d-fine

defining d-fine

XXXIII Heidelberg Physics Graduate Days

Heidelberg, October 6th, 2014

Agenda

- Why we exist
- Who we are
- What we offer
- Who we are looking for
- What you would like to know

Why we exist

Trends in the Financial World

Various developments lead to a high demand for advice

- Regulatory requirements
  - Increasing requirements for the measurement of market, credit, liquidity and operational risks (Basel III / Solvency II) and the corresponding capital charge
  - Market value-driven accounting (IFRS)
- High competitive pressure
  - Declining profit margins
  - Controlled acquisition of risks
- Increasing functional and mathematical complexity
  - Products (complex derivatives) and models
  - Risk measurements
  - Control procedures
- IT development

- (Further) development of risk / return strategies
- Building business functionalities
- Development and implementation of mathematical models and methods
- Implementation through use of information technology and design of organizational processes

Who we are

d-fine in a Nutshell (1 / 2)

» d-fine has more than 500 professionals with offices in Frankfurt, Munich, London, Vienna, and Zurich

» d-fine belongs to the Top 10 German Management Consultancies.[1]

Top 10 der deutschen Managementberatungen (Unternehmen, die ihren Hauptsitz sowie die Mehrheit des Grund- und Stammkapitals in Deutschland haben)		**Gesamtumsatz in Mio. Euro**		**Mitarbeiterzahl insgesamt**	
		2013	**2012**	**2013**	**2012**
1	Roland Berger Strategy Consultants Holding GmbH, München *)	750,0	765,0	2.700	2.800
2	zeb.rolfes.schierenbeck.associates GmbH, Münster	169,0	143,0	844	734
3	Simon Kucher & Partners GmbH, Bonn	152,0	145,0	680	620
9	d-fine GmbH, Frankfurt am Main	82,0	78,1	471	410
10	goetzpartners Group, München	77,0	62,3	220	192

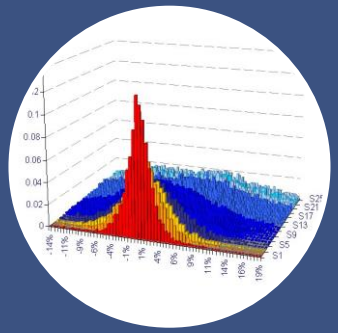
[1] see Lünendonk list 2014

d-fine in a Nutshell (2 / 2)

- We help banks, asset managers, insurance companies, industrial corporations, hedge funds and supervisory organisations with all trading, risk management, asset/liability, loan management and back office projects
  - From A to Z, from first strategic ideas to industry-strength solutions
  - From mathematical modelling to business process implementations
  - From retail and corporate loans to exotic credit and equity derivatives
  - From internal market risk models to IFRS
  - From capital allocation to risk-adjusted portfolio management
  - From internal rating systems to fully fledged Basel III and Solvency II implementations
  - From business analysis to project management

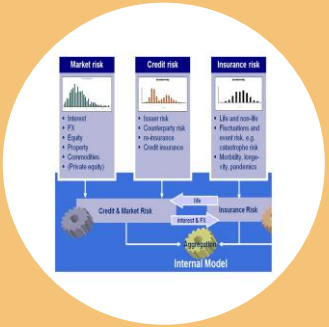
d-fine is actually the leader within some of these specialised areas

Our Services



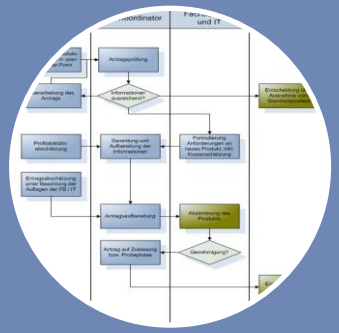
Valuation / Models

- Development and validation of models for valuation and hedging of derivatives
- Rating methodologies
- Calculation and profit testing of insurance rates



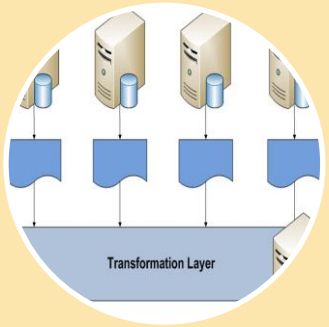
Risk Management

- Development of risk models and control procedures
- Realisation of regulatory requirements, e.g. Solvency II, Basel III or EMIR and REMIT
- Audits with focus on mathematical and regulatory aspects



Professional Design

- Advice on processes and organisational issues
- IFRS realisation
- Procedures for the value-based management of enterprises
- Valuation in the context of corporate finance
- Post merger integration

