CERA
(Chartered Enterprise Risk Actuary)

CONFERÈNCIA

7 de març de 2018

Introduction to CERA

Malcolm Campbell

7 March 2018

Introduction

- What is Enterprise Risk Management?
- CERA Global Association
- CERA Syllabus
- Value of CERA
- CERA in practice

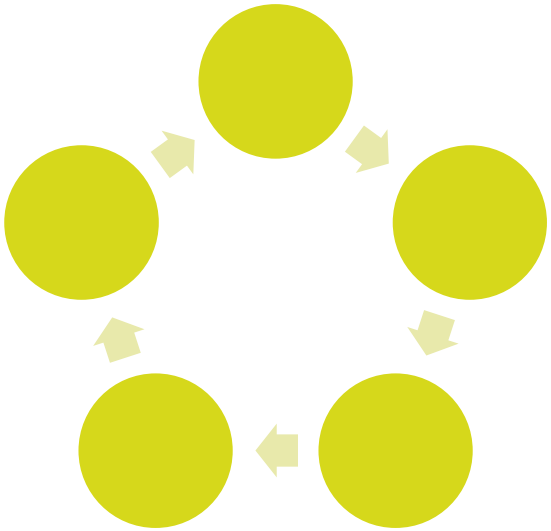
What is Enterprise Risk Management (ERM)?

There are many different definitions.

“Enterprise risk management is a process, effected by an entity’s board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achieve of entity objectives.”

COSO Enterprise Risk Management – Integrated Framework Executive Summary 2004

Characteristics of ERM



- Holistic
  - All risks
  - Integrated
- Full process / risk management cycle
- Upside as well as downside management
- Any type of organisation

CERA
Global Association

One credential based on mastery of one set of learning objectives, with accreditation applied on a consistent basis worldwide. No other credential comprehensively meets the global needs in risk management.

Dublin Statement (Oct 2007)

- Single, global, uniform, high-quality, qualification
- In-depth practitioner qualification
- Define syllabus “from the ground up”
- Enhance and promote the brand of the actuarial profession
- Position the profession to take a leading role in risk management globally
- Position the profession in EU for Solvency II
- Implement it all - effectively and convincingly
- Take early practical steps towards a truly global profession
- SOA launching first version of CERA but working to support/evaluate global project.

Tallinn (May 2009)

- Syllabus/Learning Objectives - work complete
- Groupe Consultatif (EU) & IAA supportive
- 17 associations “Interested/Active”
- Implementation & Name – still evolving.

14 Actuarial associations signed a Treaty in Hyderabad, India on 13 November 2009 globalizing the SOA qualification.

CERA Global Association (CGA)

Creation of a global credential

- Standardisation of ‘ERM toolkit’
- Standardisation of education
- Spread of ERM skills for actuaries
- International mobility
- International recognition
- Globalisation of the risk profession
- Supporting members of actuarial societies specialising in ERM

The CGA…

- Grants actuarial organisations the right to award the global CERA credential to actuaries who have satisfied the requisite education and training requirements set out in the CERA Global Treaty
- Is dedicated to promoting and administering the CERA credential worldwide
- Has 26 Treaty member associations
  - 19 of which have been granted power to award the CERA credential

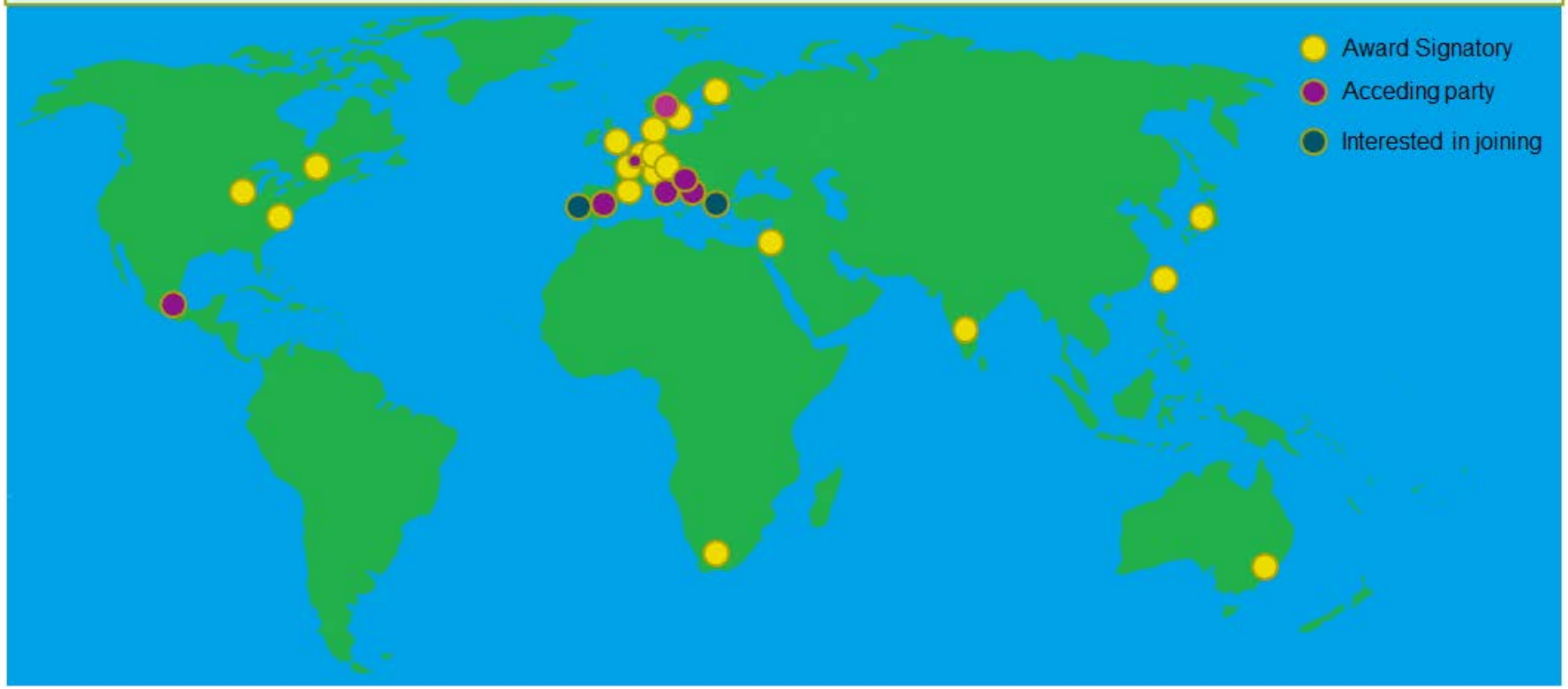
CGA objectives

- to enhance the brand of the actuarial profession globally
- to define and promote a uniform and valuable credential
- that is:
  - based on a defined syllabus and achievement levels
  - consistent with modern, effective methodologies
  - supported by high-quality education and materials
  - issued locally, in many languages
  - recognised and portable internationally
  - subject to educational quality control

    … by the global actuarial profession
- to be of value for members of the profession who wish to specialise in ERM

CERA around the world

Canada	USA (CAS and SOA)		France	UK	Denmark	Netherlands	Sweden	Switzerland
South Africa	Israel	India	Germany	Taiwan	Australia	Japan	Finland	Austria
Catalonia	Italy	Belgium	Croatia	Slovenia	Spain	Mexico	Norway	Greece	Portugal



CERA credential

- Rigorous curriculum, combining actuarial science with the theoretical, practical and professional principles of ERM
- Common syllabus, administered locally (in own language)
- Recognised and portable internationally
- Applies both **qualitative and quantitative** insight to ERM
- Instils the highest professional standards
- Equips risk management professionals to empower better business decisions
- Accreditation awarded and maintained through strong quality assurance process

CERA syllabus

1. ERM concept and framework
2. ERM process
3. Risk categories and identification
4. Risk modelling and aggregation of risks
5. Risk measures
6. Risk management tools and techniques
7. Capital management

Applies to any type of organisation: financial or non-financial

CERA syllabus: ERM framework

- Best practice ERM framework and structure within an organisation:
  - Importance of governance, culture and behavioural aspects
  - Centralised risk function and role of Chief Risk Officer (CRO)
  - Link to strategic aims
- Risk frameworks in regulatory environments (global)
- The role of regulators and credit agencies in the evaluation of risk management functions
- Relevance of ERM to all other stakeholders

CERA syllabus: ERM process

- Determination of risk appetite
  - Risk capacity, risk profile, risk tolerance, risk limits
- The overall risk management process / cycle
- Different definitions and concepts of risk
- Risk taxonomy
- Identification of risks
- Understanding contagion
- Case studies

CERA syllabus: *all* risks covered

For example:

