



Risk Management Education and Research

Michael Sherris and Mark Young



ERM-II Initiative (www.ermii.org)

- non-profit educational and research organization established to meet the needs and challenges of future risk professionals
- initiated by an international group of universities and professional organizations
- with a focus on education, research, and training
 - within an ERM conceptual framework,
 - quantitative methods and tools,
 - and best practices.



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2006 Financial Services Forum

Expanding Our Horizons

ERM-II Initiative





ERM-II Objectives

- **OBJECTIVE 1:** To develop and promulgate international standards for quantitative risk education intended to be the core foundation for risk managers in all major economic sectors including banking, insurance, investment, energy and other utilities, and non-financial industries (manufacturing, retail, transportation, health services, government, etc.).

ERM-II Objectives

- **OBJECTIVE 2:** To promote multi-disciplinary, international, research in the emerging discipline of enterprise-wide risk management, by developing innovative concepts, effective quantitative tools and strategies.

ERM-II Objectives

- **OBJECTIVE 3:** To help existing and future institutions and organizations to improve professional standards of education, conduct and competence in the modelling and management of risk on an enterprise-wide basis.



ERM-II University accreditation

- The standards for accreditation promulgated by ERM-II are founded on the premise of improving the competence of those entering the risk management profession by ensuring a minimum level of technical competence and enough breadth across mathematical, economic and statistical tools required to conduct sound quantitative risk analysis as applied in any industry.



ERM-II University Programs

- **Background knowledge:** substantially taught at post graduate level and cover or require background knowledge of:
 - *(a) mathematics in both multivariate calculus and linear algebra*
 - *(b) calculus based probability and statistics including probability distributions, regression and statistical inference*
 - *(c) financial accounting*
 - *(d) corporate finance*
 - *(e) micro economics of the consumer and firm*



ERM-II University Programs

Program content: risk modelling and management and provide a broad and integrated perspective across institutions and risks:

- (a) financial economics and asset pricing in both discrete and continuous time*
- (b) models of risks including stochastic processes, econometric modeling and estimation, computational and numerical methods for risk management*
- (c) risk and financial management of corporations and financial institutions, including both theory and practice*

Study requirements: *over a minimum period of two standard sessions of full time study load*



ERM-II University Programs

Course Instructors:

course instructors with relevant industry, academic and research qualifications and experience

a program that includes visiting lecturers with practical experience of risk management issues.

Research program:

a research program in quantitative risk management

the program ensures research is incorporated into the learning process and curriculum



ERM-II Founding Universities

- Carnegie Mellon University - MS in Computational Finance
- Columbia University - Department of Industrial Engineering and Operations Research
- Georgia State University - Robinson College of Business
- Heriot-Watt University - Department of Actuarial Mathematics and Statistics
- North Carolina State University - ERM Initiative
- University of New South Wales - Master of Actuarial Studies (Quantitative Risk Management) and Master of Statistics (Mathematical Finance)
- University of Waterloo - Institute for Quantitative Finance and Insurance

ERM-II UNSW Courses

- Master of Actuarial Studies
 - The program consists of 12 courses – 4 core plus 8 options.
 - Covers Part I (Core Technical) , Part II courses, risk management and other options.
 - Students can include up to 2 modules of Part III of IAAust exams passed while completing the MActSt.
- Master of Statistics
 - Courses in Mathematical Finance (Financial Engineering)



ERM-II UNSW Courses

- **ACTL5301 Models for Risk Management (S1)**
covers market, credit and operational risk models, GLM's; extreme values and tails of losses; copulas and modelling dependency.
- **ACTL5302 Risk and Capital Management (S1)**
covers integrated risk management approach to insurer balance sheet and capital management for market, credit and operational risk, pricing theory, risk based capital and capital management.
- **ACTL5303 Asset-Liability Management (S2)**
covers models and techniques for valuation and risk management of asset and liability cash flows, optimal asset-liability strategies; risk-neutral computation; dynamic programming; ALM in insurance; DFA modelling in insurance and reinsurance.
- **ACTL5304 Risk Management Strategies (S2)**
covers innovative risk management strategies using capital and insurance market techniques including ART and securitization.



