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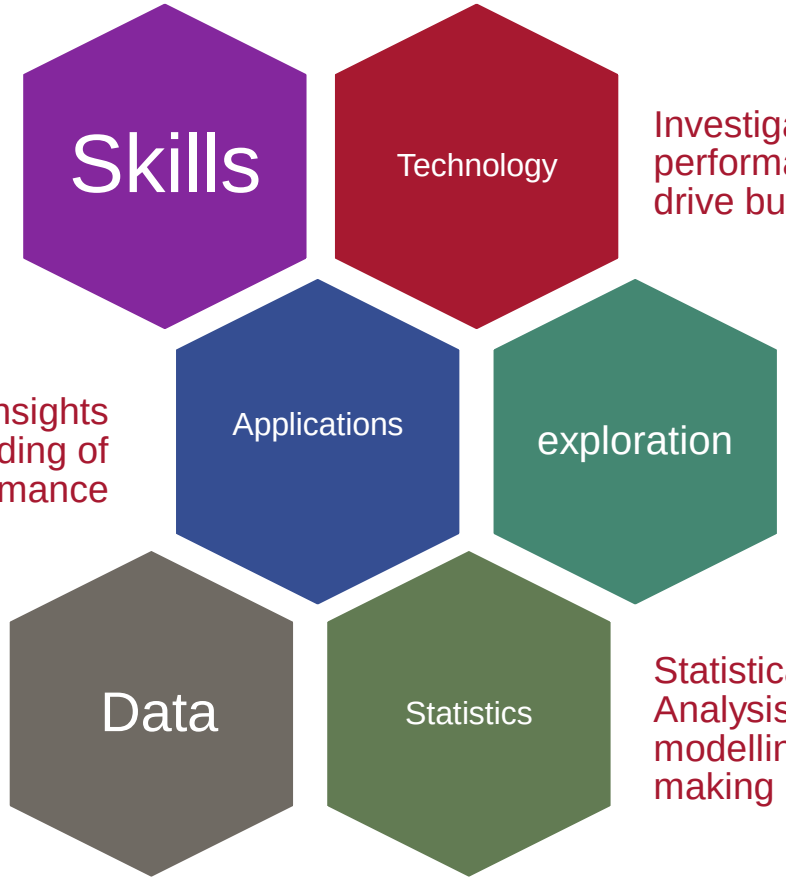
21st century analytics for the insurance and financial sectors

Hannes van Rensburg – Dynamo Analytics S.A.

Adrian Ericsson – Dynamo Analytics U.K.

Business analytics…what

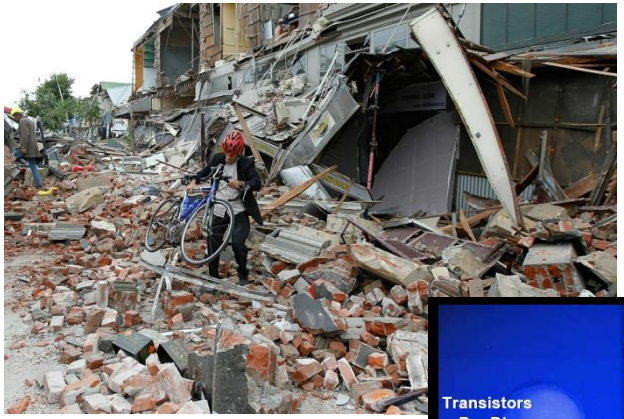


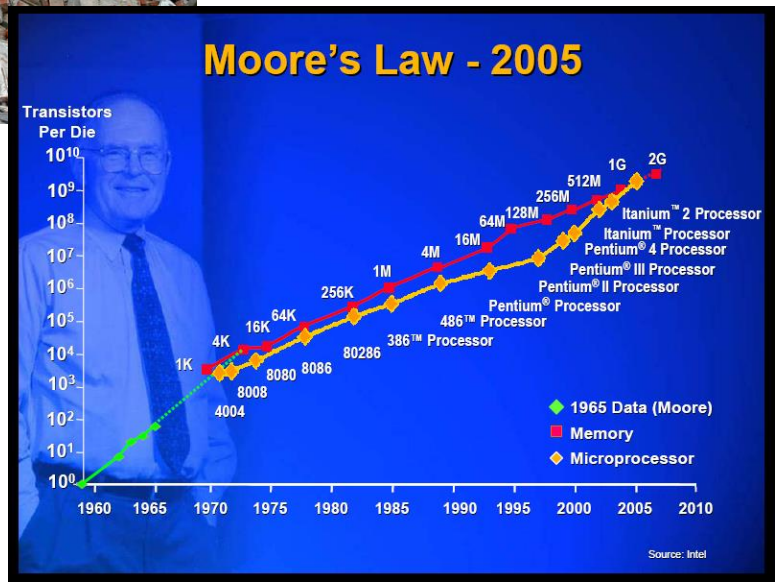
Investigate past data and performance to gain insight and drive business planning