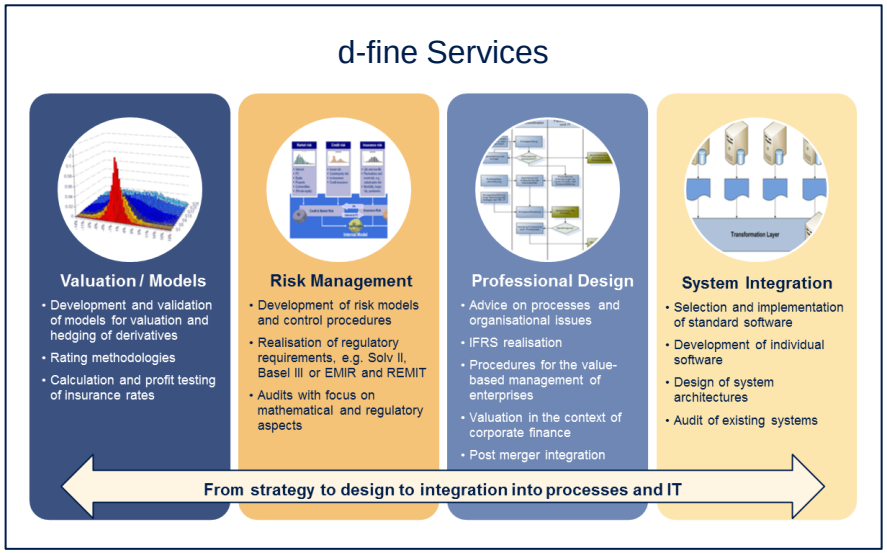


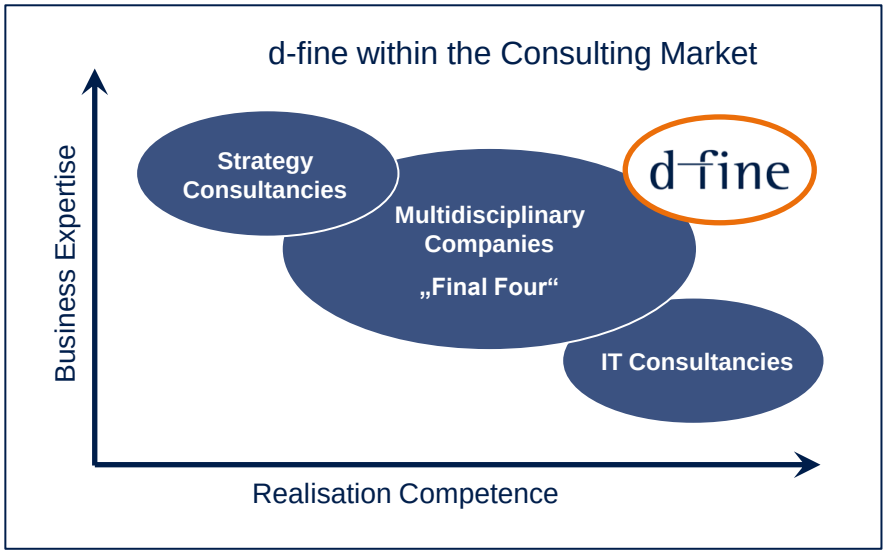
System Integration

- Selection and implementation of standard software
- Development of individual software
- Design of system architectures
- Audit of existing systems

From strategy to design to integration into processes and IT

Our Services within the Market



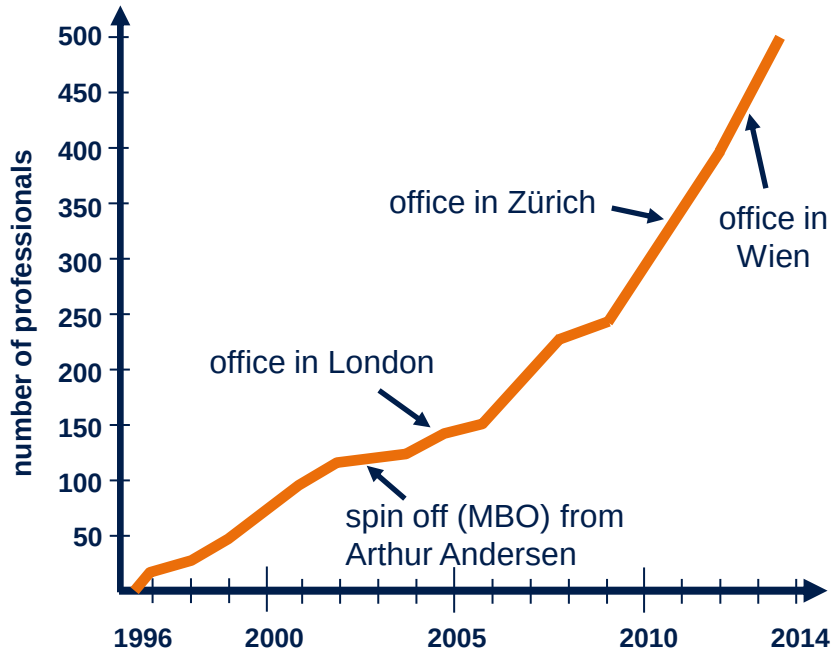


- » d-fine offers services for the financial world around valuation, risk and financial management, accounting, reporting and IT-integration
- » d-fine is independent of the big multidisciplinary companies (audit independence)
- » d-fine combines strategic thinking, professional expertise and methodology with implementation expertise

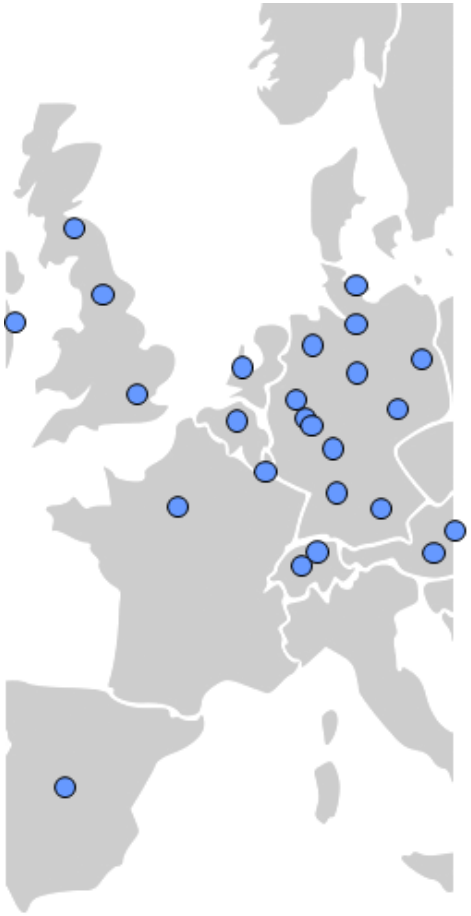
Our History

- Successful in business since 1996
- Founded as a speciality consulting service of Arthur Andersen Germany
- Continuous and constant organic growth
- Hundreds of successful projects on all scales
- Developed a very high level of cooperation with universities and software providers

- d-fine as a separate legal entity
  - Since 07 / 2002: d-fine GmbH
  - Since 11 / 2004: d-fine Ltd, London
  - Since 07 / 2010: d-fine AG, Zurich
  - Since 03 / 2012: d-fine Austria GmbH, Vienna



Our Clients



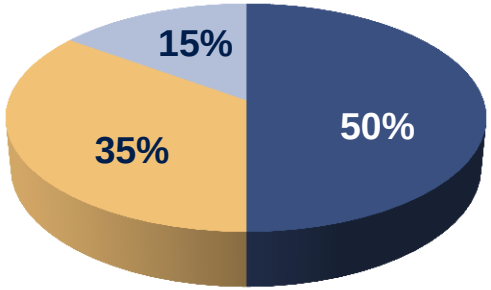
- Large, medium sized, and specialised banks
- Insurances, asset managers, hedge funds
- International industry corporations and energy traders