ERM-II UNSW Courses

- **MATH5335 Computational Methods for Finance**
- Covers design, implementation and use of computer programs to solve practical mathematical problems in finance, insurance and risk management. Fourier series and the FFT, partial differential equations, Monte Carlo methods and simulation, random numbers and variance reduction, numerical integration, Quasi-Monte Carlo (QMC) methods
- **MATH5985 Term Structure Modelling**
- Covers modelling of various kinds of interest rates, and the valuation of interest rate derivatives, short-term rate models, the Heath-Jarrow-Morton methodology, the BGM model of LIBORs and Jamshidian's model of forward swap rates.

ERM Initiatives – IAAust Activities

- **Formation of a specific Institute Risk Management Practice Group**
 - Has industry, institute, regulatory and academic membership
 - Focused towards FIAA CPD and Part 3 outcomes and
 - ERMII education requirements

- **Development of a focused ERM Qualification and Accreditation Program**
 - Pilot program for a masters program with UNSW being investigated so as to:
 - Align with ERMII specifications
 - Interface with UNSW existing course material as discussed
 - Link with involving professional services requirements in the same pattern as FIAA program

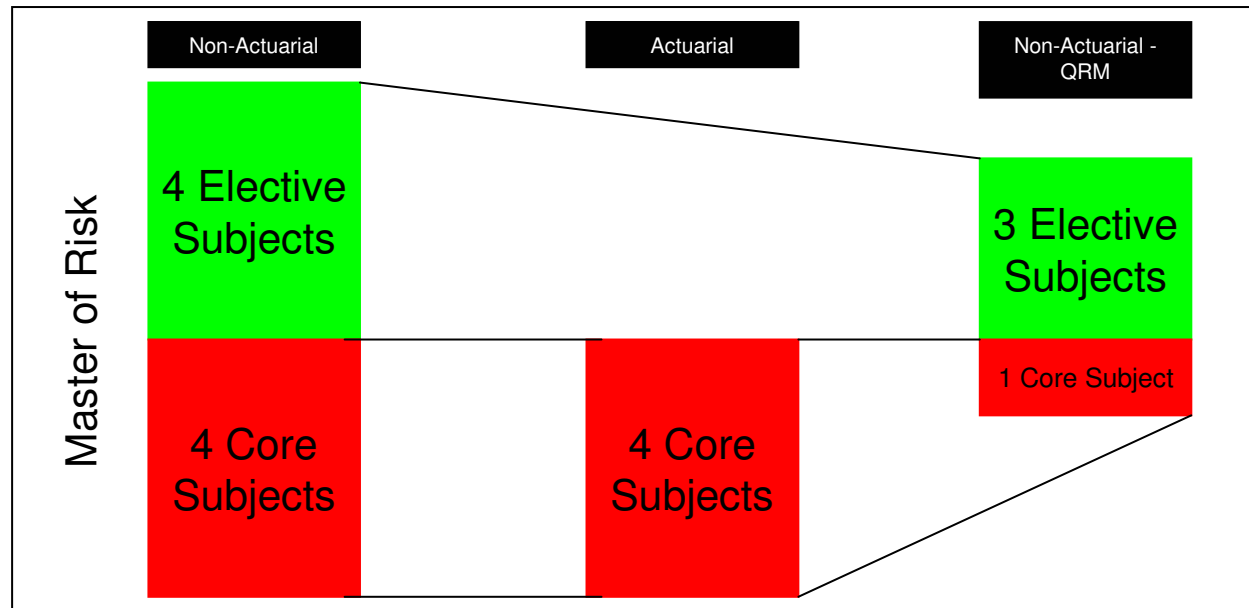
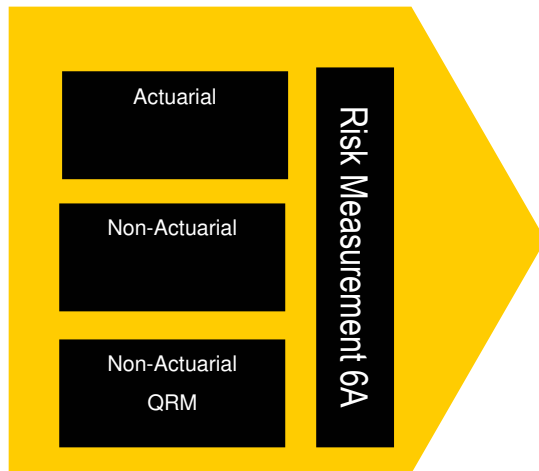
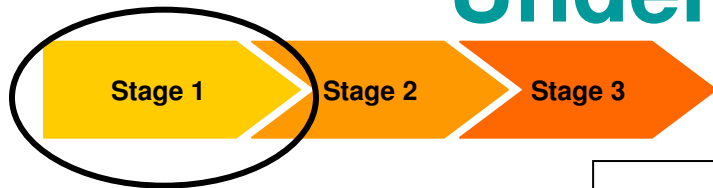


The IAAust CRA program...

