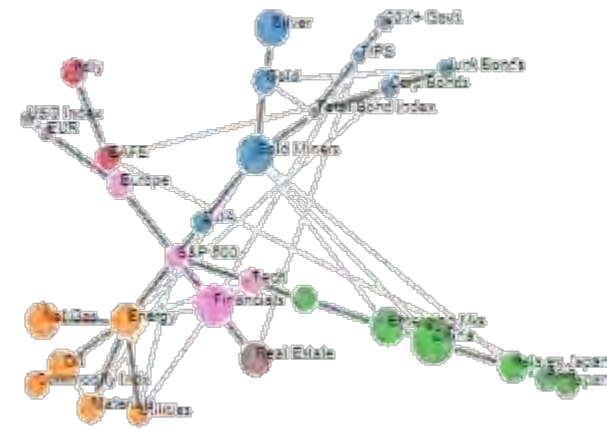
**Underwriting
Losses**



**Non-Underwriting
Operational Impact**



**Investment Portfolio
Impact**



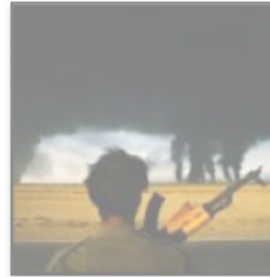
2013: Scenarios Development



Geopolitical Conflict

Sino-Japanese Conflict in the East China Sea

Regional conflict in South China Sea
embroiling multiple military powers
SME: Richard Hartley, Josh Wallace, Cytora;



Oil Price Shock

Regime Change in Saudi Arabia

Arab Spring event leads to western military
intervention triggering major oil price spike
*SME: Ivan Ureta, Geneva School of Diplomacy &
Richard Hartley, Josh Wallace, Cytora;*



Cyber Catastrophe

Sybil Logic Bomb Cyber Attack

Major compromise of commercial IT systems
by cyber attack

*SME: Rob Watson, Richard Clayton, Frank Stajano,
Cambridge Computer Labs; Éireann Leverett, I/O Active*



Banking Crisis

Bank run in Southern European

Run on banks in Greece and Cyprus causing
contagion through European financial system



Human Pandemic

Sao Paulo Flu Pandemic

Virulent influenza pandemic causes months
of absenteeism and economic disruption

SME: Mary Chang, Molly Sullivan, RMS



Climatic Freeze Event

8 week freeze in Northern Hemisphere

Severe and extended winter in Northern Europe
and East Coast USA



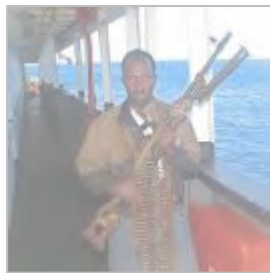
Social Unrest Risk

'Sack the Bankers'

Worldwide Protest Movement

Austerity-driven riots and strikes across
multiple cities in several Eurozone countries

SME: Ivan Ureta, Geneva Schl of Diplomacy



Piracy Crisis

Severe Piracy Activity in Horn of Africa

Intensity of piracy incidents increases to the point
that shipping patterns are impacted

Emerging Risk Seminar

20 March 2014

- Collaboration with Oxford Economics
- Guest speaker **Dr. Carl Astorri**, Senior Economist, International Macroeconomic Forecasting Team, Oxford Economics
- Presentation of three scenarios:
 - Geopolitical conflict (Sino-Japan war 3)
 - Human Pandemic (Sao Paolo Virus)
 - Cyber Catastrophe (Sybil Logic Bomb)
- Panel discussions about governance and best practice for managing complex risks and emerging risks

Panel Members

Confirmed Panel Members include

- Mark Chaplin, **Aviva**
- Rowan Douglas, **Willis**
- Kay Haggis, **Catlin**
- Matt Harrison, **Hiscox**
- Jeremy Hindle, **XL Group**
- Trevor Maynard, **Lloyds**
- Robert Muir-Wood, **RMS**
- Rainer Sachs, **Munich Re**
- John Scott, **Zurich**

Followed by dinner at
Downing College

Attendance through registration on
Risk Studies web site

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

Candidate Additional Scenarios in 2014

- Financial and economic scenarios:
 - Asset Bubble Burst
 - Sovereign Default Crisis
 - Hyperinflation Period
 - De-Americanization of economy
- Other potential stress test scenarios:
 - Volcanic eruption VEI 6
 - Solar Flare X-Class event
 - Extreme drought & heat wave
 - Ice shelf collapse & sea level rise

How Might One Crisis Trigger Another?



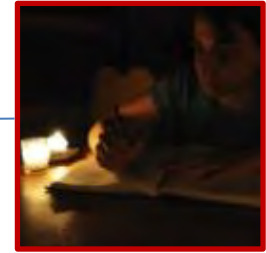
Geopolitical
Conflict



Financial
Crisis



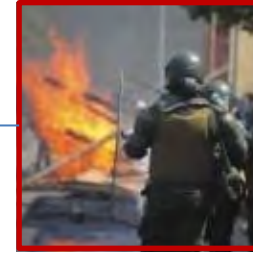
Trade
Disputes



Power
Outages



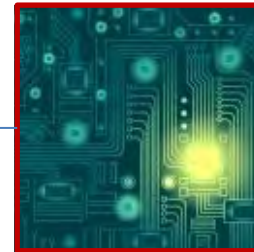
Sovereign
Default



Civil
Unrest



Organized
Crime



Cyber
Catastrophe



























Humanitarian
Crisis

Causal and Consequential Correlation of Threats

Consequential Threat

Primary Trigger

		Consequential Threat											
		1	2	3	4	5	6	7	8	9	10	11	12
		Financial Shock	Trade Dispute	Geopolitical Conflict	Political Violence	Natural Catastrophe	Climatic Catastrophe	Environmental Cat	Technological Cat	Disease Outbreak	Humanitarian Crisis	Externality	Other
													
1	Financial Shock		4	3	2	2	1	1	1	1	2	1	1
2	Trade Dispute		3	4	2	3	1	1	1	1	1	1	1
3	Geopolitical Conflict		3	2	4	3	1	1	1	1	2	1	1
4	Political Violence		2	2	3	4	0	0	0	3	3	2	1
5	Natural Catastrophe		2	2	2	1	4	2	3	3	2	2	1
6	Climatic Catastrophe		3	2	3	2	3	4	3	2	2	3	1
7	Environmental Catastrophe		3	2	2	2	3	3	4	2	2	2	1
8	Technological Catastrophe		2	2	2	2	2	2	0	4	1	1	1
9	Disease Outbreak		3	2	1	1	1	1	1	2	4	2	1
10	Humanitarian Crisis		2	2	3	3	1	1	1	1	2	4	1
11	Externality		3	2	2	1	3	3	3	3	2	2	1
12	Other												

