



**The Actuarial Profession**

making financial sense of the future

# Modelling with PillarOne

## Risk Management Meets Open Source

Markus Stricker and Stefan Kunz, Intuitive Collaboration  
GIRO 2009, Edinburgh

# PillarOne

- Driven by a community with dedicated resources – **open source**
- An **Enterprise software suite** for actuarial applications, e.g. reserving, risk modeling/management and pricing/profit testing
- A **community** which encourages the exchange of concepts, methods and implementations around enterprise risk management

Software  
Platform



Community

## Risk Management meets Open Source

### Insurance

An actuarial workbench for **reserving, risk** modelling/aggregation, ALM, reinsurance optimization, profit-testing. [More...](#)

### ERM

A risk management infrastructure to consolidate all different **ERM applications** usable in a stand-alone or multi-user, client-server mode. [More...](#)

### Open

Commercially supported by renowned firms, but **free to use and extend** - open source. [More...](#)



#### Screenscasts

Reserving  
RiskAnalytics



#### Try it online!

Reserving  
RiskAnalytics



#### Download!

Reserving v1.5  
RiskAnalytics v2.2

• Print • Email

#### NEWS

**RiskAnalytics: New Screencasts available**  
15.08.2009

**Latest entry on longlist by Insurance, Risk & Capital**  
22.05.2009

[More news...](#)

#### EVENTS

**PillarOne - Integrationsfähige Risikomanagement-Plattform**  
29.09.2009 11:15 - Vienna

**Two workshops at GIRO Convention 2009**  
07.10.2009 10:00 - Edinburgh, Scotland

[More events...](#)

#### BLOG

**The one who shares wins**  
27.05.2009

**Germany and France significantly increase Open Source adoption**  
22.05.2009

[More entries...](#)

www.pillarone.org

#### Reserving

Try it online!  
Download  
User Guide  
Screenscasts  
Roadmap  
Developer Guide

#### RiskAnalytics

Try it online!  
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User Guide  
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Developer Guide

#### Services

Business Logic  
Development  
Integration  
Consulting  
Training  
Maintenance  
Agreement

#### Community

Join!  
Forums  
FAQ  
News  
Events  
Blog  
Core Team  
Members

#### About

Vision  
The open source approach  
Sponsors  
History of PillarOne  
Technology Stack

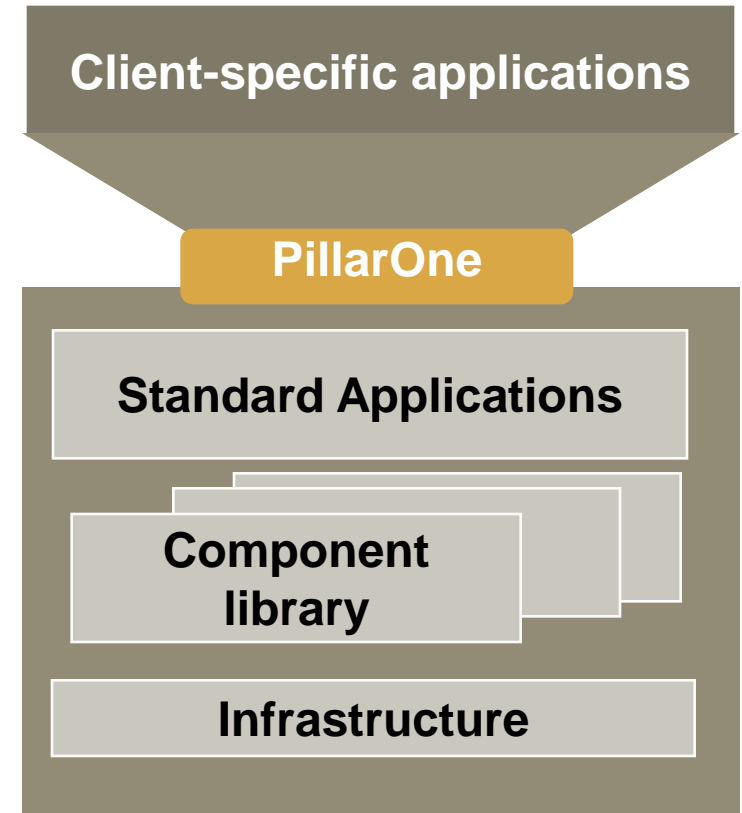
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# An Actuarial Workbench

The IT challenges are the same for all market participants. The standard, economical approach is to

- To provide a common risk infrastructure as a professional, modular base for an actuarial workbench.
- To guarantee a high level of flexibility to implement company-specific models and tools



# Applications/Products

- **RiskAnalytics**

Modelling environment for deterministic and stochastic models, such as risk and capital models like Solvency II, ICAS, Swiss Solvency Test, reinsurance optimization, etc. (modelling examples follow)

- **Reserving**

P&C reserving application (see Track B3)

- **Life** (in progress)

Environment for embedded value and profit testing.