Our client list (abridged):

- Aareal Bank
- adidas
- apoBank
- ampegaGerling
- ARAG
- AXA
- Barclays Capital
- BayernLB
- BMW
- Bundesrepublik Deutschland Finanzagentur
- Commerzbank
- CQS Management
- CLS
- Daimler
- DBS Singapore
- DekaBank
- Deutsche Bank
- Deutsche Bundesbank
- Deutsche Hyp
- DG Hyp
- DVB
- DWS
- DZ BANK
- EIB
- European Commodity Clearing
- E.ON
- EnBW
- Erste Bank
- Hannover Rück
- Helaba
- HSH Nordbank
- HSBC Trinkaus
- Hypothekenbank Frankfurt
- KfW
- Landesbank Berlin
- LBBW
- MEAG
- Münchener Hypothekenbank
- NRW.BANK
- Nord/LB
- Portigon
- R+V
- RZB, RBI
- RLB Steiermark
- RWE
- Sparkasse KölnBonn
- Talanx
- Toyota Kreditbank
- UBS
- Union Investment
- VW Financial Services
- Zürcher Kantonalbank

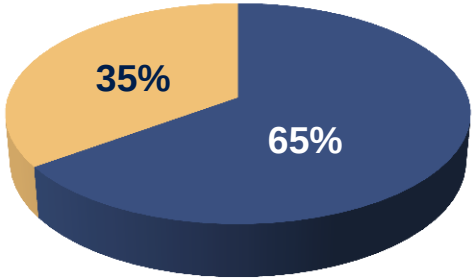
Our People – Your Future Colleagues?

» Deep technical and mathematical skills



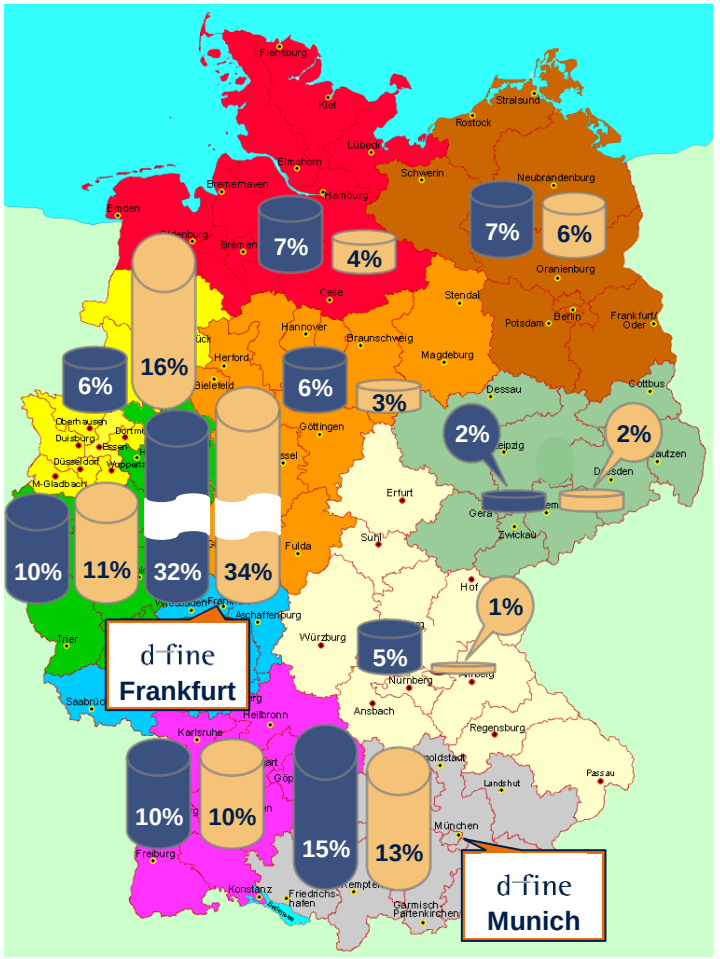
- physicists
- mathematicians
- other (IT, MBA, economics)

» Highly qualified



- PhD level degrees
- master level degrees

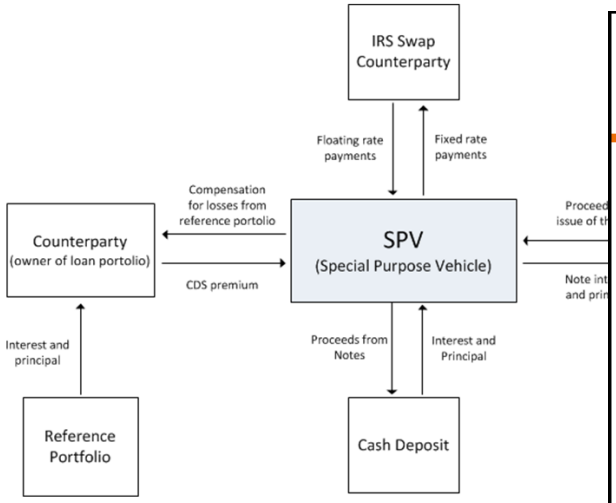
» Typically in top percentile of their class at university



What we offer

Interesting Tasks

Securitization via Swap (“Synthetic Transaction”)



In a swap transaction, the bank retains the loan portfolio but transfer

CDS: Credit Default Swap

Stock process

The Geometric Brownian motion of some stock price $S(t)$

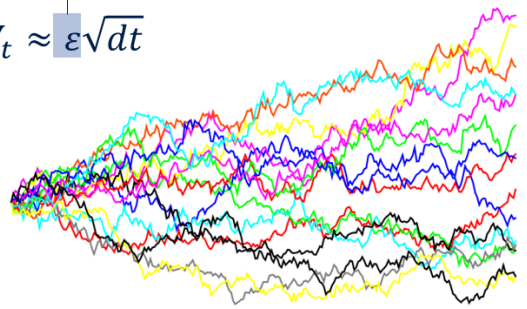
Drift

Volatility

Standard normal distributed random number

$$dS_t = \mu S_t dt + \sigma S_t dW_t \qquad dW_t \approx \varepsilon\sqrt{dt}$$

$$d\ln S_t = \left(\mu - \frac{\sigma^2}{2}\right)dt + \sigma dW_t$$



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A Personal Comparison – Physics vs. Mathematical Finance (1 / 4)