- 0** No causal linkage
No ability to exacerbate
- 1** **No causal linkage**, but would exacerbate consequences if they occur
- 2** **Weak potential** to trigger threat occurrence
- 3** **Strong potential** to trigger threat occurrence
- 4** Ability to trigger **Other threats within same type class**

Further Development of the Cambridge Threat Taxonomy

■ Taxonomy version 1.0

- 2009-2010
- Initial 160 years

■ Taxonomy version 2.0

- 2011-2102
- Definition of thresholds & qualifying events
- 1000 years historical retrospective
- Included counter-factuals and conjectured categories
- Peer review process

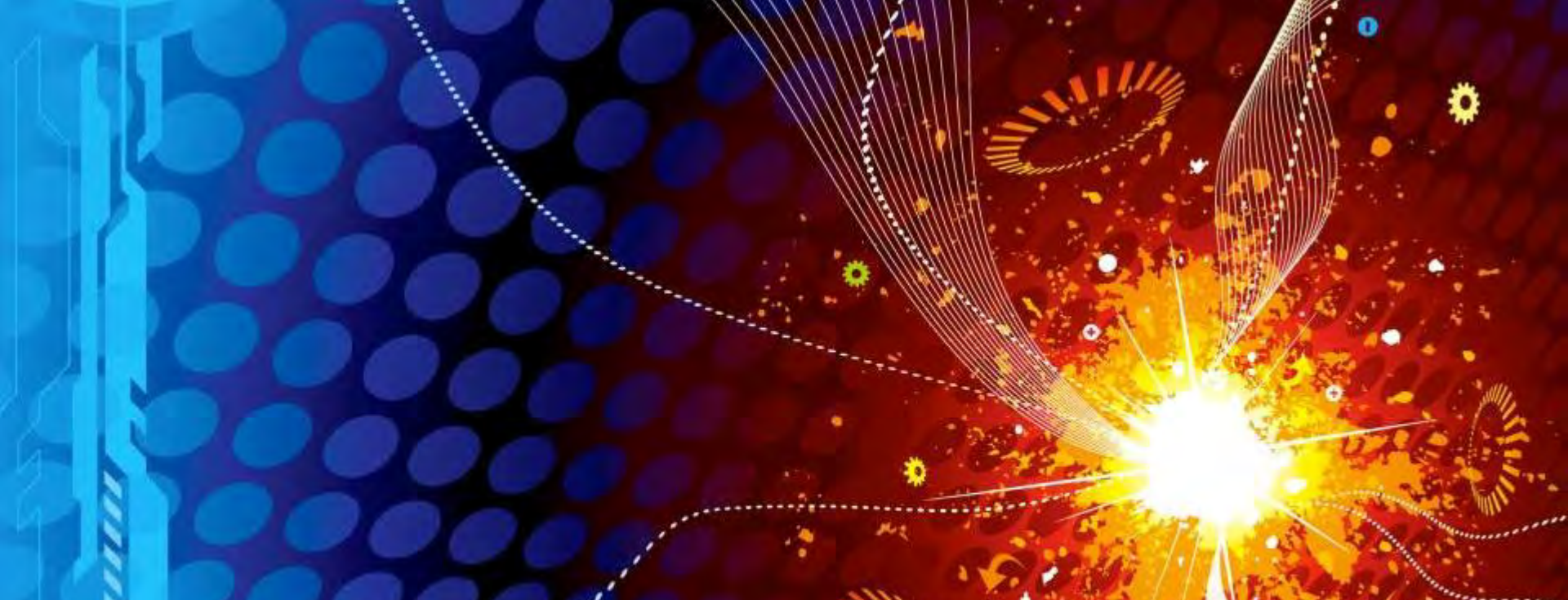
■ Taxonomy version 3.0

- Blend with ‘bottom-up’ approaches, add broader consultation
- Apply more rigorous approach to cascading scenarios of correlated threats
- Focus more on insurance application and/or corporate concerns
- Collapse 12 categories down to 7 (‘dashboard’ of risk)
- Add regulatory shocks
- Improve categorisation of liability risks



Potential 2014 Research Agenda for Research Theme 1 Global Complex Risk Landscape

- Develop a version 3.0 of the taxonomy, incorporating bottom-up approaches and broader consultation
- More comprehensive population of content across threat categories, collaborating with external specialists
 - Produce first-order frequency-severity distributions for many of the threat categories to rank threats
- Add more scenarios, particularly financial shocks and outlooks
- Improve methodology for multi-line loss assessment & macroeconomic consequence assessment
- Focus on governance and best-practice management decision-making for complex and emerging risks



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Research Theme 2

Understanding Complex Business Exposure

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Simon Ruffle

Director of Technology Research
Centre for Risk Studies

Cambridge Risk Framework 2014

■ Server side development

- make more generic to give better support for modellers
- “Risknode” standardisation
- better mapping facilities
- risk dashboard
- support for multiple users
- move to new server with VCS integration

■ Client side development

- improvements to user interface for network management and model use
- user accounts & social networking
- design of info-graphics for network and map visualisation

Network Models 2013

■ Resilient International Supply Chains (RISC)

- Scenario: Freeze
- At-risk networked asset: Consumer electronics supply chain
- Model: Supply chain health

■ Liquidity shock to global banking network (FinCat)

- Scenario: Greece and Cyprus default
- At-risk networked asset: Global interbank network
- Model: Liquidity