CRA - Pathways

		Stage 1	Stage 2	Stage 3	
Actuarial Part III pathway	Part I + Part II + Inv	Risk Measurement 6A	Risk Practice 6B	CAP 1 CAP 2	Actuary & Chartered Risk Analyst FIAA, CRA
		Delivered by University	Delivered by the Institute	Delivered by the Institute	
Non Actuarial First Degree Undergraduate and or Postgraduate Mathematics, Finance or Similar		Master of Risk	Risk Practice 6B	CAP 1 CRP 1	Master of Risk & Chartered Risk Analyst MRisk, CRA
		Delivered by University	Delivered by the Institute	Delivered by the Institute	
Non Actuarial QRM First Degree Bachelor of Quantitative Risk Management (B.QRM)		Graduate Diploma of Risk	Risk Practice 6B	CAP 1 CRP 1	B.QRM & Chartered Risk Analyst BQRM, CRA
		Delivered by University	Delivered by the Institute	Delivered by the Institute	

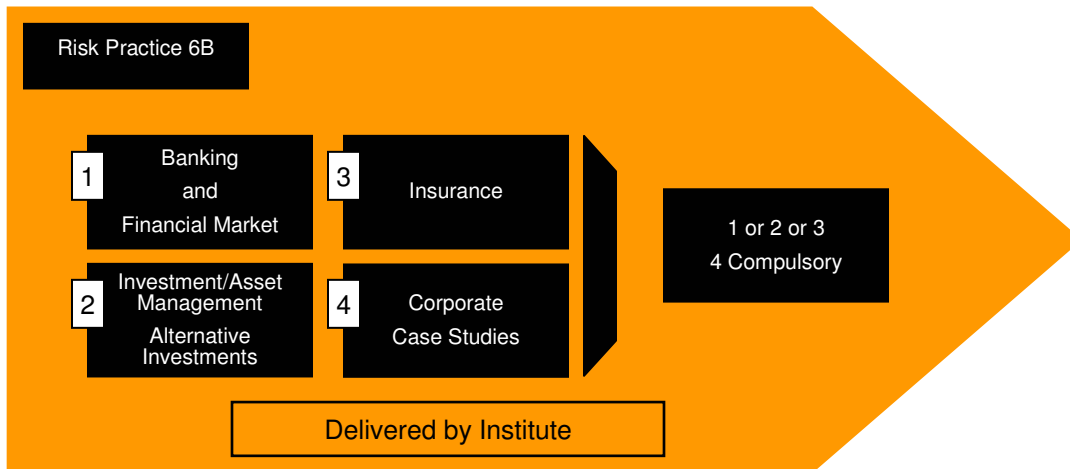
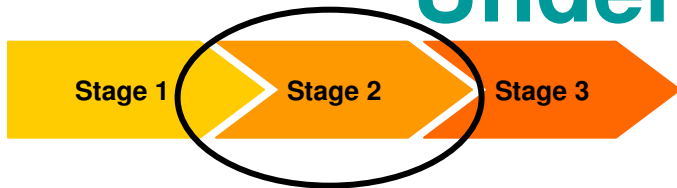
Understanding Stage 1



Issues to Resolve to Go Forward

- Formation of as part of a larger group an Education Stream to address course content and entry criteria, should include all universities with actuarial departments and institute membership
- Examination of existing course materials (UNSW for example) to fast-track course development
- Thought being put towards augmentation of any PRMIA and GARP training materials