# IT Advantages

- Multi user, client-server and stand-alone
  - Client-server for an actuarial workbench in a company,
  - Stand-alone for consultants and evaluations
- Operational safety and audit trace
  - Includes data versioning to guarantee full reproducibility
  - Who did what and when?
- IT Integration:
  - Operating systems: Windows, Unix/Linux or Mac
  - Databases: MySQL, Oracle, MS SQL, db2, MaxDB, etc.
  - Authorization and authentication with LDAP or ActiveDirectories
  - Reporting Engines: JasperReport, Birt, Business Object, etc.

# Business Advantages

- Validation
    - Automated testing of methods, components and models.
    - Validation rules for parameters.
  - Simulation Engine
    - Includes support for multi-period simulations
  - Libraries with re-usable business logic
    - Claims generators
    - Dependency models
    - Exposure and underwriting info
    - Reinsurance contracts
  - Example models and applications
-

# Models and Components

- A model is a collection of components
- Components can contain components → hierarchies  
Examples: LoB, claims generator
- Components can send and receive more than just lists/arrays of floating point numbers  
Examples: List of claims contains also claims origin, incurred date, exposure information

capital eagle	
[-] Motor Third Party Liability	
[+] Underwriting Information	
[-] Claims, stochastic	
[-] Single Claims Generator	
[+] Frequency	
[-] Single Claims Generator	
base	Absolute
[-] distribution	
type	Pareto
Alpha	1.416
Beta	1,000,000
[-] modification	
type	censored
minimum	1,000,000
maximum	100,000,000
[-] Attritional Claims Generator	
base	Premium Written
[+] distribution	
[+] modification	
[-] Reinsurance Program (serial, five)	

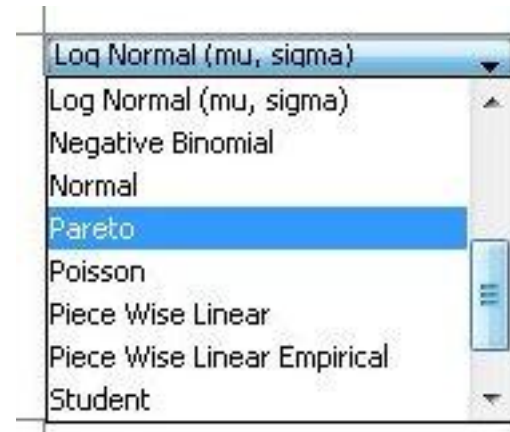


# Components

Three different kinds of components

- Ordinary component: Captures a piece of business logic with parameters
- A placeholder for a set of components with similar properties – „chose from“

Examples: Claims distributions, the model definition will not specify which one is used. The parameterization of the model will define it.



distribution	
type	Pareto
Alpha	1.416
Beta	1,000,000

distribution	
type	Piece 'Wise Linear
support points	[[0; 1]; [0; 1]]

distribution	
type	Log Normal (mu, sigma)
mu	0
sigma	1

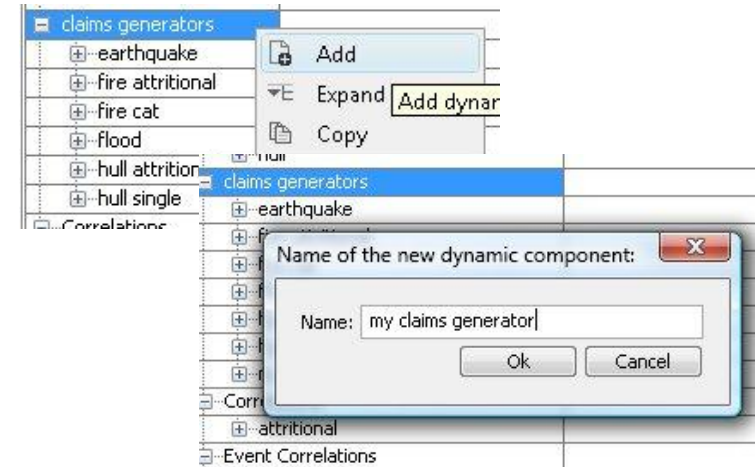
# Dynamically Composed Components

Dynamically composed components contain a user or data defined number of one component\* type