- **Financial**: stock market, economic, interest rate, foreign exchange, basis, credit, liquidity, insurance, basis
- **Operational**: catastrophe, counterparty, people, process, technological (including cyber), project, model, parameter
- **Business / external**: customer demand, environmental, legal, regulatory, political, agency, reputational, conduct, strategic, moral hazard, demographic

CERA syllabus: quantitative methods

- Risk measures and their properties
- Analysis of quantitative data
- Model selection
- Methods of risk aggregation, including:
  - Correlation-based approaches
  - Copulas
- Tail distributions and tail dependencies
- Extreme value theory

CERA syllabus: ERM modelling

- Quantifiable v. non-quantifiable risks
- Best practice use of models in the overall ERM decision-making process
- Model risk and parameter risk
- Assessment and analysis of different types of risk
  - Market, credit, insurance, operational, liquidity etc
- Development of an economic capital model
- Techniques for allocation of capital across an organisation

CERA syllabus: risk management tools and techniques

- Risk optimisation
- Responses to risk
- Recommendation of risk mitigation approaches
  - With transfer / without transfer
  - Practical considerations
  - Balancing benefits against constraints
- Tools and techniques for managing different types of risk
- Residual risks

Value of CERA

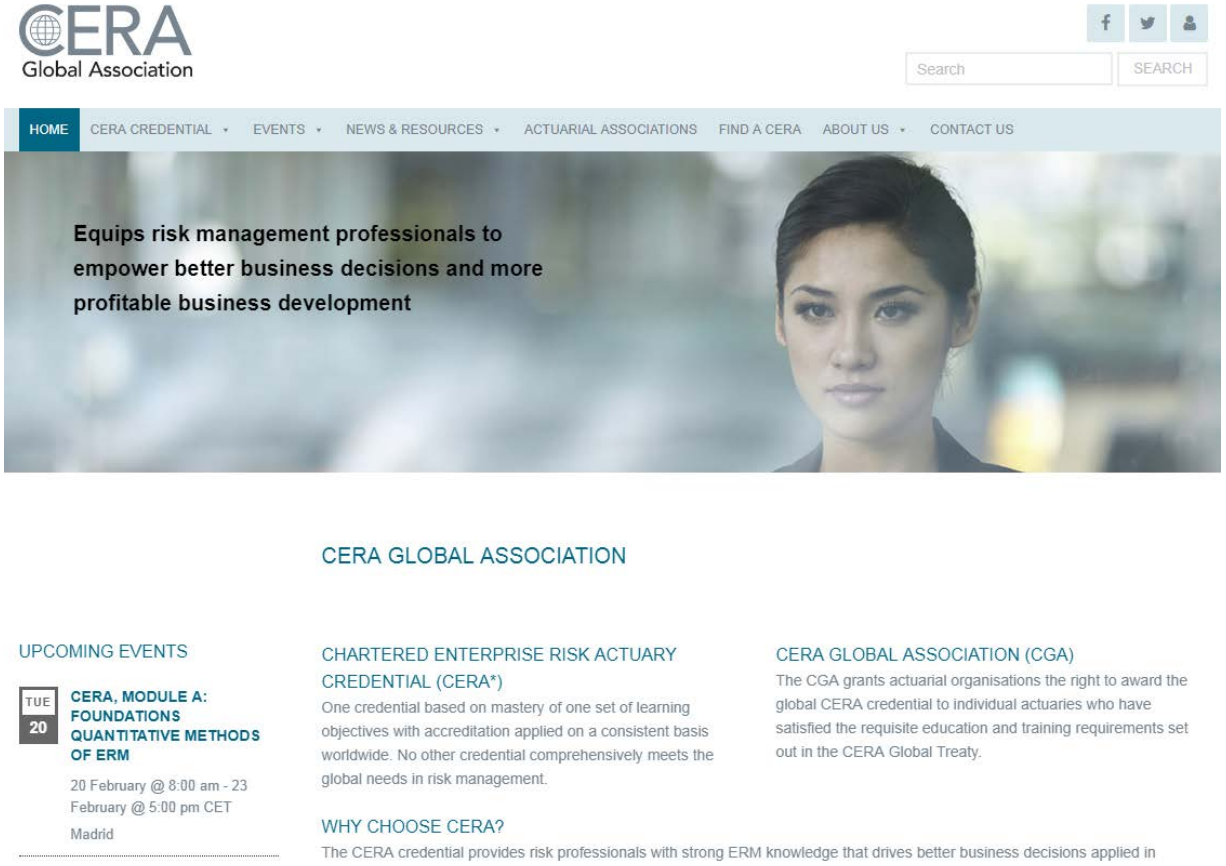
- CERAs are trained through a rigorous multi-year examination process to identify, measure and manage risks and opportunities within complex enterprises
- CERAs make confident decisions related to complex financial challenges affecting business, by applying qualitative and quantitative insights to risk management
- CERAs add value to ERM through their rigorous training, making them equipped to provide a full overview of an organisation's risk profile
- As actuaries, CERAs are bound by a code of professional conduct to act with integrity, care and competence

Value of CERA (contd)

- Assess and manage the entire risk spectrum of an organisation, including financial, operational and strategic risks
- Well-qualified for a range of risk management positions such as risk analyst, risk manager, Chief Risk Officer
- Can contribute within a broad range of fields, including:
  - **Life insurance**
  - **General insurance**
  - **Banking**
  - **Asset management**
  - **Pension funds**
  - **Other financial services**
  - **Technology**
  - **Consulting**
  - **Energy**
  - **Transportation**
  - **Healthcare**

To find out more, please visit

www.ceraglobal.org



The CERA at work

Malcolm Campbell

7 March 2018

Change in the way of working

Change Drivers

- Technology
- Information
- Business complexity
- Globalization
- Regulation

Characteristics of change

- Change is not linear – its accelerating
- Greater and faster access to information
- Big data
- Social media

Unique skills of an actuary

- Evaluate and manage risk and opportunity
- Solve complex problems using mathematics, probability and the time value of money
- Understand and communicate intricate financial concepts
- Apply analytical, statistical and mathematical skills to financial and business problems
- Perform in depth economic and financial analysis
- Think strategically

Skills Employers are looking for

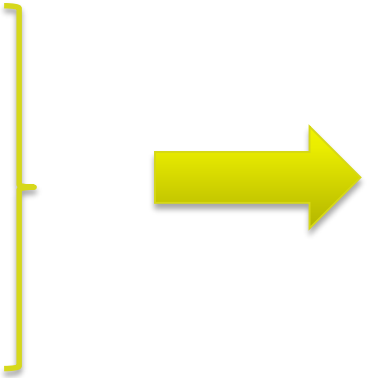
- Commercial and softer skills
  - Communication
  - Stakeholder management + teamwork
  - Consulting
  - Project Management
  - Delivery
  - New business
  - Innovation
  - Leadership + influence + people

Skills Employers are looking for

- Personal attributes
  - Professionalism
  - Appetite to continue to develop
  - Energy
  - Persistency

So where does that leave us

- Combination
  - Technical skills
  - Business skills
  - Communications skills
  - Management skills



CERA of today

ERM Framework

Objectives
- What s the brand, strategy and objectives of the enterprise?
- What is the appetite for risk?