Understanding Stage 2

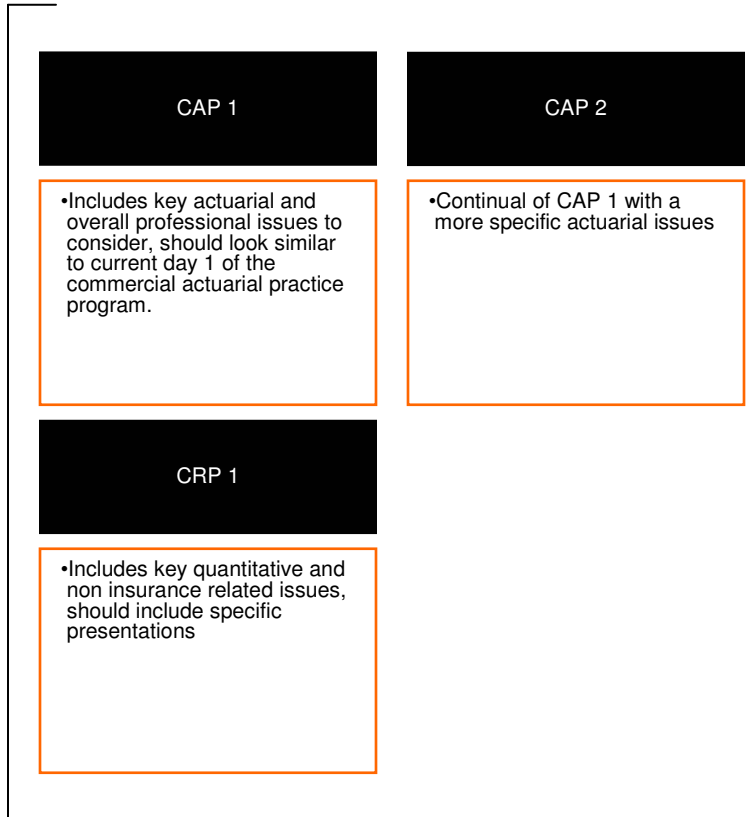
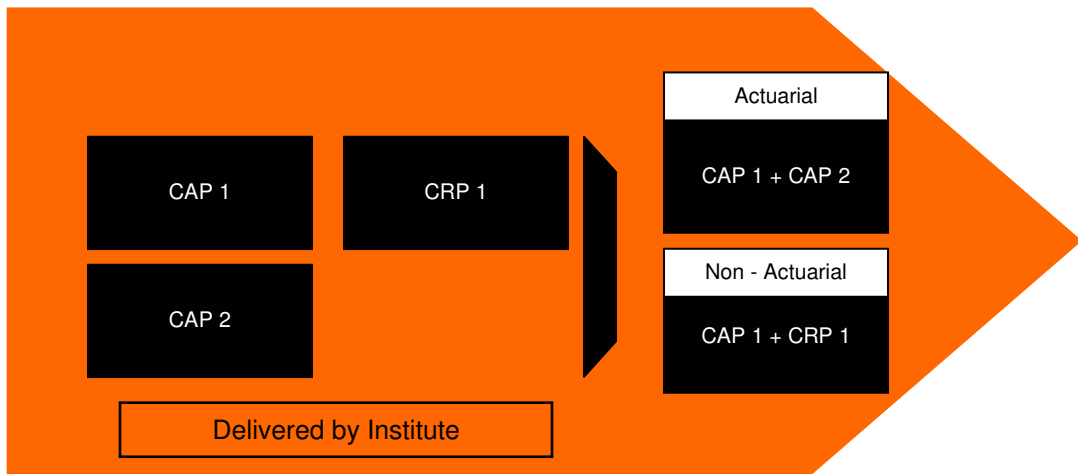
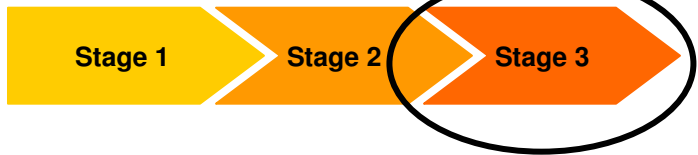


<p>Banking and Financial Market</p> <ul style="list-style-type: none"> Examines key banking and financial markets risk management crises: <ul style="list-style-type: none"> National Australia ING Barings Proctor and Gamble 	<p>Insurance</p> <ul style="list-style-type: none"> Examines key insurance risk management crises: <ul style="list-style-type: none"> Equitable Life James Hardie Reinsurance
<p>Investment/Asset Management Alternative Investments</p> <ul style="list-style-type: none"> Examines key Investment/Asset Management and Alternative Investments risk management crises: <ul style="list-style-type: none"> Enron 	<p>Corporate Case Studies</p> <ul style="list-style-type: none"> Examines key corporate case of financial crises: <ul style="list-style-type: none"> Enron WorldCom