Global Substrate Data

Utilities

Energy

Transportation

Telecommunications

Geography

Trade

Finance

● Water & sewerage

● Electricity

● Gas

● Oil

● Roads

● River & sea

● Rail

● Air

● Data

● Telephony

● Broadcasting

● Countries

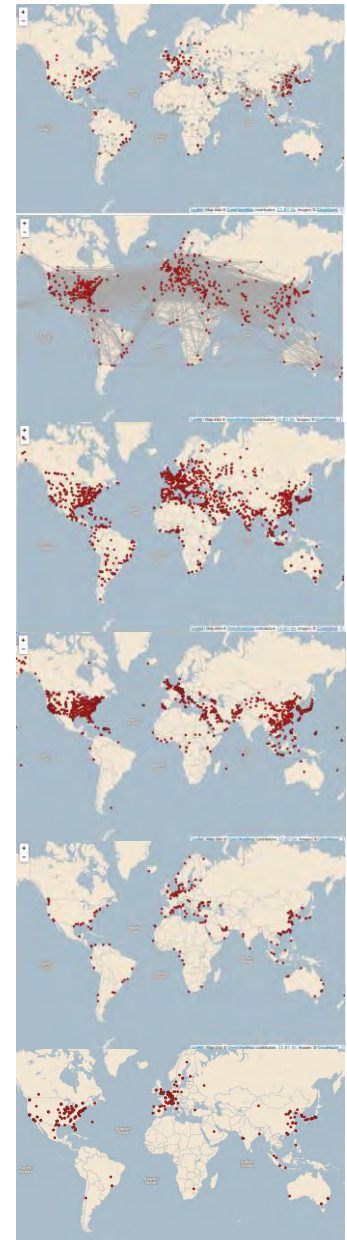
● Cities

● Military power structure

● Inter country

● Inter enterprise

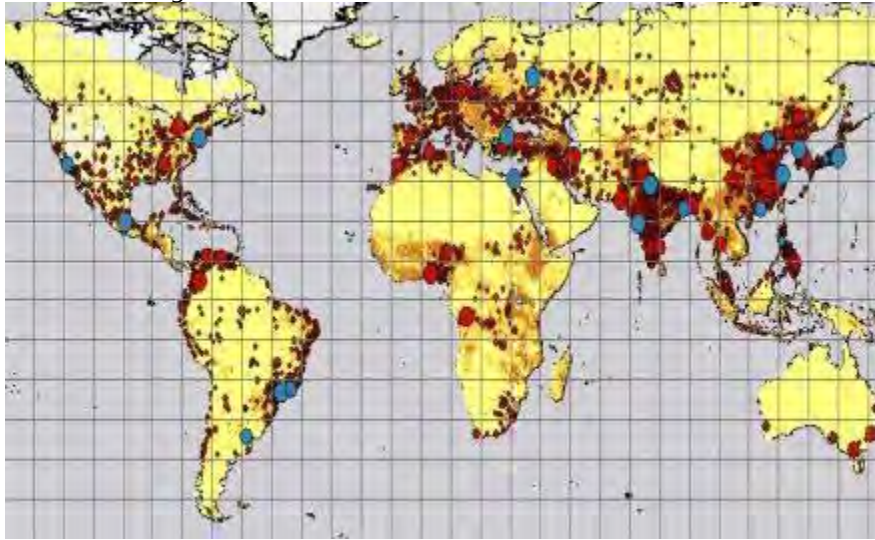
● Inter bank



■ *continuing data gathering,
validation and curatorship needed*

Substrate Databases Compiled in 2013

World City Database



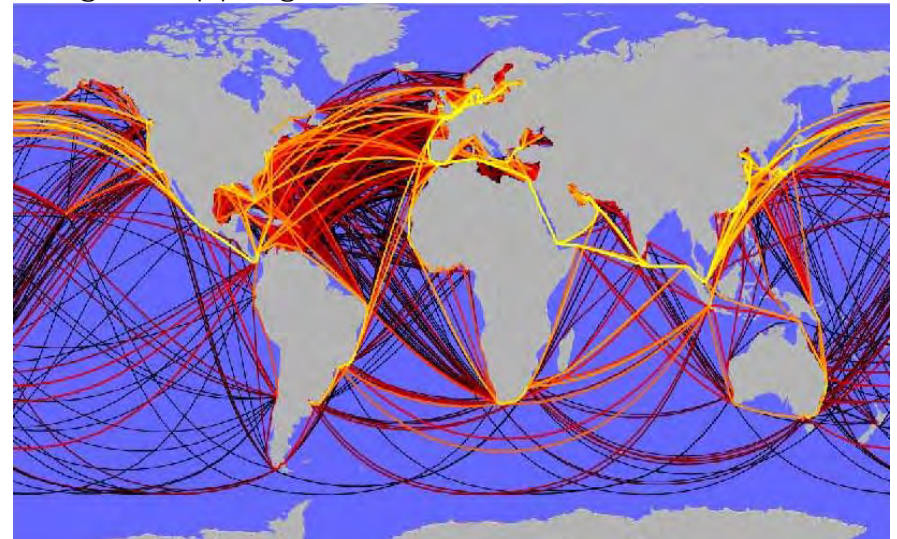
Air Travel Network



Communications Networks



Cargo Shipping Networks



Enterprise Model of the Global Economy

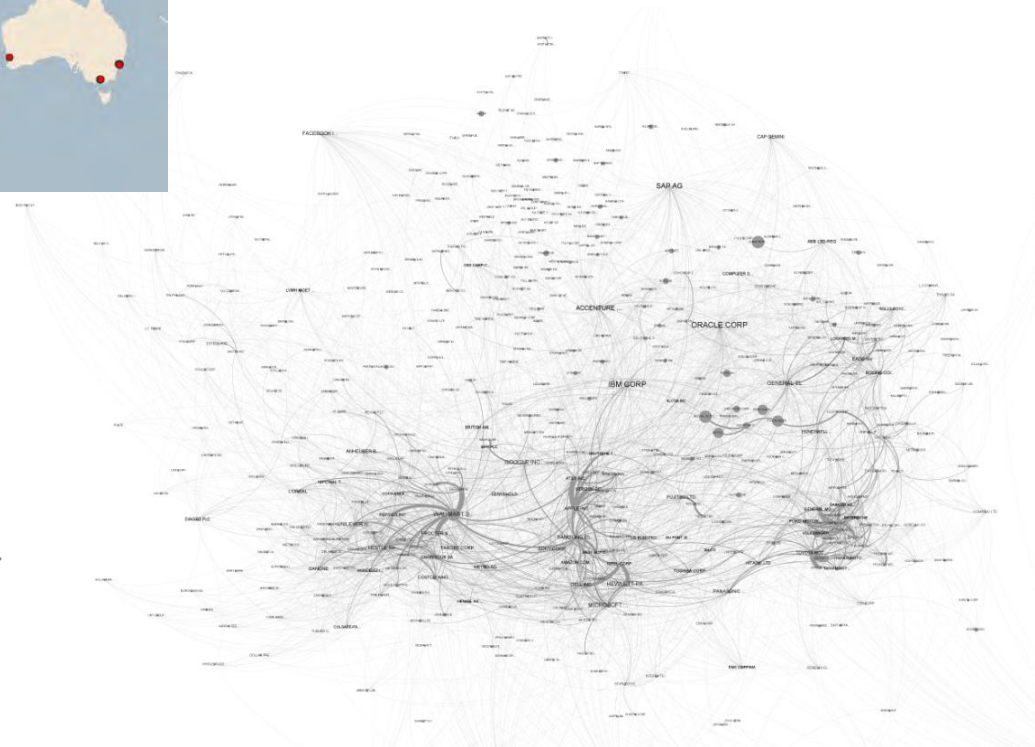
- GICS Sectors and Industry Groups
- 600 Companies from Bloomberg Industry Leaderboard
- Data sourced electronically from Bloomberg Data Service.
- Includes inter-enterprise relationship value
- Will be known as **Cambridge Global Enterprise Network**