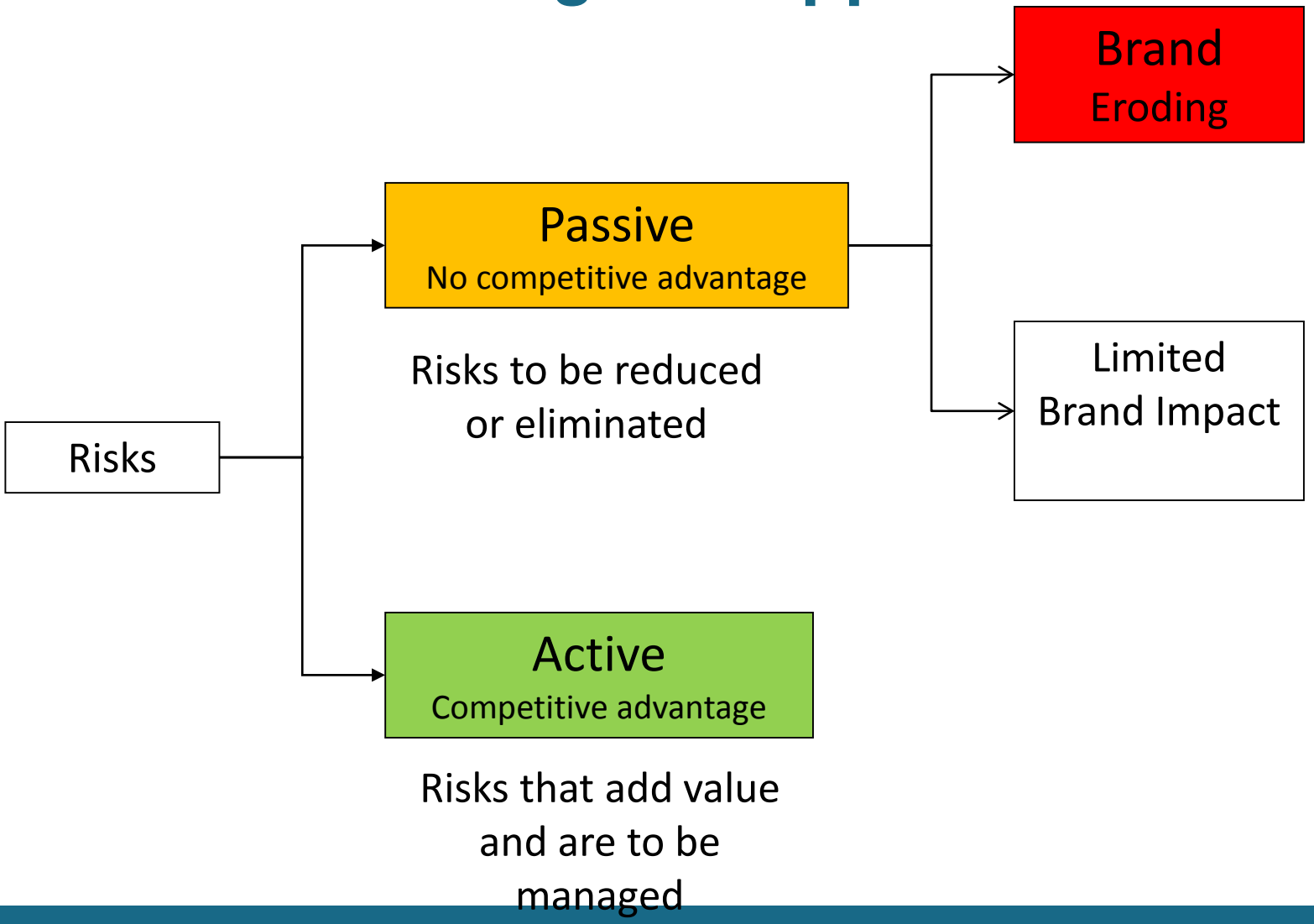
Compliance and governance
- What are the risks?
- Characterisation of risks

Diagnostics
- What is the (financial) impact?
- What is the likelihood?

Solutions (“risk mitigation”)
- What can be done?

Execution
- What is the action plan?
- Measures of success

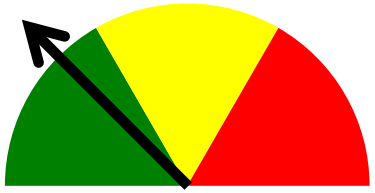
Understanding risk appetite



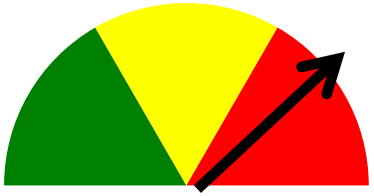
Risk
Mitigation Cost

Risk
Reward

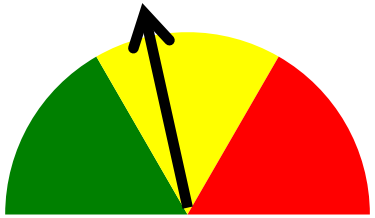
Presentation of risk measures



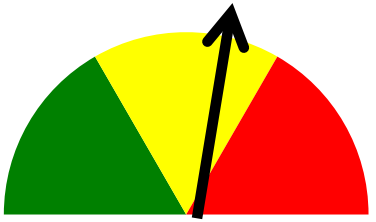
Insurance Risk



- Market Risk

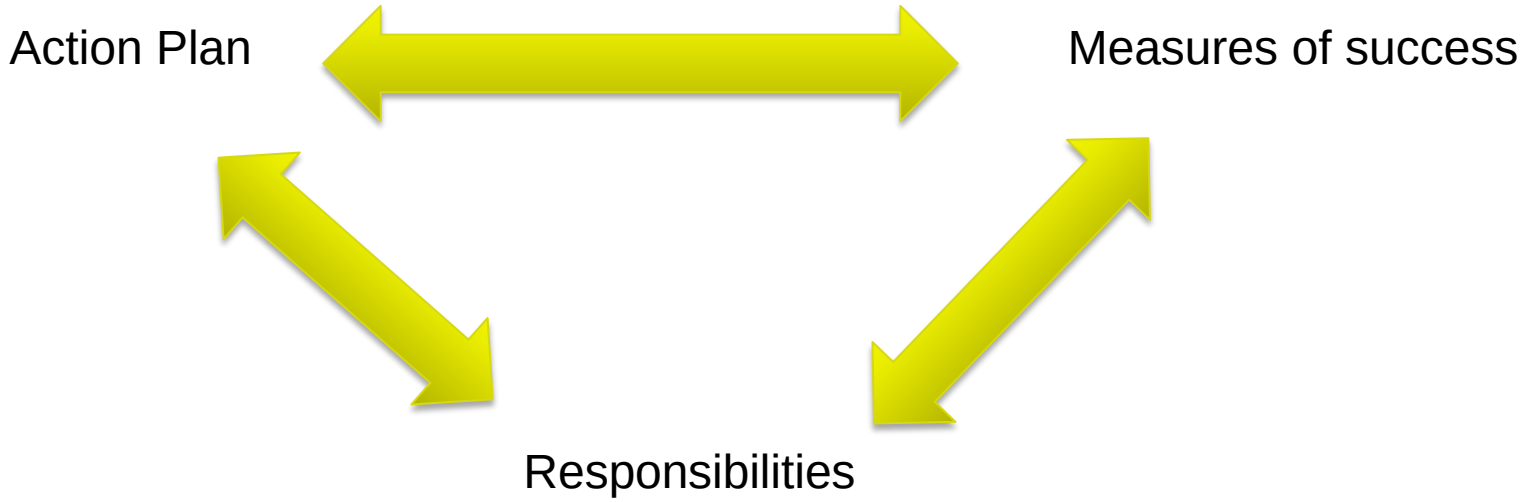


- Operational Risk



- Regulatory Risk

Action Plans



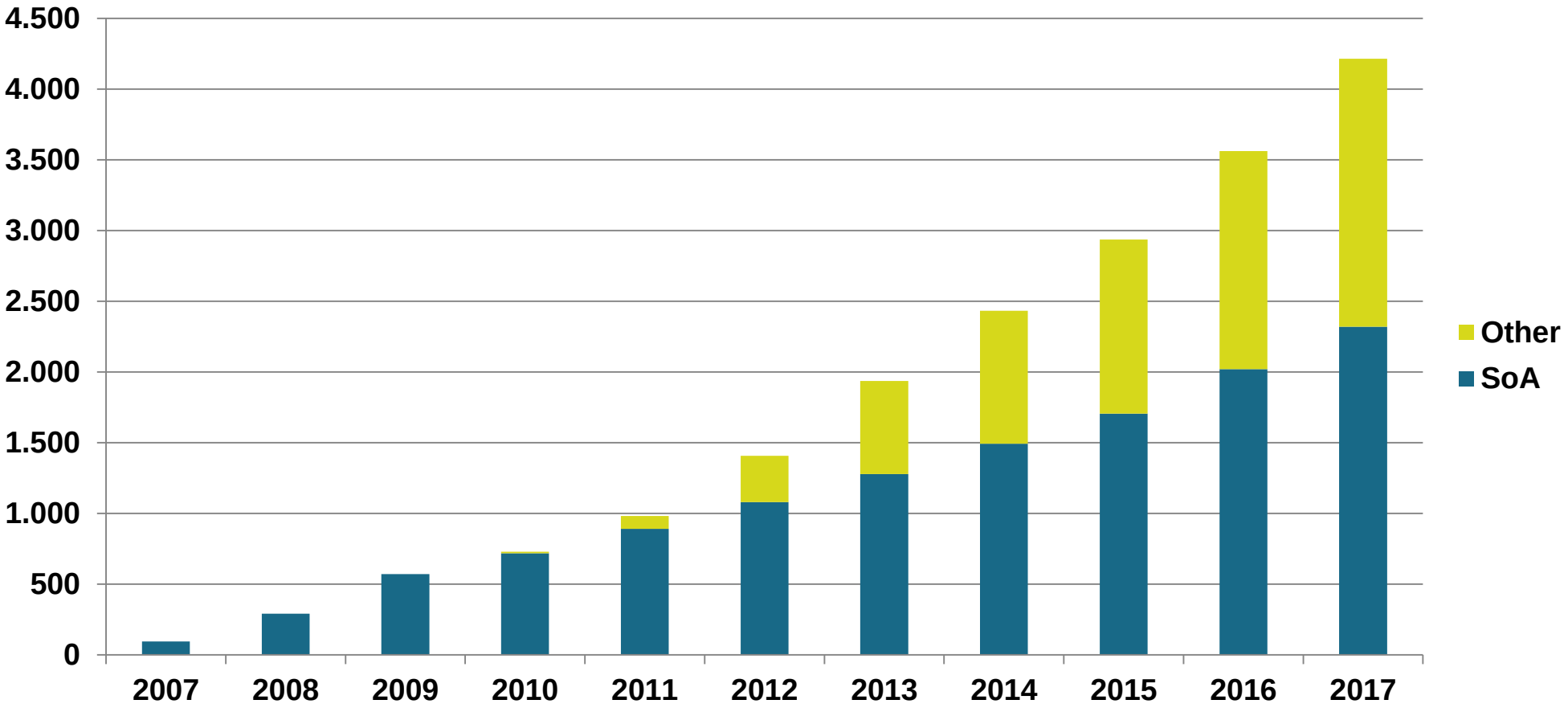
Where do actuaries work in ERM?