Developing new insights and understanding of business performance

Statistical and Quantitative Analysis and predictive modelling – Drive decision making

The world is changing





Market stock take - capital

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BIG intellectual capital investment last 10 years in UK, now well under way in SA

- Risk based capital model
- Solvency 2 – ORSA and Standard Formula
- Capital allocation

What have we seen

- Large datasets, difficult to interrogate and actually not always that useful
- Embedded in the planning process, but not used widely in driving business decisions
- Market has gotten to grips with some of the technical aspects, but still some operational problems

Market stock take - pricing

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Personal lines pricing

- Models are sophisticated
- GLM models integrated with UW process
- Price Optimisation and Elasticity modelling
- Competitor rating
- Postcode flood modelling
- Telematics

Market stock take - pricing

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Commercial lines pricing

- Catastrophe modelling – model coverage increasing, sophistication increasing, confidence not yet at risk level and probably not going to be
- Exposure management tools
- Rate monitoring tools – driven by Lloyd's and large companies
- Benchmark pricing tools – from excel to integrated platforms
- Resulting in better portfolio management

Analytics working in limiting downside risk

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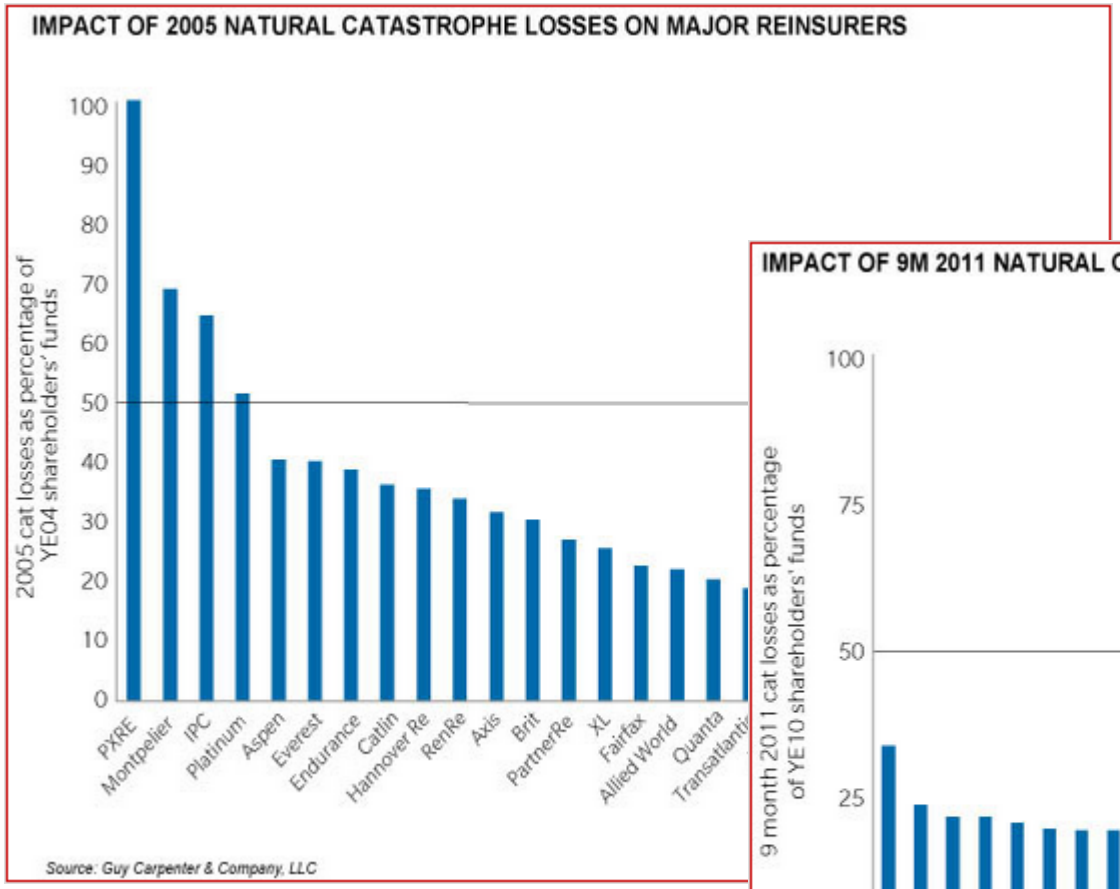