Global Enterprise Network



The 600 enterprises with the location of their corporate HQs mapped

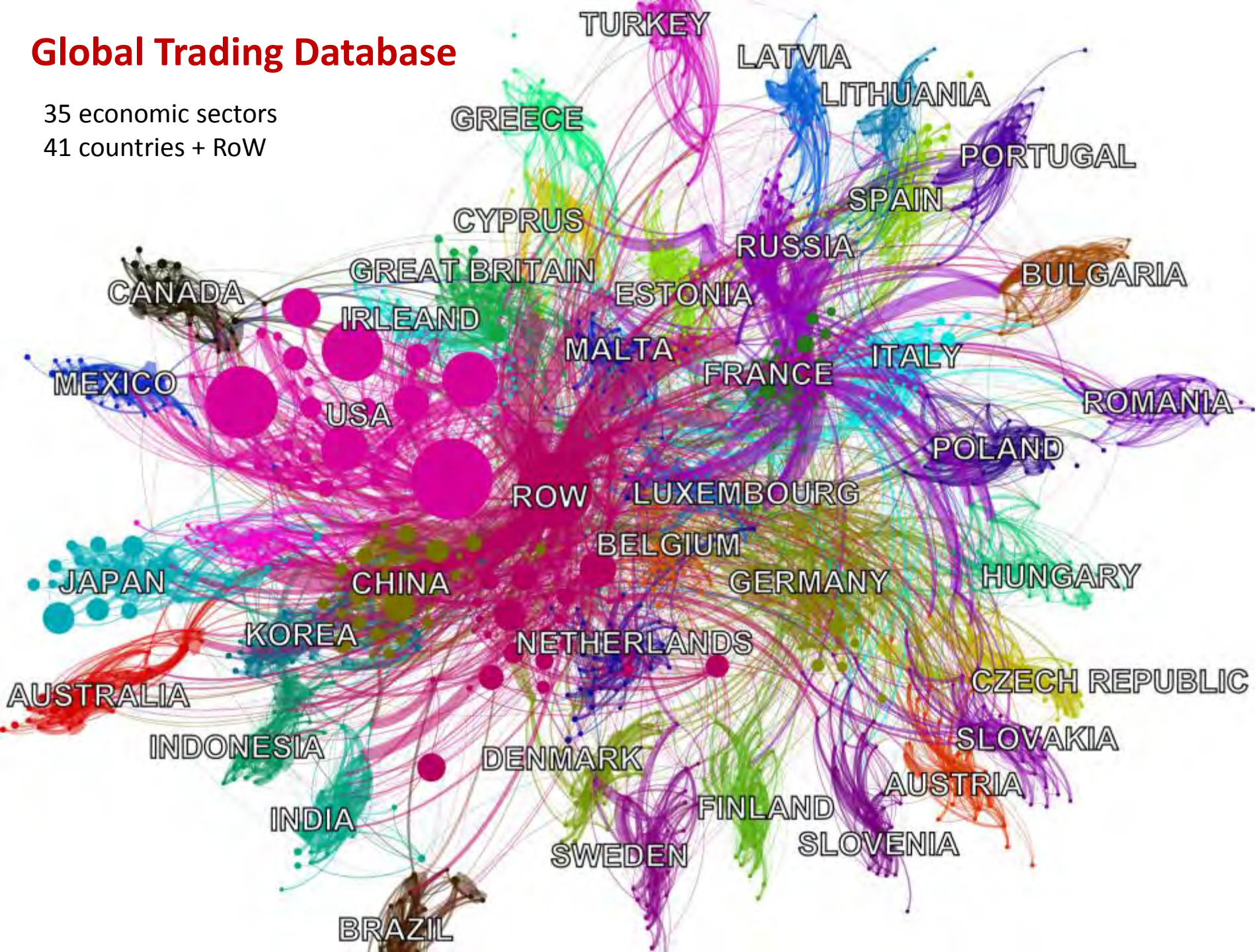
475 out of 600 enterprises that have trading relationships shown on a force-directed graph, node radius = revenue; label size = degree



Source: Bloomberg 2014

Global Trading Database

35 economic sectors
41 countries + RoW



Network Models 2014

■ Cambridge Global Enterprise Network

- driven forward by LMCO Cyber
- subsume supply chain?

■ Financial Catastrophe

■ Other scenario specific

- which?