→ Very powerful to specify models which can be extended in a safe and controlled way by business users

Examples: If a line of business component is dynamically composed, then the user can add LoBs by just adding their data in a parametrization

\* Can contain a component hierarchy



The top screenshot shows a tree view of 'claims generators' with options like 'earthquake', 'fire attritional', 'fire cat', 'flood', 'hull attritional', and 'hull single'. A context menu is open with 'Add', 'Expand', and 'Copy' options. A dialog box titled 'Name of the new dynamic component:' is shown with the text 'my claims generator' and 'Ok'/'Cancel' buttons.

hull attritional	
hull single	
my claims generator	
claims model	
type	attritional
claims size base	Absolute
claims size distribution	
type	Constant
Constant	0
claims size modification	
type	none
associate exposure info	
type	No Allocation
underwriting information	

# The Power of Typed Data

Example: Which claims are covered by a reinsurance contract?

- Claims are not just floating point numbers. They have other properties (e.g. claims type, currency, an incurred date)

[-] hull attritional	
[-] claims model	
type	attritional
claims size base	Absolute
+ claims size distribution	
+ claims size modification	
+ associate exposure info	
underwriting information	[hull]

This way, components can filter the relevant information (e.g. for claims origin)

- In a dynamic model environment strong data types are essential

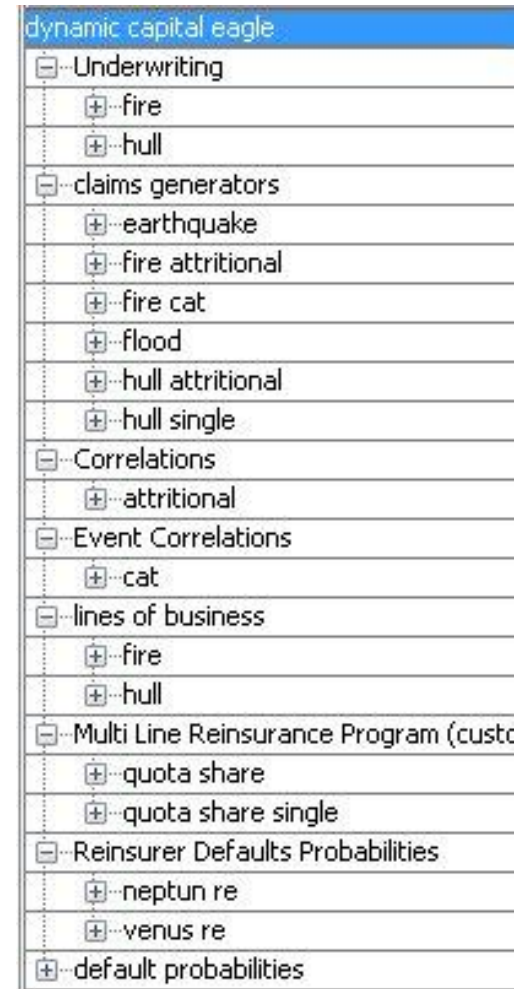
[-] quota share	
+ contract strategy	
inuring priority	0
covered lines	[hull]
Perils, Covered	[hull attritional]
Reinsurer	neptun re

# Model Prototypes/Templates

The example model to demonstrate the power of dynamically composed components is Dynamic CapitalEagle.

All top-level components are dynamic:

- Underwriting
- Claims generators
- Dependency structures
- Lines of Business
- Reinsurance



# RiskAnalytics – Roadmap

## Fall 2009 – v 0.4

- Data driven modelling, including sample application for reinsurance modelling (as demonstrated)
- Internationalisation (GUI can be configured for any language)

## Spring 2010 – v 0.5

- Components for asset modelling
- Components for reserve risk modelling, including import from PillarOne.Reserving
- Comparison of simulation results
- Commenting of parameters (collaboration support in multi-user mode)

# Contact



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