- Chief Risk Officers (CROs) / Senior Risk Officers
- Operational / Group risk managers
- Rating agencies
  - Developing ERM review frameworks
  - Performing ERM capability assessments
- Consultants developing ERM capabilities in companies
  - Including integration of pension scheme risks

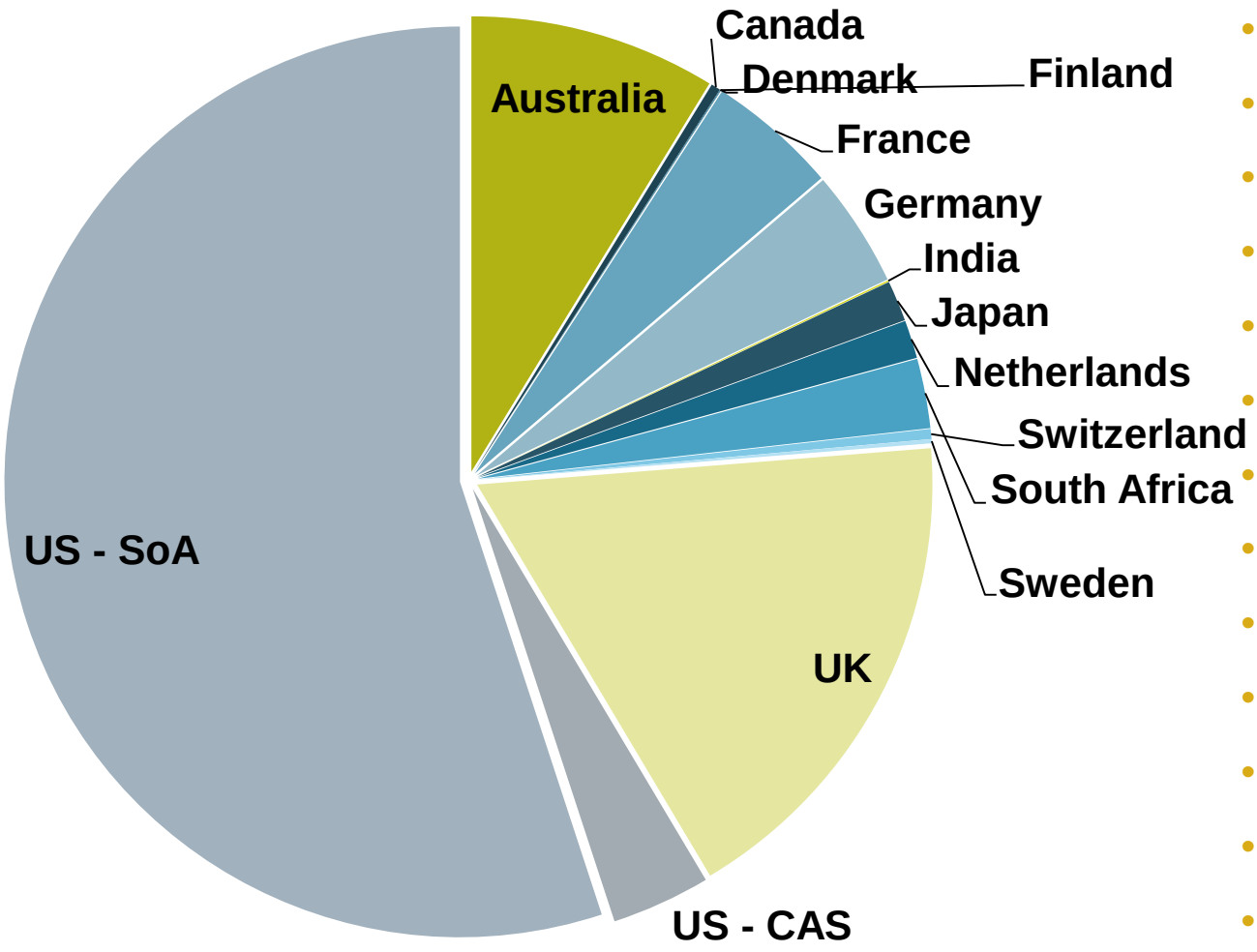
Where do actuaries work in ERM? (contd)

- Risk modelling & research
- Risk-based capital assessment techniques
- Alternative Risk Transfer (ART)
- Project appraisal and risk management:
  - Energy companies
  - Engineering / construction
  - Transport / aviation
  - Banking / corporate finance

CERA: the numbers



CERA holders at end of 2017



Australia	369
Canada	14
Denmark	1
Finland	1
France	195
Germany	175
India	2
Japan	61
Netherlands	57
South Africa	104
Sweden	6
Switzerland	15
UK	747
USA – CAS	148
USA – SOA	2,320
TOTAL	**4,215**

A good ERM specialist has

- Technical competence – CERA
- Business skills
- Management skills
- Communication skills

CERA Global Association

Any questions?

Visit: www.ceraglobal.org

Email: CERA.Global@actuaries.org.uk

The views expressed in this presentation are those of the presenter and do not necessarily reflect the views of the CERA Global Association.

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The European knowledge centre for actuaries

CERA Education by EAA

Henning Wergen
Managing Director EAA

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Agenda

- About EAA
- CERA Credential and CGA
- CERA Program by EAA
- Cooperation between national associations and EAA

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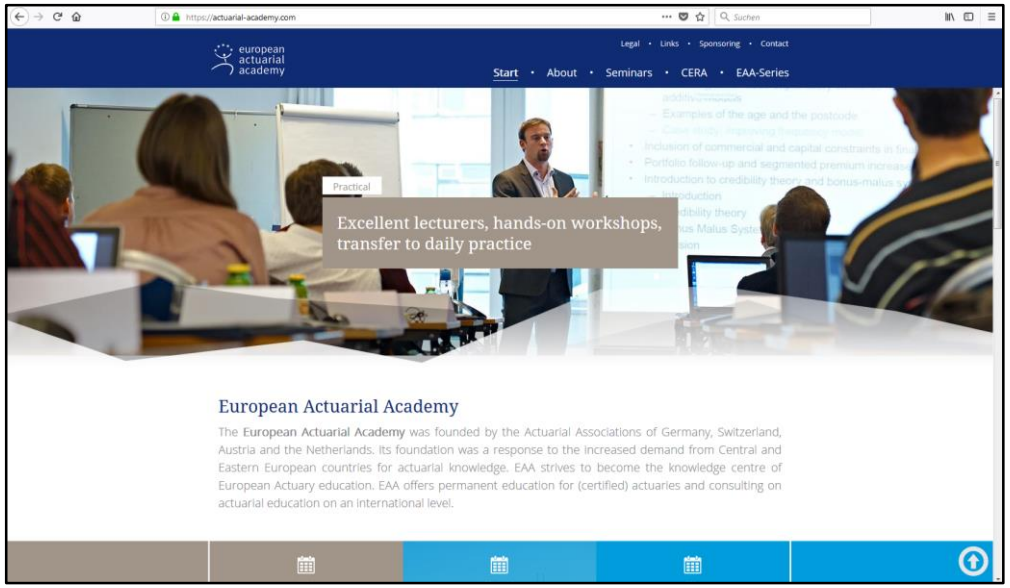
About EAA

- Started in 2002, legally established in 2005
- Founded and run by the actuarial associations of Austria, Germany, the Netherlands and Switzerland
- EAA offers permanent education from actuaries to actuaries in Europe
- EAA cooperates with supranational organizations (e.g. IAA, AAE, CGA, EIOPA)



- All information on www.actuarial-academy.com

- CPD-Seminars
  - Approx. fifteen to twenty seminars in central locations in Europe
  - Qualified and experienced speakers
  - Workshops for practical application
  - Social events for networking
  - International group of attendees