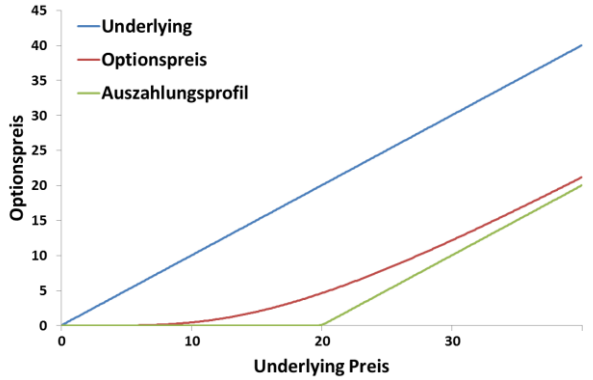
» Heat equation

$$\frac{\partial T}{\partial t} - \frac{\lambda}{\rho c}\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2}\right) T = 0$$

T : temperature
t : time
$\lambda/\rho c$: thermal diffusivity
x,y,z : spatial variables

» Black-Scholes equation

$$\frac{\partial V}{\partial t} + \frac{1}{2}\sigma^2 S^2 \frac{\partial^2 V}{\partial S^2} + rS\frac{\partial V}{\partial S} - rV = 0$$



V : price of an option on an underlying (e.g. a stock)
S : price of the underlying
t : time
σ : measure for the variance of the underlying
r : risk free rate

A Personal Comparison – Physics vs. Mathematical Finance (2 / 4)

» Path integral of pure (lattice) gauge theory

$$\langle \mathcal{O}(U_\mu) \rangle_T = \frac{1}{Z} \int_{per} \mathcal{D}U \, \mathcal{O}(U_\mu) \exp\{-S_G[U_\mu]\}$$

with $$Z = \int_{per} \mathcal{D}U \exp\{-S_G[U_\mu]\} \ .$$

› Monte Carlo simulation of the gauge fields (e.g. gluons) to achieve a thermalisation of the configuration

» Value at Risk (VaR) computation in the context of market risk

$$\mathrm{VaR}_F\left(\vec{S}, P_a, t, \Delta t\right) \cong -a \sqrt{\Delta t} \sqrt{\sum_{i,j=1}^{n} \Delta_i \, S_i(t) \sigma_i \, \rho_{i,j} \, \Delta_j \, S_j(t) \sigma_j}$$

with $S_i(T) = S_i(t) \, e^{\left(\mu_i - \sigma_i^2/2\right)\Delta t + Y_i}$ for $i = 1, \ldots, n$

› Monte Carlo simulation of the risk factors (e.g. stock prices)

Solve different problems with the same numerical methods

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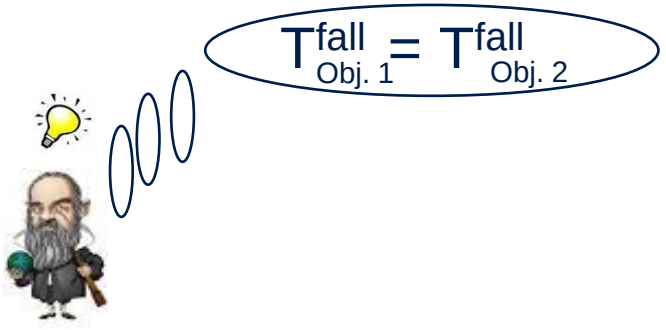
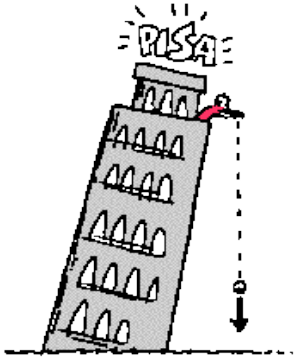
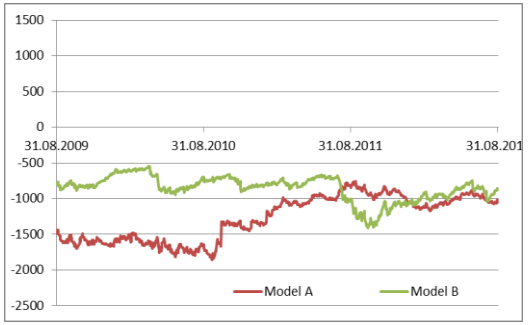
A Personal Comparison – Physics vs. Mathematical Finance (3 / 4)

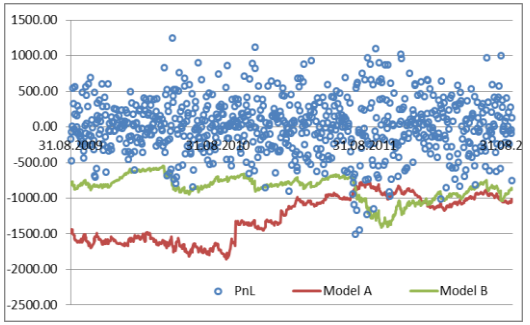
» Model validation – physics:
Testing a theory by experiments





» Model validation –mathematical finance:
Testing a (marked) risk model by „backtesting“



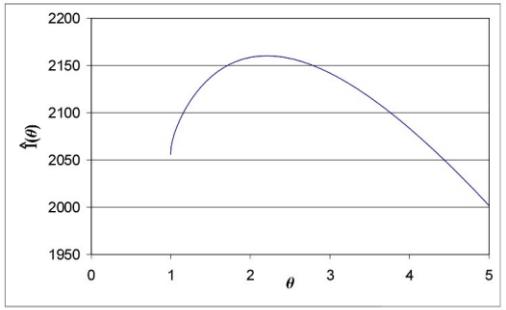


Same validation criteria: Quality of a model depends on reality check

(back)

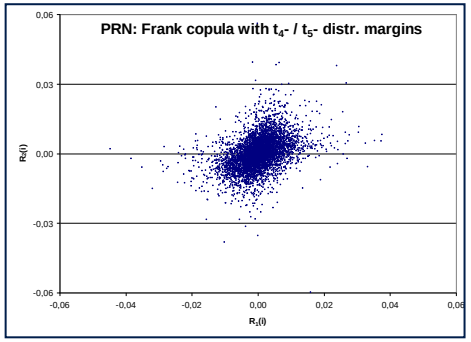
A Personal Comparison – Physics vs. Mathematical Finance (4 / 4)