■ The Cartography of Finance

■ Sea container cargo

- in collaboration with Jasmine Lee, NTU

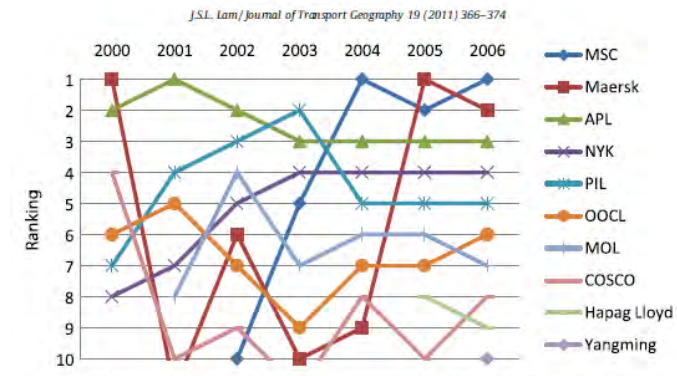
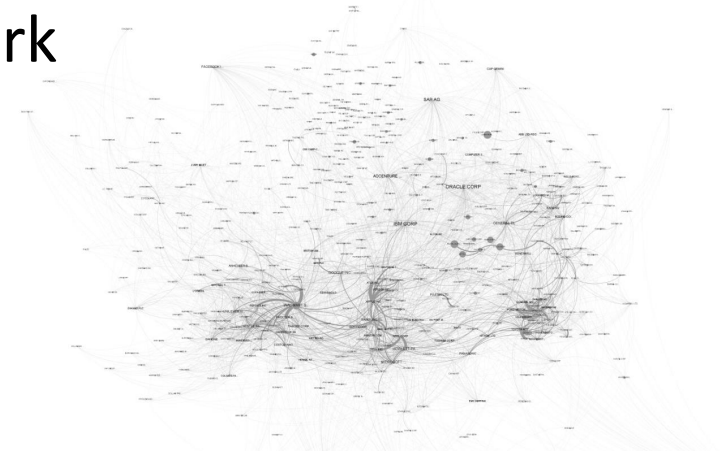
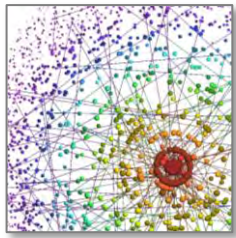


Fig. 1. The top 10 lines connected to the port of Singapore in terms of slot capacity deployed (2000–2006).



Potential 2014 Research Agenda for 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.

- Substrate data
- Cambridge Risk Framework technology

- Network models
 - Global Enterprise Network
 - Financial catastrophe
 - Other scenario-specific?
 - Cartography of Finance
 - Sea cargo

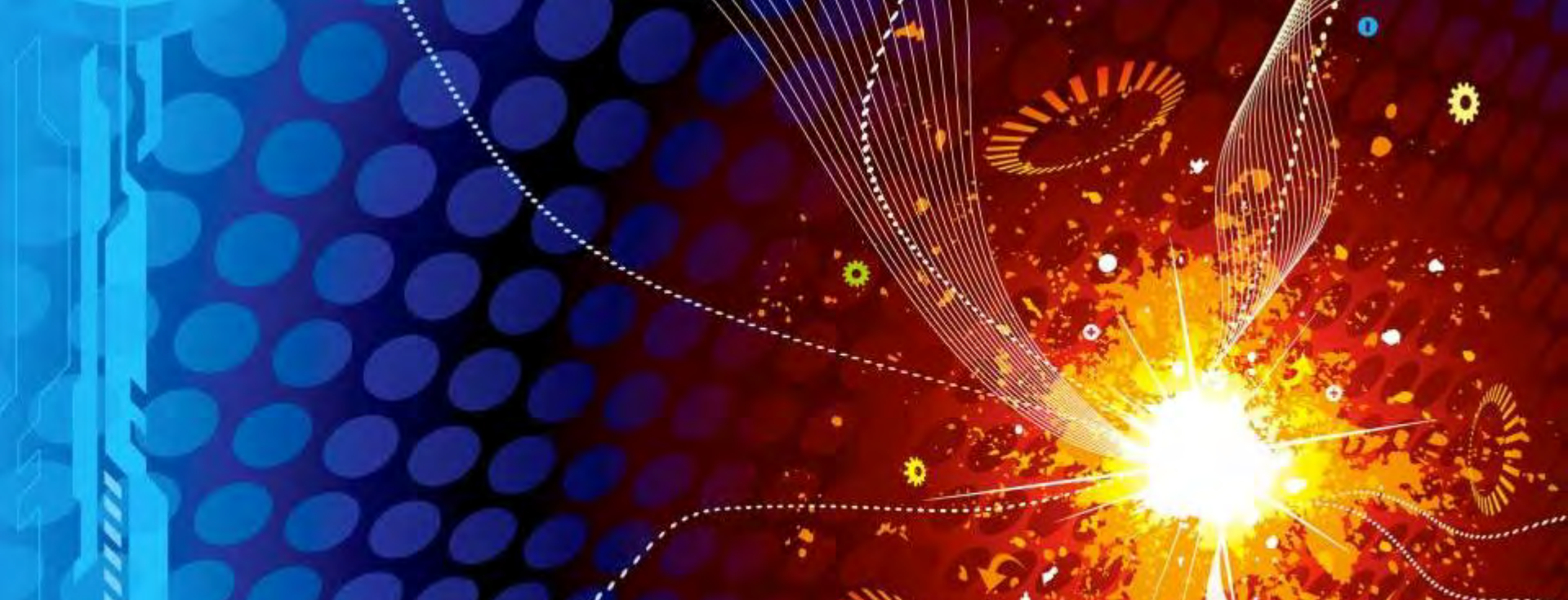
Discussion Topics

Research Theme 1: Global Complex Risk Landscape

- 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

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



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23 January 2014

Research Theme 3

Financial Catastrophe Risk

Centre for
Risk Studies



UNIVERSITY OF
CAMBRIDGE
Judge Business School

Dr. Andrew Coburn

Director of External Advisory Board
Centre for Risk Studies

Research Objectives of FinCat Project 2014



State-of-the-Art Review

- Who is doing what; literature review; leading opinion survey; Workshop



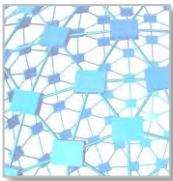
Causes of Future Crises

- What might cause future FinCats? Defining a full taxonomy; Developing an authoritative historical catalogue; What will be different in the future?



Developing Hypothetical Scenarios

- What toolkit do we need to model the impacts of potential events? Can we ensure 'coherence' in their effects?