- Special activities
  - Since 2012 EAA offers seminars based on the IAA monographs in direct cooperation with IAA
  - Two-hour webinars on specific actuarial topics
  - Business simulation game in cooperation with TATA Interactive
  - EAA regularly cooperates with supervisory authorities to organize education for supervisors on actuarial topics

CPD Activities

- EAA offered the following CPD events in 2017:
  - 'Understanding IFRS 17'; Zagreb, 09/2017; Lisbon, 10/2017
  - 'Neural Networks and Deep Learning in Insurance - Theory and Practice'; Prague, 09/2017
  - 'A Primer in Life Insurance Products'; Milan, 10/2017
  - 'Advanced Non-Life Pricing & Profitability Analysis: Modern Techniques with R Application'; Madrid, 10/2017
  - EAA Forum: 'Business Simulation Game on Risk and Capital Management under Solvency II'; Copenhagen, 11/2017
  - 'Health Insurance: From the Actuarial Background to Product Development'; Munich, 11/2017
  - 'Stochastic Modeling – Theory and Reality from an Actuarial Perspective'; Athens, 11/2017
  - 'Validation of Technical Provisions under SII – An Actuarial Perspective'; Budapest, 12/2017
  - Webinar: 'Equity Volatility Modelling and Forecasting'; 12/2017
  - Webinar: 'German Industry Standard for Category 4 PRIPPs'; 12/2017

CPD Activities

- Events to come:
  - 'Non-Life Pricing: Introduction to Pract. Implementation of Modern Techniques in R'; Athens, 03/2018
  - 'An Introduction to Economic Scenario Generators and their Validation'; Madrid, 04/2018
  - 'Life Annuities – From Basic Products to Capital Management'; Stockholm, 04/2018
  - 'Loss Reserving in Property and Casualty'; Dublin, 04/2018
  - 'Fit and Proper for Actuaries – (Not just) Fulfilling the Solvency II Directive'; Amsterdam, 05/2018
  - 'The Actuarial Control Cycle – Traditional and New Applications in Case Studies'; Milan, 06/2018
  - 'Update to ORSA'; Ljubljana, 09/2018
  - 'Predictive Modeling for Life & Health Insurance'; Barcelona, Autumn 2018
  - EAA Forum: 'Business Simulation Game on Risk and Capital Management under Solvency II'; Vienna, 10/2018

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Agenda

- About EAA
- CERA Credential and CGA
- CERA Program by EAA
- Cooperation between national associations and EAA

Why Enterprise Risk Management for Actuaries?

- The actuarial world is changing:
  - Increasing duties and responsibilities for actuaries to measure risk potentials
  - Increasing involvement in modeling diverse risks
  - Increasing integration in the comprehensive risk management of a company with overlaps in the functions of Responsible Actuary, actuarial function, risk-management function and CRO function
- Solvency II stimulates the process of integration:
  - Pillar 1 (SCR, internal models etc.) requires advanced actuarial techniques that are integrated in risk management
  - Pillar 2 requires specific understandings of risk management and high involvement of actuarial competence in establishing risk management (actuarial function, risk management function, ORSA process etc.)

Why Enterprise Risk Management for Actuaries?

- Consequences on actuarial profession:
  - The actuary's competence will become more important and even deeper with regard to technical expertise
  - The role of actuaries will be discussed in the future because of overlaps between actuarial function and risk management function:
    - Actuaries only as technical experts within the risk management; actuarial reporting substituted by risk management reporting or
    - Actuaries as responsible managers within the risk management process
  - In addition, more and more actuaries work outside of traditional fields due to their specific and practical know-how
- This is the basis for CERA initiative in order to upgrade actuarial competence to skills in comprehensive risk management (actuaries as responsible risk managers)

CERA in a nutshell

- Why CERA?
  - Provides the most comprehensive and rigorous training in ERM
  - Is a fast-growing globally-recognized credential
  - Combines a range of business and professional skills with the mathematics of finance and risk
  - Equips risk management professionals to empower better business decisions and more profitable business development
  - Has a wide range of applications in insurance and finance, and well beyond
  - Combines the highest professional standards, with an enforceable code of ethics, conduct and discipline
  - Is supported by actuarial associations worldwide
  - Is recognized and transferable internationally
  - Has a rigorous and advanced curriculum underpinned by actuarial science, with an emphasis on ERM and professionalism
  - Offers career choices outside the traditional actuarial markets
  - Equips risk management professionals to better contribute to consumer protection and financial stability

CERA education syllabus

- The CERA education syllabus consists of the following seven sections:
  - Enterprise Risk Management Concept and Framework
  - ERM Process (Structure of the ERM Function and Best Practices)
  - Risk Categories and Identification
  - Risk Modeling and Aggregation of Risks
  - Risk Measures
  - Risk Management Tools and Techniques
  - Economic Capital
- Syllabus can be put into education systems differently

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Agenda

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EAA as education provider

- Actuarial Associations can delegate an educational program and a suitable examination process to an Accredited Education Provider
  - This might be useful for those actuarial associations that don't have the capacity (financially and/or personally) to develop an own system
- That has encouraged EAA to offer an already accredited system to other associations:
  - EAA can support actuarial associations in the application process to become Acceding Party (member of CGA) and/or Award Signatory (allowed to award CERA)
  - EAA can act as Accredited Education Provider
- The designation CERA will be awarded by the national actuarial association, not by EAA

EAA Education on CERA

- Basis of EAA's education program for CERA is the accredited system of the German Actuarial Association (DAV) and the German Actuarial Academy (DAA)
- Program has 13 training days with a very high practical relevance to ERM
- Program is designed to take 1,5 years
- This education system consists of four modules (seminar + exam):
  - Foundations and Quantitative Methods of ERM
  - Taxonomy, Modeling and Mitigation of Risks
  - ERM Processes
  - Economic Capital
- Every seminar and every exam (approx. 6-8 weeks after the exam) take place once a year

Foundations and Quantitative Methods of ERM

- Seminar: 4 days
- Examination: 180 minutes
- Date: 20-23 February 2018 in Madrid (once a year in Spring)
  - Next run in Spring 2019 (date and location not yet fixed)

- Topics:

  - Concept of ERM
  - Principal terms in ERM
  - ERM Culture, Communication, Monitoring and Governance
  - Creating Value by ERM
  - Risk Measures
  - Statistics (univariate models)
  - Statistics (Bayesian statistics)
  - Statistics (multivariate models / Copulas)
  - Integrated Risk Management
  - Interest Rate Risk
  - Credit Risk

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Dr. Irene Merk

1.5 Org. Framework – Lines of defence

Lines of defence

One central concept in risk management is the „three lines of defence".

1. The Internal Control System (ICS) is operating on single-risk level. It is embedded within the processes taking place in the operative departments. The aim is to prevent risks in the making or to mitigate them. Main focus are operational risks.

2. Risk Management (RM) as central function provides an overall view of the risk profile of the company and develops overarching measures. RM is also involved in developing the risk strategy, and provides reporting and counseling to the management.

3. Internal Audit (IA) is an independend, neutral, and competent observer. It examines the company's processes for efficiency and adequacy. IA establish a risk based audit plan, monitor the issues detected and report to the board.

Pricing of Equity and Debt

In Merton's model it is assumed that the asset value (V_t) is a traded security, and that the riskless interest rate equals some constant $r \geq 0$. Under this assumption we can price equity and debt using the Black- Scholes formula.

Pricing of Equity. Recall that equity is just a call option on the asset value V_t. Hence Black-Scholes formula yields

$$\begin{aligned} S_t &= C^{\mathrm{BS}}(t, V_t; \sigma_V, r, T, F) := V_t \Phi(d_{t,1}) - F e^{-r(T-t)} \Phi(d_{t,2}), \\ d_{t,1} &= \frac{\ln \frac{V_t}{K} + (r + \frac{1}{2}\sigma_V^2)(T-t)}{\sigma_V \sqrt{T-t}}, \; d_{t,2} = d_{t,1} - \sigma_V \sqrt{T-t}. \end{aligned} \tag{20}$$

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Dr. P. Brühne, Dr. I. Merk, E. Müller, A. Wolfstein,
Prof. Dr. R. Frey, Prof. Dr. J. Wolf

One board member was approached by the construction firm involved in the claim above with the offer to invest in a dam project in Brazil which just started. For the first five years this would be a loan to the company in € without repayments, and after successful putting into operation for 35 years, a minimum interest and repayment in local currency financed from the profits generated by the dam will be paid to your company, with the option of bonus payments. In case the dam project would be blocked by a court decision, it would be replaced by a commercial real estate project in China.

As a type of collateral, part of the package is a derivative that would replace the minimum return of the dam or the commercial property in case none of both projects will be realized.