» Maximum likelihood parameter estimation

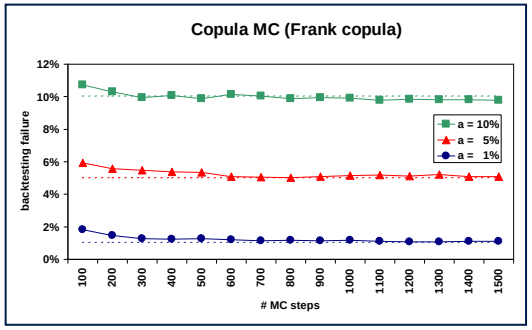


modified likelihood function $\hat{l}(\theta)$ vs. θ

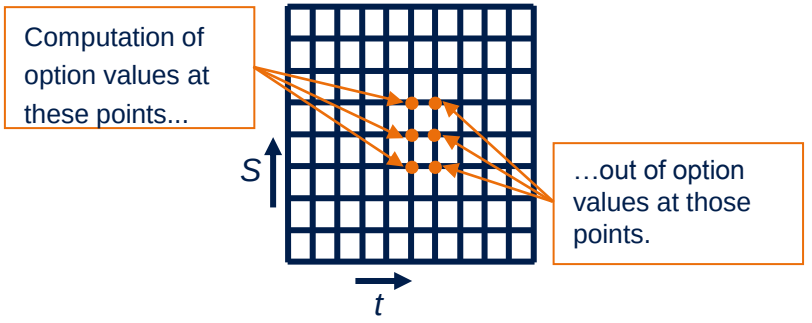
» Generation of pseudo random numbers (MC simulation)



» Evaluation of experimental data



» Solving of PDEs



(back)

Comprehensive Training: M.Sc. in Mathematical Finance @ University of Oxford (1 / 2)

Comprehensive Training: M.Sc. in Mathematical Finance @ University of Oxford (2 / 2)

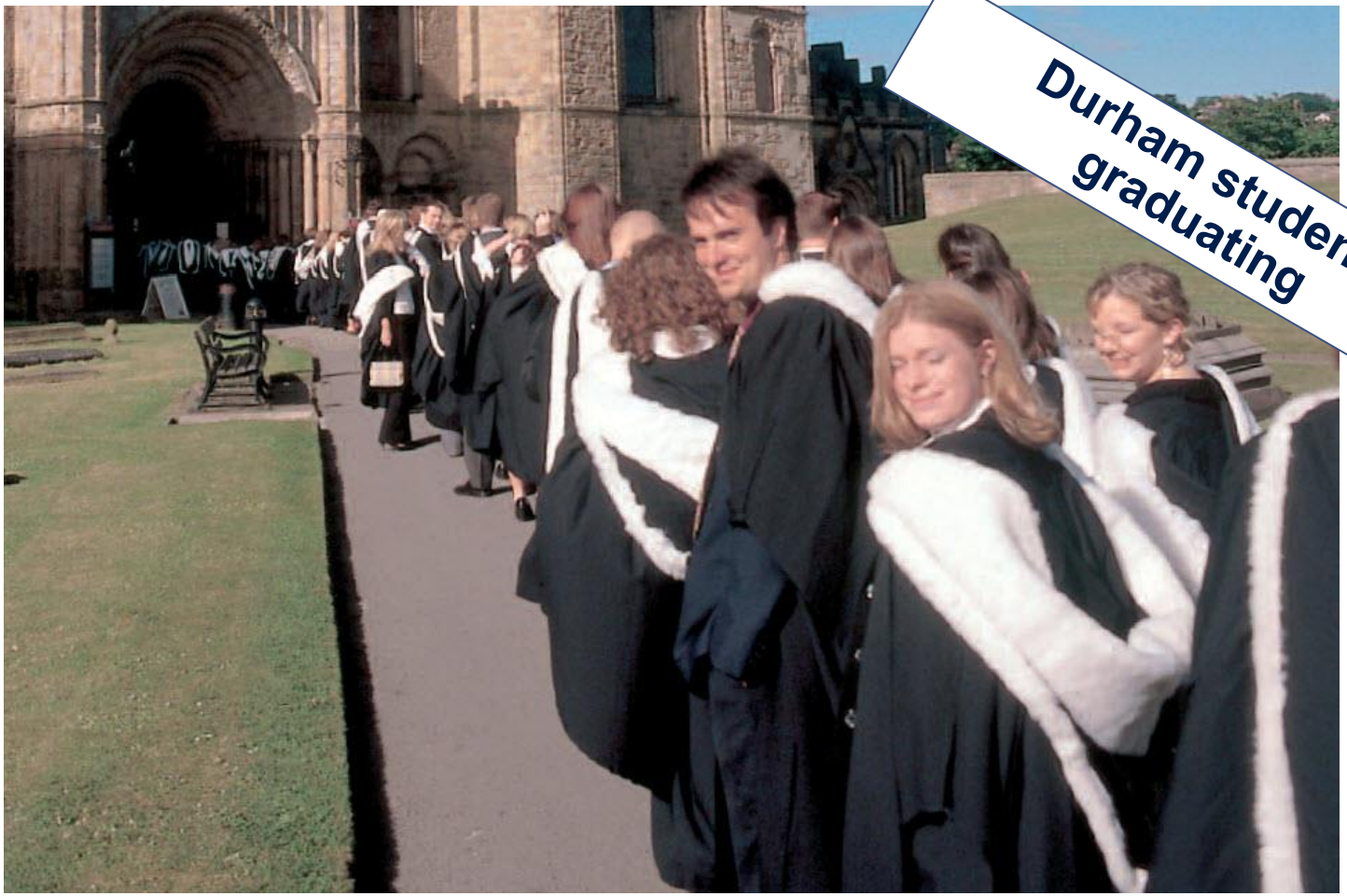
Comprehensive Training: M.Sc. in Quantitative Finance @ Frankfurt School of Finance & Management

Comprehensive Training: executive MBA
@ European Business School with Durham Business School (1 / 3)

Comprehensive Training: executive MBA
@ European Business School with Durham Business School (2 / 3)