Understanding Extreme Financial System Behaviour

- Understanding financial network modelling, interconnectivity, network behaviour, critiquing common modelling approaches, social behaviour

Overall Objectives

- Apply and develop methodologies for assessing the frequency and severity of financial crises
 - Assess the impact they have on different investment portfolios
- Develop a ‘practioner’ model of the financial economy capable of simulating shock propagation
 - Scenarios need to be ‘coherent’
- Develop useful insights for practioners to manage the risk of financial crises in their own portfolios
 - Fully understand counterparty risk, credit flows, portfolio management and other risk management strategies

Long-Perspective Historical Catalog of Financial Crises



- Partnering with the Centre for Financial History (CFH) at Cambridge University <http://www.centreforfinancialhistory.org/>.
- CFH historians currently researching and documenting several hundreds of crises and providing detailed analysis for 40 selected events
- Covers 1500 to present
- Covers all geographical markets
- Will result in a 4-volume publication by Routledge in 2014



Project lead
D'Maris Coffman
Director of
Centre for Financial History



Co-edited by
Larry Neal
Professor of Economics
University of Illinois



Taxonomy of Financial Catastrophe

- Qualitatively different causes of **endogenous** financial shocks



Financial Shock



Asset Bubble

Based on Allen & Gale 2009,
Understanding Financial Crises



Financial Irregularity



Bank Run



Sovereign Default



Market Crash

Potential Financial Catastrophe Scenarios



Asset Bubble Shock

China Property Bubble Collapse

Sudden collapse of property prices in China mainland

SME: Prof. Michael Dempster, Centre for Financial Research, University of Cambridge



Sovereign Default Shock

Country defaults

Sudden default of a country on its debt

SME: D'Maris Coffman, Centre for Financial History; Prof. Michael Dempster, Centre for Financial Research, University of Cambridge



Hyper-Inflation World

High levels of inflation run for many years

Rampant inflation running in many countries

SME: Prof. Michael Dempster, Centre for Financial Research, University of Cambridge



De-Americanization of Economy

Dollar loses its dominance as a trading currency

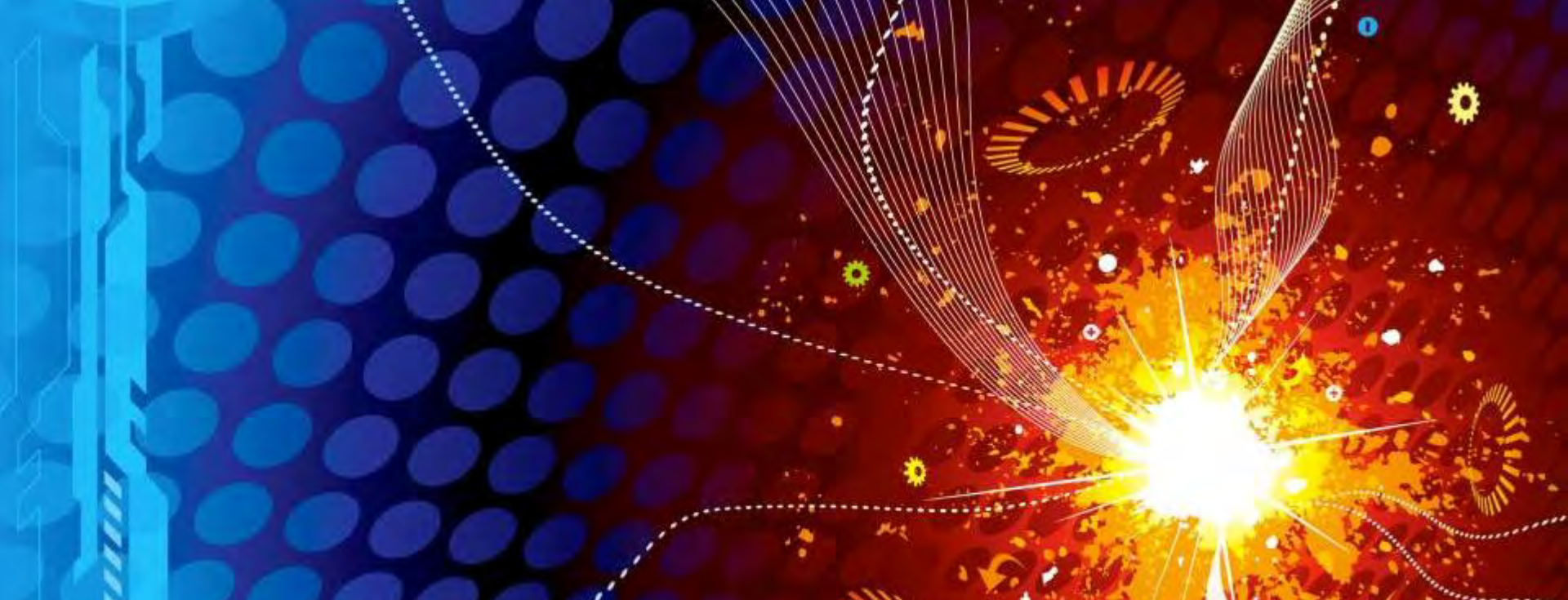
US dollar replaced by another or multiple currencies

SME: D'Maris Coffman, Centre for Financial History; Prof. Michael Dempster, Centre for Financial Research, University of Cambridge

Potential 2014 Research Agenda for Research Theme 3 Financial Catastrophe Risk



- Compile substrate data on ‘financial cartography’ of enterprises and banking relationships
 - Develop a ‘financial exposure model’ (FEM)
- Complete a review of modelling techniques for simulating financial shocks
- Apply best-of-class models to explore the impact of a range of financial crisis scenarios on the FEM
- Develop a taxonomy of financial threats and a historical perspective on each



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Research Theme 4

Resilient International Supply Chains

Centre for
Risk Studies



UNIVERSITY OF
CAMBRIDGE
Judge Business School

Professor Danny Ralph

Academic Director
Centre for Risk Studies

Supply Chain Project

Looking backwards



■ Milestones

- Deloitte funding 2011-12
- Database design; combining GIS and NetworkX 2011-12
- Review of Supply Network Disruptions Oct 2012
- INFORMS talk on modelling supply chain disruption Oct 2012
- Networks displayed using interactive graphics layered over world maps, premiered at ICRM's annual symposium Mar 2013
- SCOR conference talk on resilient supply chains June 2013
- B Leslie starts event driven simulation of supply chain Aug 2013
- Aon-Benfield conference talk on Cambridge Risk Framework Sep 2013
- M Jansen starts PhD on risk & resilience in supply chains Oct 2013
- CAR gathers "substrate" infrastructure data autumn 2013

Supply Chain Project Looking Forward



- ESRC research assistant being recruited now
- London Business Interruption Assoc. talk Mar 2014
- *Insurability of Supply Chain* workshop Apr 2014
- POMS PhD presentation on S.C. risk May 2014
- Ongoing industry engagement
 - Risk supplier: insurance, banks etc
 - Risk consumer: manufacturing, insurance, banks, oil & gas etc

- 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?