The volume of this investment could be chosen to be up to 5% of your balance sheet length.

As the reserves for the above mentioned damage event at the end might not be needed to set up, an ALM alternative discussed would be make use of the investment opportunity to match cash flows from your enterprise's household and building insurance portfolio.

You are requested to explore this investment opportunity from the perspective of risk management. The CRO has provided you with a list of questions that you have to answer.

a) (16 P) Analysis of risks
Please analyse the risks associated with such a kind of investment. Please do not only provide a list of potential quantifiable risks (at least 5) but analyse the concrete situation with potential interrelation of risks and also include non-quantifiable risks (at least 3).

b) (12 P) Develop project outline and explore process implications
With respect to the typical elements of risk management in a Solvency II context with financial reporting according to the IFRS, please develop a project step outline for entering into this specific investment, including

i) focus topics and deliverables for the project,

ii) internal and external stakeholders to be involved and the most important interfaces to regular processes.

You do not need to sketch a time plan but only the main steps.

c) (16 P) Recommendation for risk governance and further risk mitigation measures
Based on the risks that you identified under a), please explain for each consequences for the risk governance and recommend potential risk mitigation measures.

3. Risk measures. (28 P)

a) (4 P) Let the claim size X be exponentially distributed with parameter $\lambda > 0$. Determine Value at Risk $\mathrm{VaR}_\alpha(X)$ and Expected Shortfall $\mathrm{ES}_\alpha(X)$ at the confidence level $\alpha \in (0,1)$ and compute the asymptotic ratio $\lim_{\alpha \to 1} \frac{\mathrm{ES}_\alpha(X)}{\mathrm{VaR}_\alpha(X)}$.
Hint. $\int \ln(x)\,dx = x\ln(x) - x$

b) (24 P) Let the random parameter Λ be Gamma(a,b)-distributed. Suppose that, given the realization $\Lambda = \lambda$ of the quality parameter, the claim size X is exponentially distributed

2

Taxonomy, Modeling and Mitigation of Risks

- Seminar: 5 days
- Examination: 180 minutes
- Date: 10-14 September in Madrid (once a year in Autumn)

- Topics:
  - Economic Valuation, Balance Sheet, Proxy Modelling Techniques, Approaches and Models for Quantifying Risk, Risk Taxonomy
    - Strategic Risk
    - Reputational Risk
    - Liquidity Risk
    - Operational Risk
    - Market Risk
      - Equity Risk
      - Property Risk
      - Currency Risk
      - Interest rate Risk
      - Credit Risk
    - Underwriting Risk (Property & Casualty)
    - Underwriting Risk (Life & Health)
  - Variable Annuities
  - Concentration Risk and Risk Aggregation

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Examples of Strategic Risks

Distribution Strategy	Opting for one particular distribution channel can result in the company losing money if this distribution channel has weaknesses or the company is not optimally geared towards this distribution channel.
Products	Companies that launch relevant products "too late" or even not at all are not participating to the best of their abilities in a market that is continuing to expand.
Investments	Companies that do not include a new attractive asset class into their investment portfolio (e.g., infrastructure investments) are losing out to their competitors in terms of both returns and appeal.
Business/ Market Segments	A group that chooses not to enter the private medical insurance market will miss out if the health market is ever subjected to increased privatization. In contrast, a group that focuses on writing health insurance business will suffer heavy losses if the private medical insurance market ever weakens.

Risk Taxonomy; Strategic, Reputational and Liquidity Risk | 2017 | Page 14

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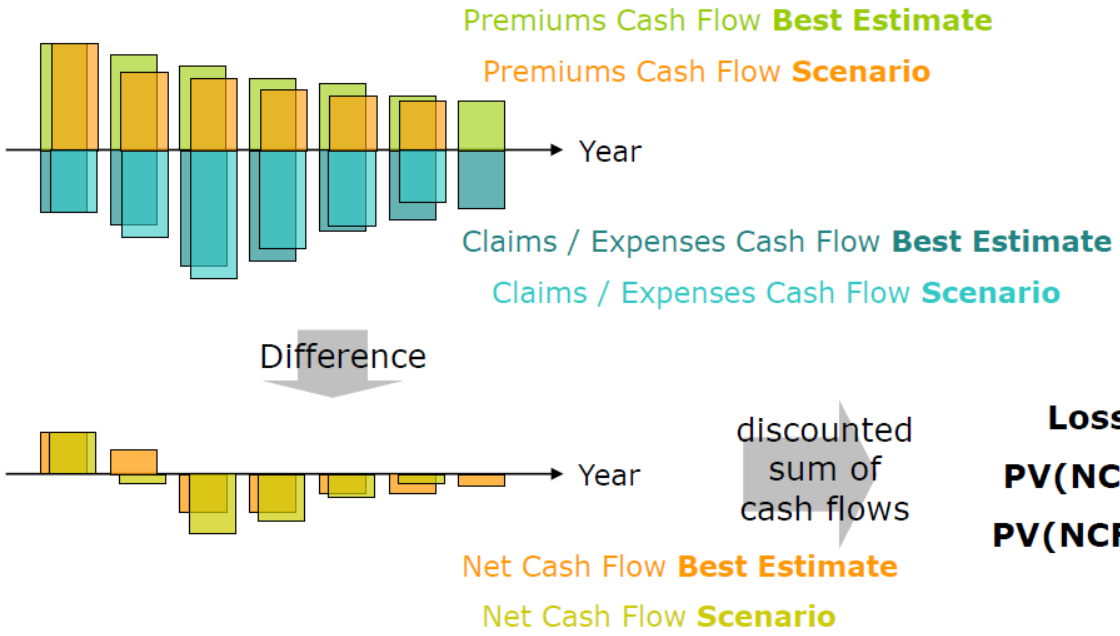
Review: Valuing Risk Scenarios

Changes to the market value balance sheet are valued under stress scenarios with a risk-free interest rate:



Loss-Risk =

$$PV(NCF)_{Scenario} - PV(NCF)_{Best\ Estimate}$$

Case Study for Questions 3 and 4

Feldafinger Brandkasse (FFBK) is considering buying Wedemark Cargo Insurance (WCI), whose portfolio consists exclusively of transport insurance (mainly focusing on marine cargo insurance and storage). Immediately after the acquisition WCI is to be merged with FFBK and have the brand name FFBK. Following the merger the WCI board members are to be appointed to the board of FFBK and will continue to carry out their previous duties.

FFBK sells its products exclusively via tied agents whereas WCI only uses brokers. The management sees great sales potential in diversifying its distribution channels and is thus planning a marked increase in new business across all lines. In order to drive the integration forward rapidly and leverage the synergies accordingly, FFBK plans to close down the location in Wedemark in northern Germany and relocate the employees to Feldafing in Bavaria, some 700 km away. According to current planning the relocation-costs will be amortised in the first year after the relocation. Moreover, initial analyses have shown that both companies' IT systems are similar, meaning that further synergies can be leveraged by migrating the respective in-force portfolios.

Complete due diligence has, however, not yet been performed. Nor have the regulatory authorities been informed about the planned acquisition.

Question 3 (20 marks) *Strategic and operational risks,risk- taxonomy, scenario analyses*

a) (3 marks) Which significant strategic risks can you see in the acquisition of Wedemark Cargo Insurance?
b) (6 marks) The FFBK Board wants to know the consequences that the occurrence of these strategic risks could have for the company. Develop a concrete scenario analysis for the strategic risks you identified in section a) that will enable the occurrence of the risk in question to be analysed and/or quantified. Describe the target figures and the analysed scenarios as precisely as possible.
c) (3 marks) What significant operational risks are associated with the acquisition of WCI?
d) (4 marks) Draw up a taxonomy of operational risks and allocate the operational risks that you identified in section c) to the classes of operational risk you defined.
e) (4 marks) Analyse the taxonomy of operational risks that you defined for completeness, homogeneity, absence of overlap and transparency. Give reasons for your answers.

Proposal for solution for Question 3.

a) (3 marks) In order to gain full marks for this section of question 3, candidates must name at least three strategic risks.
   - Since FFBK has no experience and reputation whatsoever in broker business the merger with WCI and the loss of the brand name WCI could lead to a significant decline in new business in the broker market for transport insurance. Since FFBK has no experience at all in the LoB Transport, this decline in new business from brokers cannot be compensated for.
   - One of WCI's focuses in transport insurance is ocean cargo insurance. A move from northern to southern Germany while simultaneously re-branding the company could trigger uncertainty among existing policyholders who might, as a result, either cancel their policies in numbers (mass lapse) or might refuse to purchase further cover from the new company.
   - The planned relocation of employees to Feldafing may lead to high attrition / staff turnover and a corresponding loss of know-how. The need to fill these vacancies and any consequences of the loss of know-how could lead to the company being unable to leverage the anticipated synergies.