... or study at Durham University

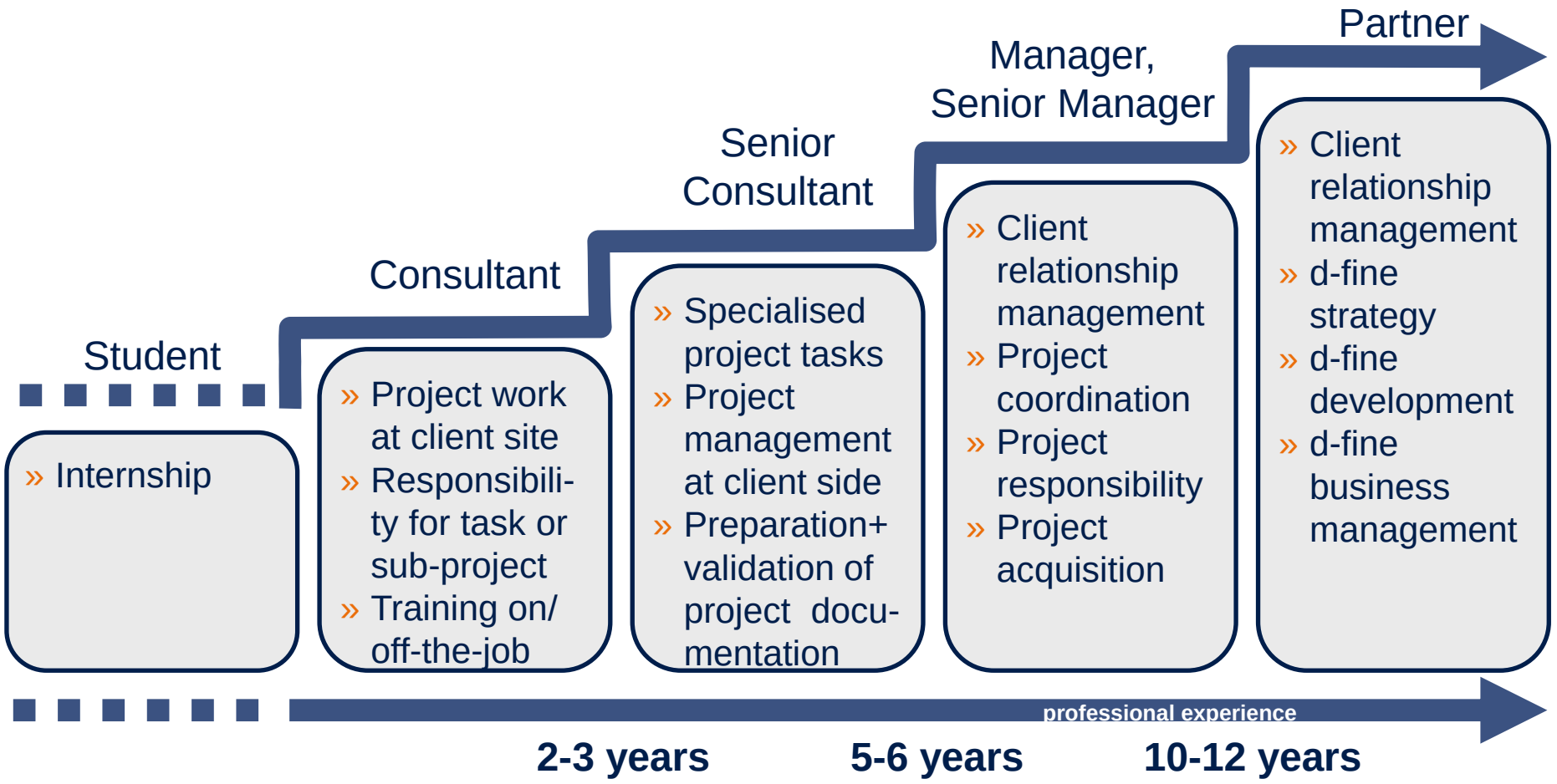
Comprehensive Training: executive MBA
@ European Business School with Durham Business School (3 / 3)



Additional Continuous and Intensive Training

- CFA (Chartered Financial Analyst)
- Actuary
- Corporate Finance: University of Warwick
- Considerably more additional internal and external training: e.g. finance, soft skills, software, …
- State of the art know-how through internal research, cooperation with leading universities, e.g.
- University of St. Andrews (Scotland)
- Goethe University (Frankfurt)
- You are able to regularly attend international conferences and seminars
- European Credit Risk Conference (Vienna)
- Annual Capital Allocation and Management Conference (London)
- RiskMinds Conference (Geneva)
- Testing & Finance Conference (Frankfurt)

Clear Career Perspectives



d-fine is a “Fair Company”

Fair Companies…

- … do not replace permanent positions with interns, trainees, guest students, permanent temporary personnel etc.,
- … do not put off a university graduate who applied for permanent position with an internship,
- … do not decoy interns with a vague outlook on a subsequent permanent position,
- … they do offer internships mainly for professional orientation during the time of education,
- … they do pay adequate expense refunds to interns.
- … they do inform interns about the rules and do alert interns on the feedback address(1).
- … do create transparency on their participation and the regulations(2).

d-fine obeys the above mentioned rules. That’s why we are allowed to use the Fair Company seal of quality, issued by karriere.de.

(1) faircompany@karriere.de (2) http://faircompany.karriere.de/faircompany.aspx

d-fine supports Science (Examples only)

- September 2012 & August 2013:
  Conference sponsoring „Lattice 2013“ and „Statistical Mechanics: Interplay of Theory and Computer Simulations“ at Johannes Gutenberg University Mainz

- Since April 2012:
  Support of PhD students in mathematical finance by the d-fine PhD scholarship „Optimization in Financial Markets“ at Humboldt-University Berlin

- Since October 2010:
  Support of a MSc student in physics by a so called Deutschland-stipendium at the University Cologne

- Since October 2002:
  Sponsoring of the Physics Graduate Days at the University of Heidelberg (2 x per year), including lecture series during fall events

d-fine PhD Scholarship – 2nd Edition

- Invitation to tender in autumn 2014
- Duration: 3 years
- Prerequisite:
  - MSc degree in mathematics or business mathematics
  - Interest in mathematical finance + probability theory
- What you can expect:
  - Innovative research topics
  - Diverse industry contacts
  - Large quantity of international contacts
  - International team
- Detailed information: Prof. Dr. Ulrich Horst (HU Berlin)

Interested? Contact me after the lecture!