Potential 2014 Research Agenda for Research Theme 4 Resilience of Supply Chain Risk

- Explore with practitioners what tools and models they would need to assess and manage supply chain risk
 - Explore potential for analytics to improve the insurability of supply chain risk
- Assemble substrate datasets that improve the understanding of supply chain operations and potential for disruption
- Identify the standard ‘configurations’ of typical supply chains for different sectors of economic activity
- Explore the usefulness of agent-based models in simulating disruption consequences in supply chains

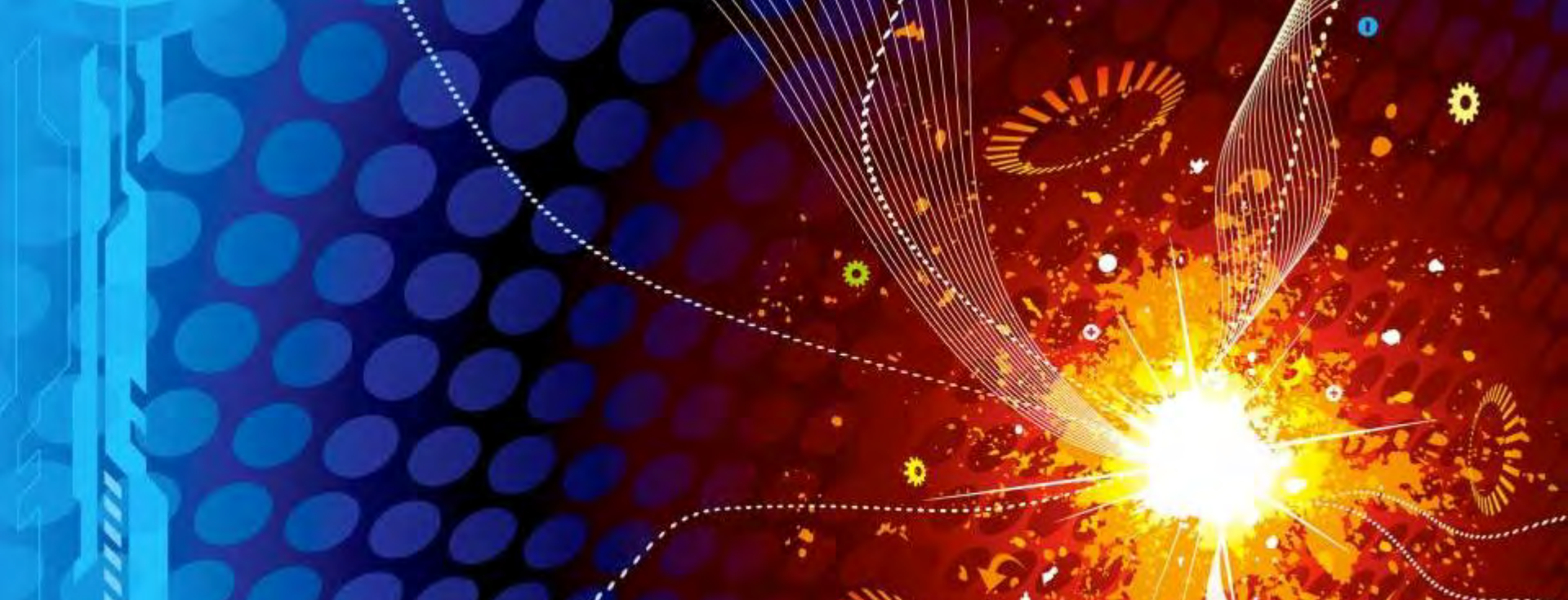
Discussion Topics

Research Theme 3: Financial Catastrophe Risk

- 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

- 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?



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Research Theme 5

Understanding the Threat of Cyber Catastrophe

Centre for
Risk Studies

Simon Ruffle

Director of Technology Research
Centre for Risk Studies



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Cyber Catastrophe Risk 2013

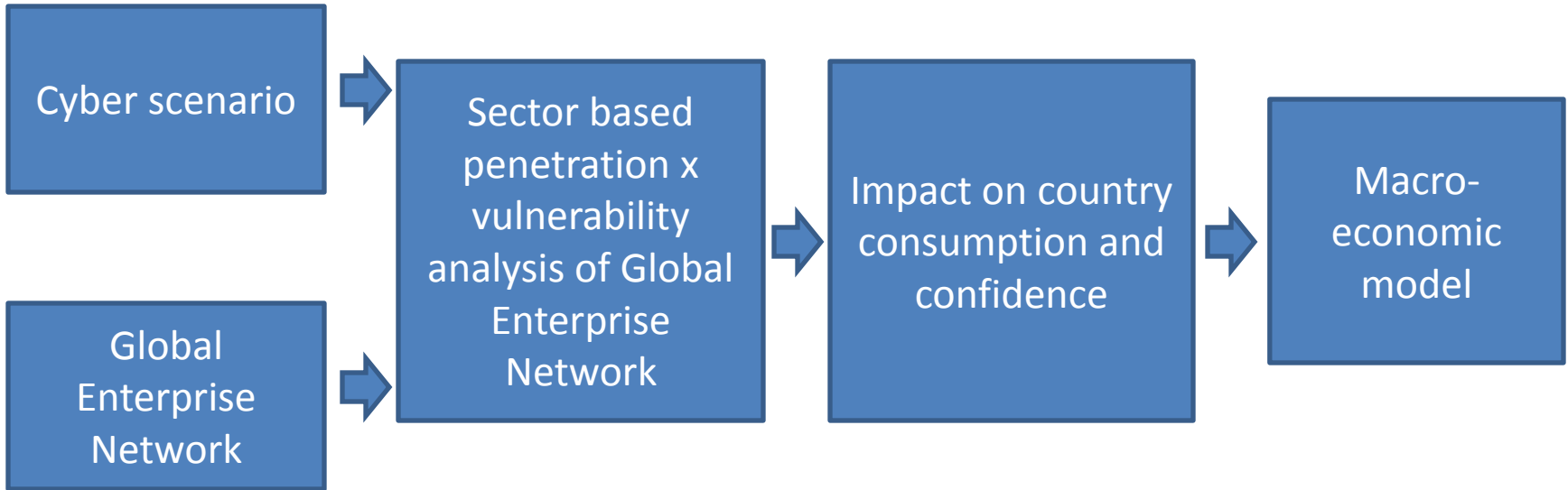
- Absence of established framework for analysis of cyber risk
- Subject Matter Experts
- Historic catalogue
- Cyber threat magnitude and vulnerability scales
- Industry group vulnerabilities
- Precedent IT failures as calibration points
- Scenario definition
- Loss modelling and macro economic impact