7

Module: ERM Processes

- Seminar: 2 days
- Examination: 180 minutes
- Date: 12/13 March 2018 in Vienna and in Spring 2019 in Madrid (once a year in Spring)

- Topics:
  - Risk Exposure arising from Financial and Non-financial Risks
  - Risk Profile, Risk Management System, Limit System
  - Risk Communication
  - Risk Management Control Cycle
  - Case Study – Non-life

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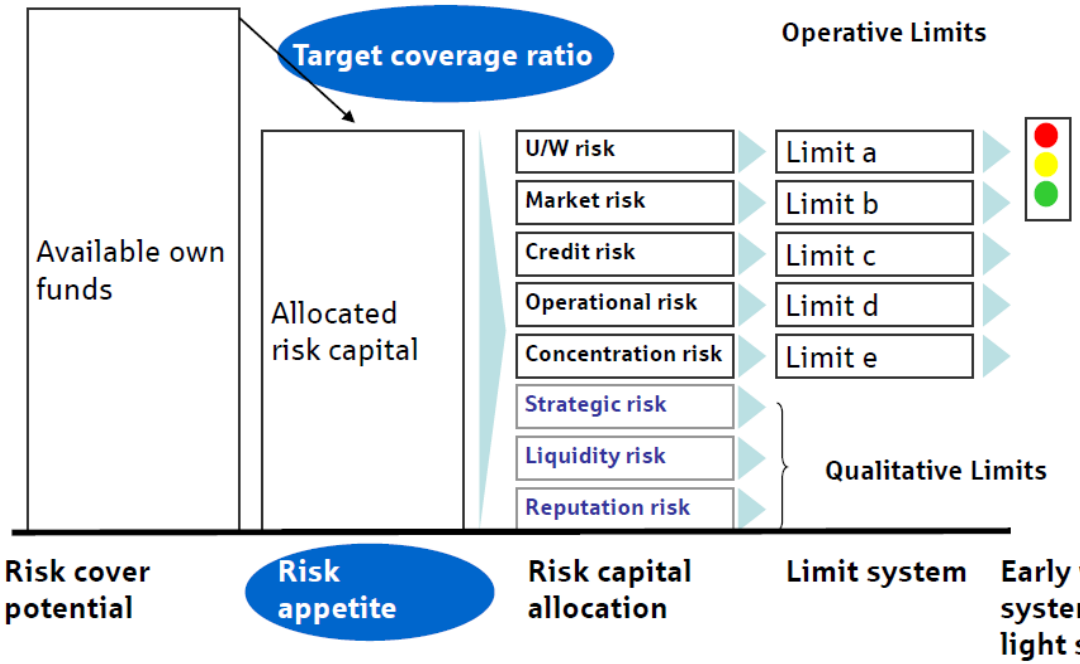
3.1 Desired Risk Profile

Target coverage ratio as desired ratio of available to required risk capital is determined by the risk appetite of the Management Board.



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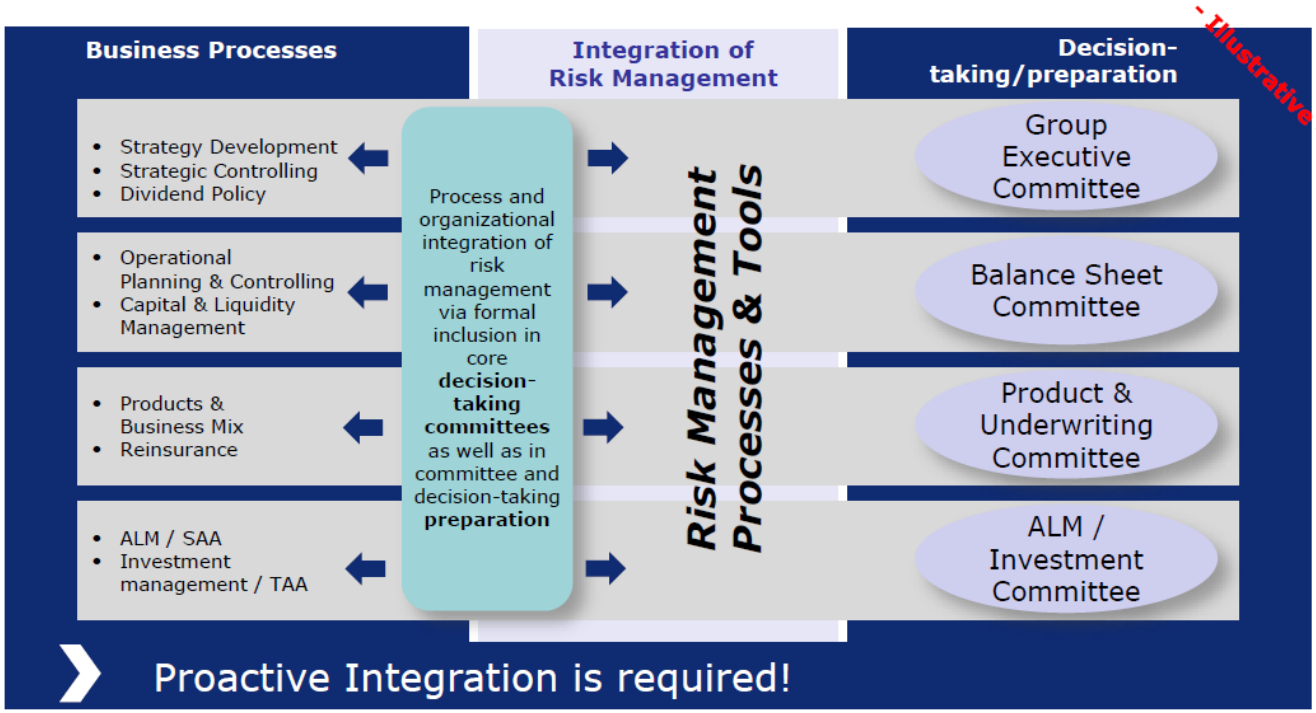
7.5 Who Benefits From Risk Management?

Integration of Risk Management: Formal role of risk management within the corresponding committees



- A detailed analysis of the impact on the SCR and diversification effects should be calculated with the internal model assuming that the previously purchased reinsurance limits of the Group are doubled.

Question 2 (35 marks):

a) The main elements that are asked for in the question are listed and described in the Section "Communicating Risk Measurement and Risk Management – ORSA Process - Part of the ERM Process".

i. Regulatory risk capital (and the regulatory solvency ratio) is to be projected over the company's planning horizon (e.g., 3 years) in accordance with the future assumptions of the business plan concerning internal and external influences.

ii. The adequacy of the Standard Formula should be reviewed as part of the company's own assessment of its risks. Various analysis techniques are possible. This review ought to cover future changes to the risk profile, in accordance with the business plan, that may possibly lead to a change in its adequacy (e.g., due to new insurance products, new investments, a change to the reinsurance structure etc.).

iii. In addition to a purely quantitative analysis, risks that cannot be quantified or that are difficult to quantify should be analysed and, if necessary, included with risk capital in the ORSA. For example, legal risks or reputational risks. Future developments (e.g., in the event of litigation) that could affect the risk or solvency position should also be covered. Ultimately ORSA ought to show overall solvency that is also projected for the future in accordance with the planning process.

iv. Adequate capital planning should be performed that investigates potential future capital-related activity (e.g., dividend payments, new equity or outside capital etc.) in accordance with the planning process, as well as potential contingency plans.

In addition to the 4 elements named, others are conceivable, such as stress tests and scenario analyses, emerging risk analyses or adequacy of the technical reserves, that should also consider all future developments.

b) The Departments involved are mentioned in the Section "Communicating Risk Measurement and Risk Management – ORSA Process - Part of the ERM Process". In detail:

i. Close coordination with the Planning / Controlling Department is necessary in order to receive all important details / parameters concerning planning and to assure consistency. Input for the planning process may also be necessary from sources such as investment management, underwriting, actuarial function, reinsurance, etc.

ii. In order to review the adequacy of the Standard Formula various Departments / Sections should be consulted who can provide input concerning adequacy and future business developments. These could be, for example, investment management, underwriting, actuarial function, reinsurance, accounting etc... (independently of the respective risk (sub) module in the Standard Formula).

4

Module: Economic Capital

- Seminar: 2 days
- Examination: 180 minutes
- Date: 14/15 March 2018 in Vienna and Spring 2019 in Madrid (once a year in Spring)

- Topics:
  - Economic Measures of Value
  - Economic Capital Assessment
  - Economic Capital Model/Allocation
  - Case Study – Life

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EBS&AEC: Economic Valuation

Definition

- Economic valuation of a company or a unit of the company refers to calculating the available economic capital
- This calculation has to meet the following criteria:
  - Realistic values for assets and liabilities (at which they would be traded, in particular no disagreement with market values)
  - No consideration of arbitrary security margins
  - All information, including (uncertain) information about the future and future information is taken into consideration.