Your Life at d-fine

Attractive compensation

» Competitive fixed salary plus bonus
» Accident insurance and pension fund
» Company car program

Work-Life-Balance

» Free choice of location all over Germany
  › You may live wherever you like, we take care of your business travel and accommodation
» Possibility of “Local Contract”
  › Working within a geographically limited area
  › Currently possible for senior consultants for area around Rhine/Main or Munich region
» Extra Program “Childcare”
  › Support when looking for suited child care or in cases of emergency care in almost all big German cities

Networking @ d-fine

Working together with excellent people,

- » having the same academic background (physics, mathematics, etc.),
- » having the same level of qualification (at least an MSc degree, plenty of PhD's) and
- » having reached the same high level in their university degrees

is a great experience!

More than 500 d-fine colleagues – distributed over more than 100 projects...

⇒ Q: How to get in contact with colleagues you typically don't see?

⇒ A: Regular d-fine conventions, 3 times a year!

d-fine Conventions (1 / 2)

- Three 2 day d-fine internal events each years (spring, summer, before Christmas)
- Everybody resides in a hotel
- Content:
  - Plenary talks for all consultants, e.g. Management Information
  - Parallel talks on each level – beginners, more experienced colleagues, experts
  - Time for networking, e.g. meetings between mentor & mentee

- Every 2nd year, Summer Convention together with spouses
  - Destination: Somewhere in Europa
  - Duration: Full weekend (Friday – Sunday)
  - Content: No business, fun and recreation only
  - Previous events: ...

d-fine Conventions (2 / 2)

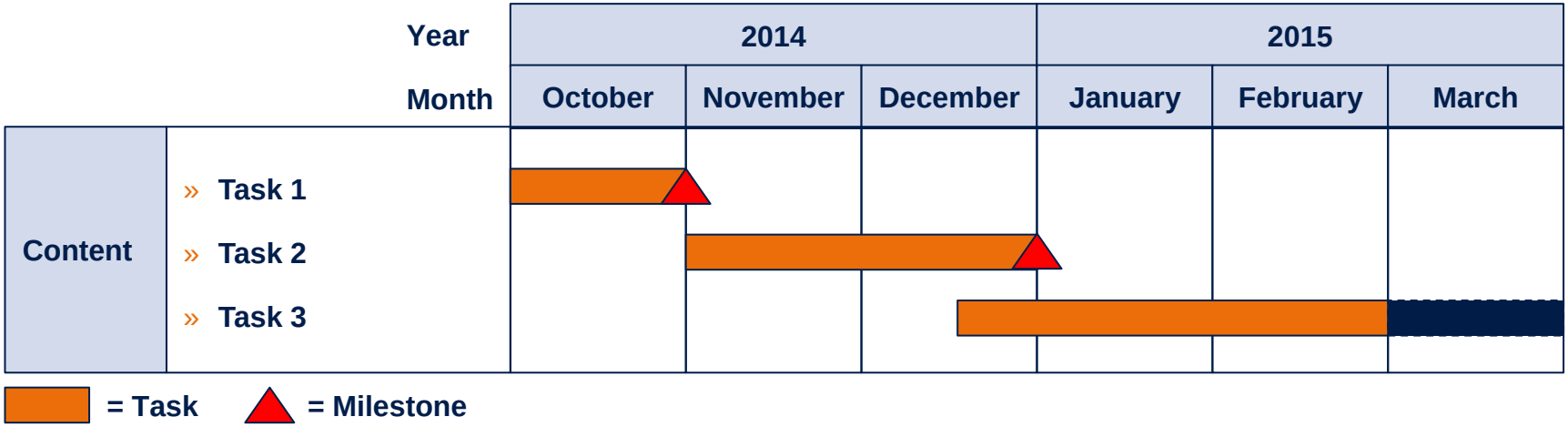
Vienna 2008: Gala Dinner at Kunsthistorisches Museum