Mapping the Cyber Economy:

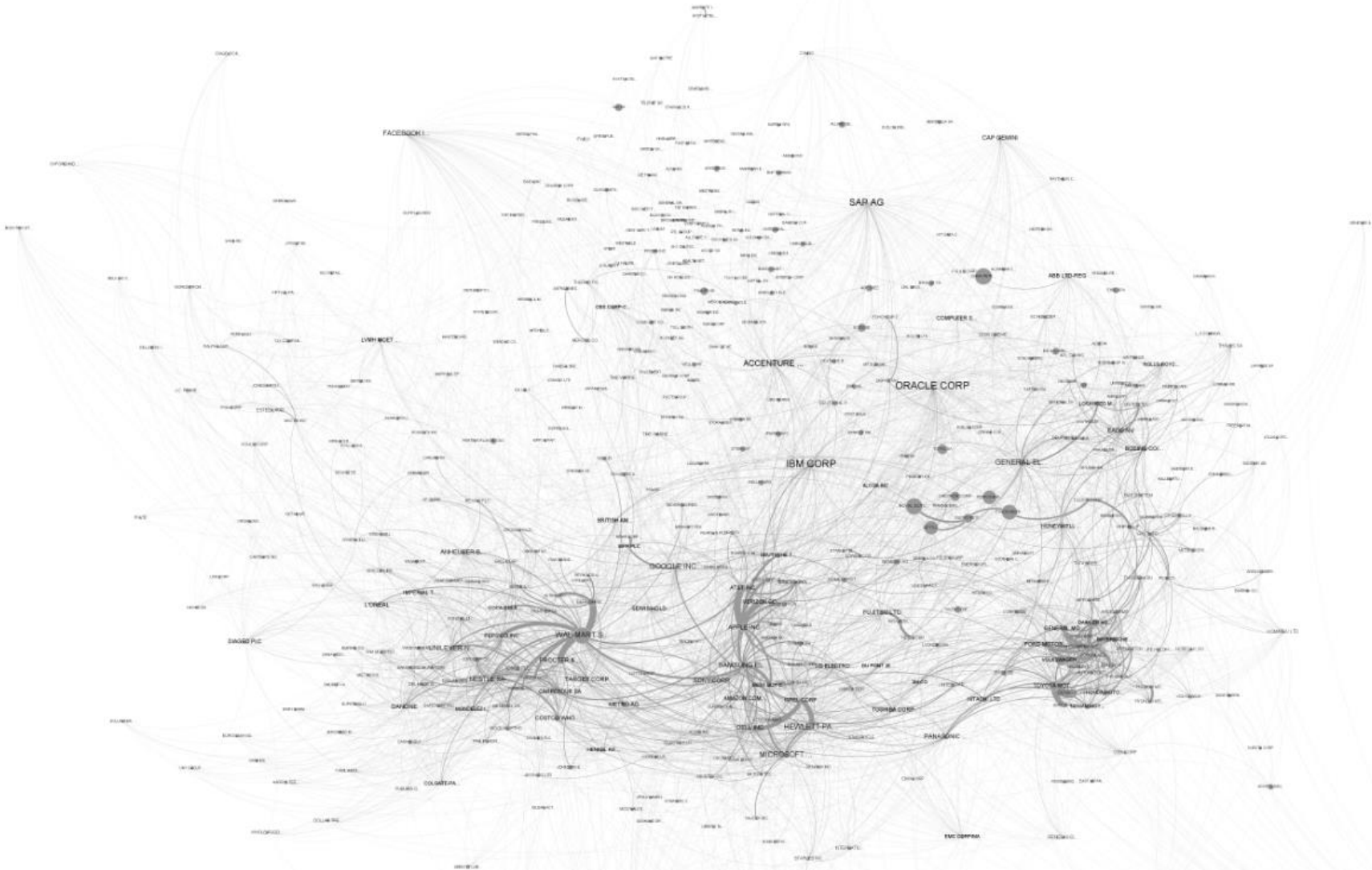
The Cambridge Global Enterprise Network

- Can we construct a model of the inputs and outputs of large corporations, in a similar way to classic Input/Outputs models of countries?
- ‘Multi-Enterprise, Multi-Regional Input Output Model’ (MEMRIO)
- Construct analysis tables from economic data produced by governments, blended with financial and other data on individual enterprises
- Assume each enterprise behaves according to its sector average until specific data is available about them
- Reflect the scale and structure of the world’s largest enterprises across regions and sectors
 - Take into account the full complexity of global supply chains
 - Remove any double-counting caused by the fact that the enterprises included in the analysis may fall within one another’s supply chains
 - deal with the uncertainty faced by an outside observer who may be under-informed about the detailed purchasing and sales structure of the enterprise in question

Cyber catastrophe macro-economic impact modelling



Global Enterprise Network



475 out of 600 enterprises that have relationships shown on a force-directed graph, node radius = revenue; label size = degree



Potential 2014 Research Agenda for Research Theme 5 Cyber Catastrophe Risk

- Review progress with Subject Matter Experts
- More detailed historic catalogue
- Calibration through precedence studies of past IT failures
- Cambridge Global Enterprise Network as basis of “Enterprise Model of the Cyber Economy”
- Meet industrial sector experts?
- Cyber scenario complete with macro-economic modelling
- Completion of Cyber Threat Monograph
- Partnerships? Priorities?

Discussion Topics

Research Theme 5: Cyber Catastrophe Risk

- 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?

Discussion Topic – Research Programme Prioritization

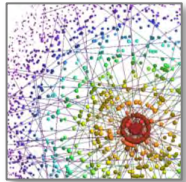
- Prioritization and relative importance of the different research themes for resource allocation

2014 CRS Research Programme Themes



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 stability, contagion, and crises in financial networks



4. Insurability of International Supply Chains

- Developing metrics of loss, ‘efficient resiliency’, and benefits of improvements to global supply chains and business networks.



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 threats in the taxonomy.