- In absence of "usable" market values (which perhaps are available for traded assets), one has to use model-based values (mark-to-model).

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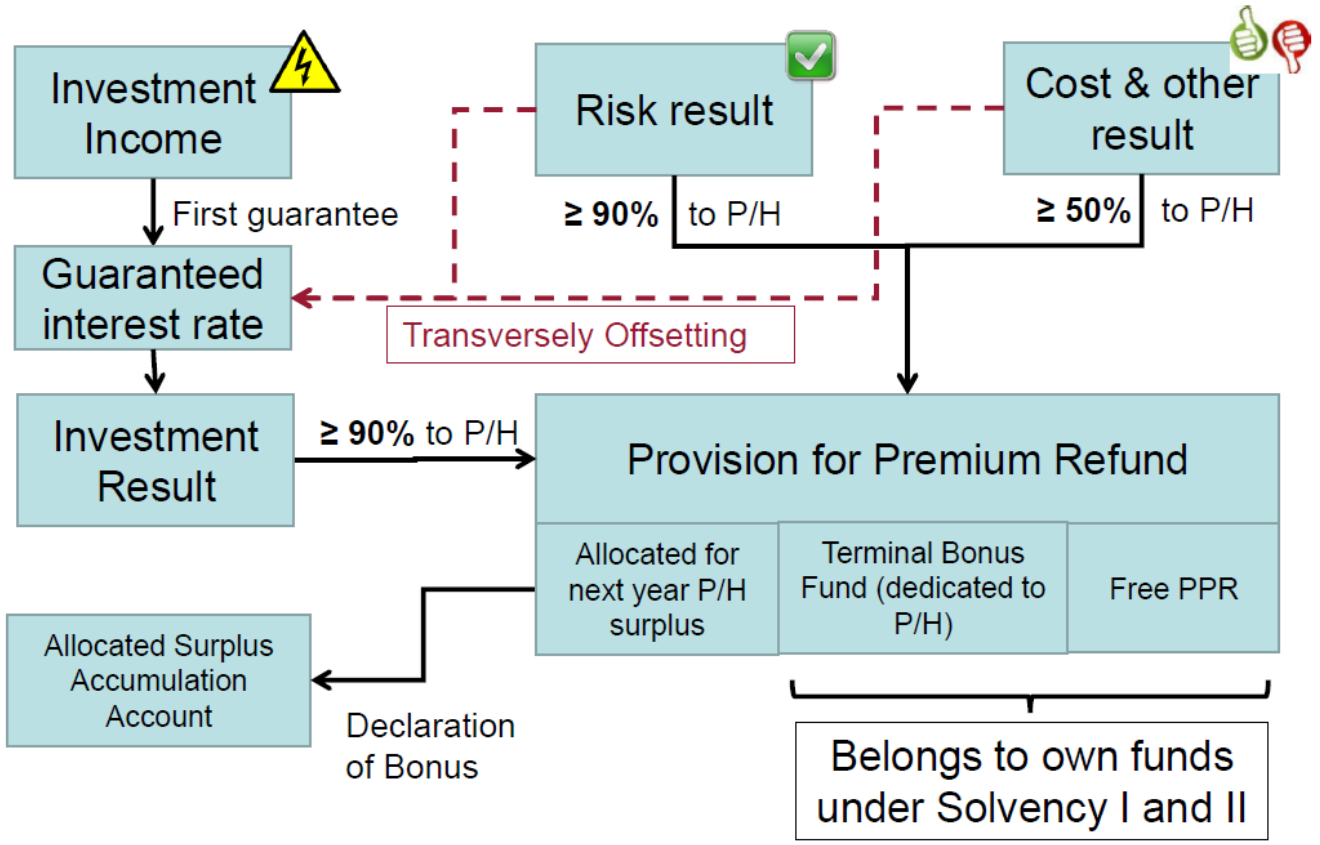
Profit Sharing – Policy-Holder Surplus



b) Risk mitigation and change in capital
(20 marks)

You are the Risk Manager at SecuraLife life insurance.
On the previous reporting date of 31.12.2015 own funds, the surplus of assets over liabilities were 160.
You have performed sensitivity analyses concerning interest and spread and calculated that the respective quantile stress changes the balance sheet as at 31.12.2015 as follows:

- In the interest rate stress the value of assets increases "gross" by +10 and the value of the liabilities by +37.
- In the spread stress the value of the assets is reduced by 36 "gross".
- In the combined stress these gross effects add up.

The anticipated with-profits surplus participation dampens the loss of own funds . In each of the three stresses, this loss can be reduced by 1/3 of the stress, though only to a maximum of 12, in order to get from the "gross" to the "net" stress.

Answer the following questions.

i. The "gross" as well as the "net" basic risk capital (BSCR) is calculated from the two individual stresses with the square root formula with correlation 0. The "net" risk capital is obtained as the maximum of the "net"-BSCR and the "gross"-BSCR minus the maximal risk mitigation effect of with-profit surplus participation of 12, i.e. "net"-RK = max("Net"-BSCR, "gross"-BSCR – 12). Calculate the "net" risk capital. How do you assess the underlying assumptions?

ii. On 31.12.2016, precisely that combined stress occurred, though there were no other changes and the development is in line with the stresses. Argue scopes for design of assigning the profits and losses to the risk drivers with at least figures for two different assignments. (Ignore other influences such as roll-forward, new business during the reporting period etc.)

iii. SecuraLife is part of the Garantia Group together with the second subsidiary, RiskyLife. The holding company has no separate balance sheet or risk capital contributions. The Group also uses the above calculation for "gross" and "net" risk capital. The Group balance sheet, for the baseline case and for the stresses, is determined by adding the individual (solo) balance sheets. At Group level any relief is limited to the Group's future with-profits surplus participation. (This is analogous to the Standard Formula in Solvency II.)
Once again the risk capital is only based on interest rate and spread. Both subsidiaries have identical "gross" and "net" risk capitals for the individual modules.
A colleague from the Accounting Department wonders why the Group has a lower SCR than the sum of the two subsidiaries.
Give a possible explanation and a numerical example, given the circumstances. Assess to what extent the diversification effect stated is economically realistic.

7

Costs of the EAA CERA education

	Module A	Module B	Module C	Module D
Seminar	1,490 € (plus VAT)	1,830 € (plus VAT)	Approx. 800 € (plus VAT)	Approx. 800 € (plus VAT)
Exam	325 €	325 €	325 €	325 €
			Sum	Approx. 6,400 €

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Some practical information

- All relevant information on joining the EAA program to become CERA can be found on www.actuarial-academy.com/cera
  - Registration for the seminars via EAA website

- As the exams are offered by the DAV, a separate registration is needed
  - All information available following this link: https://actuarial-academy.com/Documents/Documents/CERA_Exams.pdf

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Agenda

- About EAA
- CERA Credential and CGA
- CERA Program by EAA
- Cooperation between national associations and EAA

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Cooperation

- EAA offers seminars and exams (via DAV) to all interested associations and actuaries in Europe; every module takes place once a year at a different location

- Based on an established cooperation national actuarial associations can install EAA as Education Provider (accreditation by CGA is needed)

CERA Activities

- Following associations cooperate with EAA to offer CERA education:
  - AVÖ, Austria (Award Signatory)
  - CAC, Catalonia (Award Signatory)
  - HAD, Croatia (Acceding Party)
  - DDA, Denmark (Award Signatory)
  - SA, Finland (Award Signatory)
  - DAV, Germany (Award Signatory)
  - AG, The Netherlands (EAA as additional Education Provider)
  - DNA, Norway (Acceding Party)
  - SAD, Slovenia (Acceding Party application pending)
  - IAE, Spain (Acceding Party)
  - SAF, Sweden (EAA as additional Education Provider)
  - SAV, Switzerland (Award Signatory)

Thank you very much for your attention!

Contact: henning.wergen@aktuar.de

But, please allow me one last addition

ICA 2018 – Getting closer

- 4–8 June 2018
- ESTREL Convention Center, Berlin
- Over 2,000 international practitioners and academics expected
- Hosted by
  - Deutsche Aktuarvereinigung e.V. (DAV) and
  - International Actuarial Association (IAA)
- **www.ica2018.org**

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- Over **30 Invited Speaker-Sessions** of 60 up to 120 Minutes including one or two lectures by well-known invited experts in their field
- **Detailed congress program** including all sessions with slots and speakers available in separate brochure „Detailed congress program“ and on www.ica2018.org

Registration still possible

- **Registration for the ICA 2018 opened on 1 December 2017** → Already over 2,200 registrants
  - Half and full week tickets still available
  - Registration only possible for scientific sessions
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