Issues to Resolve to Go Forward

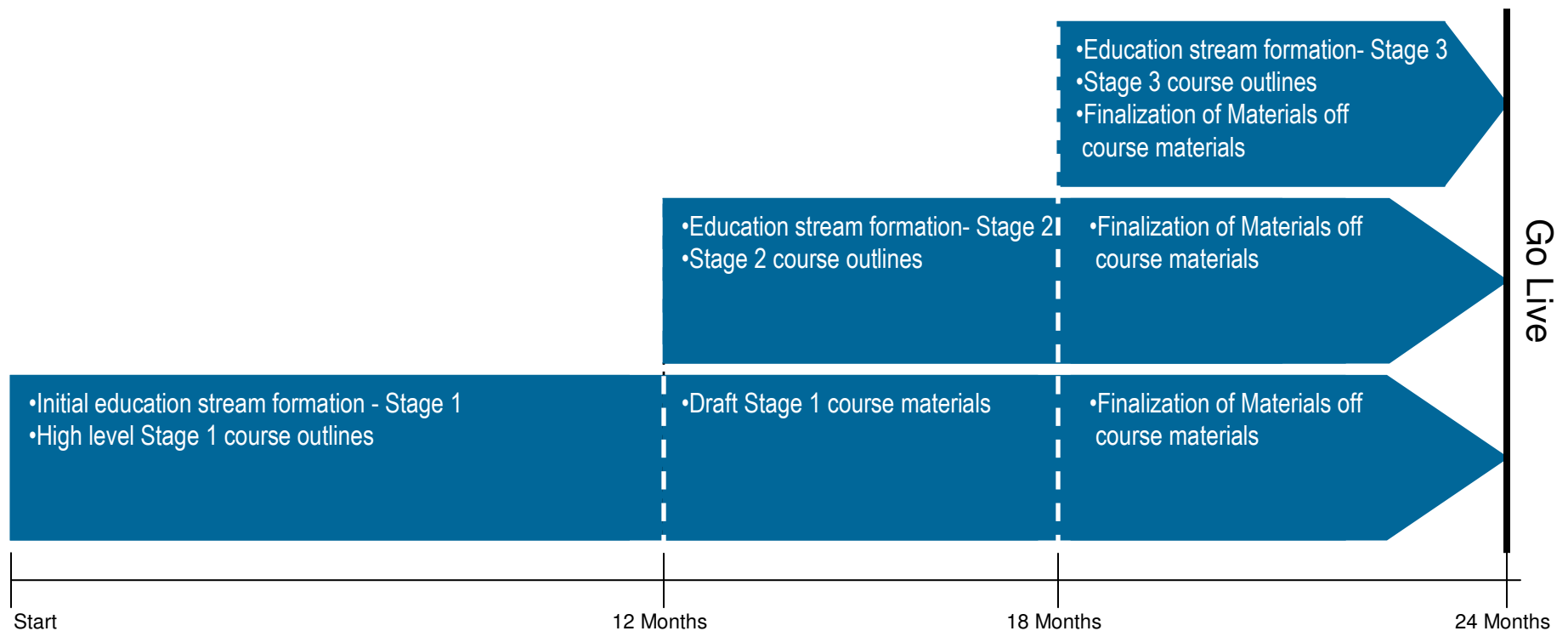
- Formation of as part of a larger group an Education Stream to address course content and entry criteria, should include industry and institute membership
- Thought being put towards augmentation of any PRMIA and GARP training materials

Understanding Stage 3



•Education Stream formed to address course content, includes key institute membership

ERM Initiatives – IAAust Activities



Issues to Resolve to Go Forward

- Agreement of the overall timeline and delivery path by the IAAust
- Establishment and assignment of roles and responsibilities in delivering a program

Risk Management Education and Research

Discussion issues

- The importance and relevance of risk management education to actuarial practice
- Roles of universities and the profession in post-graduate actuarial education in risk management
- Research program in risk management and industry involvement and support



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