Barcelona 2010: Convention Hotel

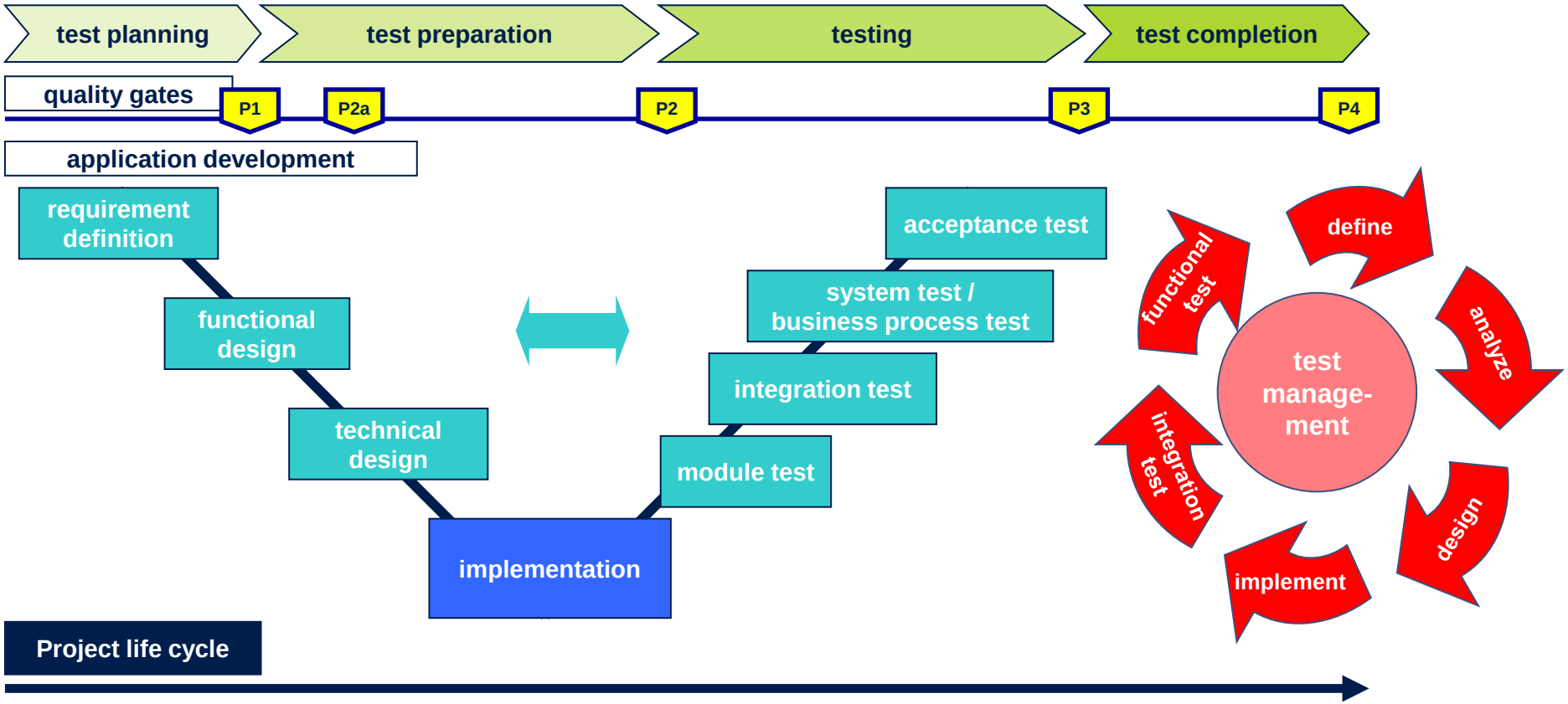
Rom 2012: Gala-Dinner at Villa Miani

What does “Project Work” really mean?

- Project
  - (Complex) topic
  - Limited time frame
  - Limited budget
  - Dedicated team
  - Nonrecurring activity, (almost) independent of daily business
  - Done at client side, together with the client
  - Accommodation from Monday until Friday in a hotel at the project location
- Roles
  - Project leader
  - Project staff
  - Internal contact persons (from business departments)
- Project management
  - Project planning, scope, specification
  - Mile stones, quality gates
  - Prioritisation
  - Status reports, regular meetings



Testing, Testing, Testing…



Variety of Project Types

strategic	specialised/ conceptual	technical	time, budget limited / time & material
big / small	sub project/ own PMO	involvement of 3rd parties	IT dependent/ IT independent
initial project	follow up project	system selection	system implementation
implementation internal model	numerous topics	special topics	…

Example: System Implementation

usage of old system	gap analysis of old system	new system requirements	selection of new system
business specification	parameterisation of software given	business architecture: connected systems, DWH?	realisation concepts
specification of interfaces	realisation (programming) of interfaces	tests	documentation
approval / acceptance	go live	usage of new system (incl. support, if applicable)	…

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As an Intern at d-fine – Firsthand Reports (1 / 3)

- Studies: Technical University Berlin, Mathematics (M.Sc.), 2nd year
- Duration: 05.02. – 30.06.2012 (originally planned for 2 month, extension during internship)
- Introduction:
  - 1 day formal introduction at d-fine office (laptop issued, organisational issues)
  - 6 days familiarisation with new project
- Project work:
  - Customer: German insurance company
  - Topic: Introduction of a partial internal model due to Solvency II
  - My role:
    - Development and implementation of several components of the partial internal model within the risk management software SAS-RMfI (e.g. aggregation with copulas, special treatment of non-proportional reinsurances)
    - Implementation of standard models for the non-life sector in SAS Base
- Miscellaneous:
  - Joint dinner with d-fine colleagues

As an Intern at d-fine – Firsthand Reports (2 / 3)

- Studies: Ulm University, Business Mathematics (M.Sc.), 4th year
- Duration: 05.03. – 05.05.2012
- Introduction:
  - 1 day formal introduction at d-fine office (laptop issued, organisational issues)
  - 2 days familiarisation with new project (getting to know the colleagues, getting familiar with project topic, project structure, …)
- Project work:
  - Customer: Big German bank incl. subsidiaries
  - Topic: Establishing transparency of the market risk calculation and the market risk position of all subsidiaries, generation of a market risk policy
  - My role:
    - Involvement in the creation of documents giving an overview on the market risk calculation of some subsidiaries
    - Creation and maintenance of gap lists
    - Involvement in the creation of a group wide product catalogue

As an Intern at d-fine – Firsthand Reports (3 / 3)

- My role (continued):
  - Aggregation, analysis and graphical presentation of market risk figures (sensitivities, present values, nominal values) of all subsidiaries
  - Enlargement of an Excel tool, used for cash flow based sensitivity calculations
  - Presentation of results in front of the customer

» Miscellaneous:

- Running with d-fine colleagues after work
- Football TV sessions with d-fine colleagues after work
- Participation in d-fine internal meetings (spring convention, business unit meeting)

Who we are looking for

Qualification Profile: Key Qualifications and Skills…

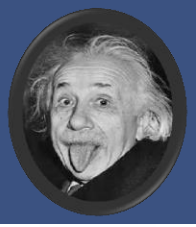
- Excellent quantitative and analytical skills

  ⇒ Very good final degree at university (Diploma, Master) or PhD in Physics, Mathematics, Business Informatics, etc.
- High grade of social competence
- Very good IT skills
- Very good English skills
- Interest in financial markets
- Work experience abroad, internships, scholarships, etc.

...and why Physicists and Mathematicians most of them fulfil

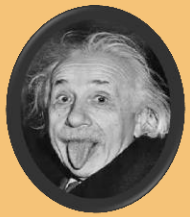
Strong Analytical / Methodical Skills

- Stochastic methods
- Monte Carlo methods
- Differential equations



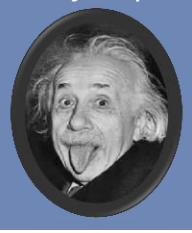
Strong IT-Know-how

- Programming
- Numerical methods
- Data bases



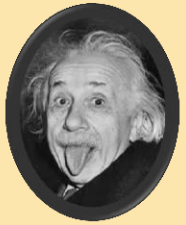
Good Understanding of Economics and Business Processes

- Developm. of economics
- Mechanics of financial crises
- Regulatory requirements



Good Communication Skills

- Presentation skills
- (Simple) representation of complex topics



What you would like to know

Summary

- The professional opportunities available to scientists (m/w), mathematicians (m/w) and business informatics (m/w) are
  - huge

  and
    - diverse.
- At d-fine you can discover them.

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