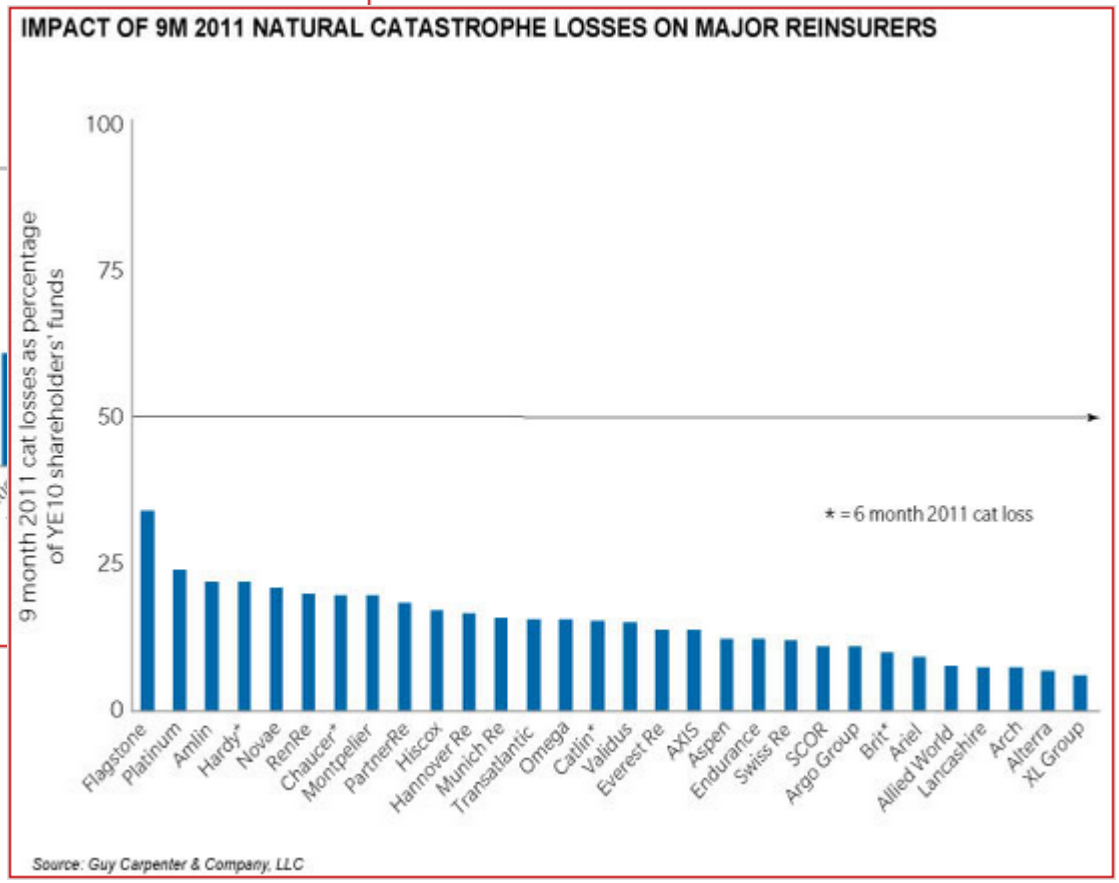

Banking sector

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- Sophisticated economic capital models in development for years, very much left on the shelf.
- Financial fall-out put more emphasis again on Pillar 1.
  - Regulatory formula more often than not managements business driver rather than ICAAP
  - Increased capital requirements under Basel 3 keeping companies busy and de-leveraging of capital resources
  - Investment not going into own assessment of exposures

Analytics focus…

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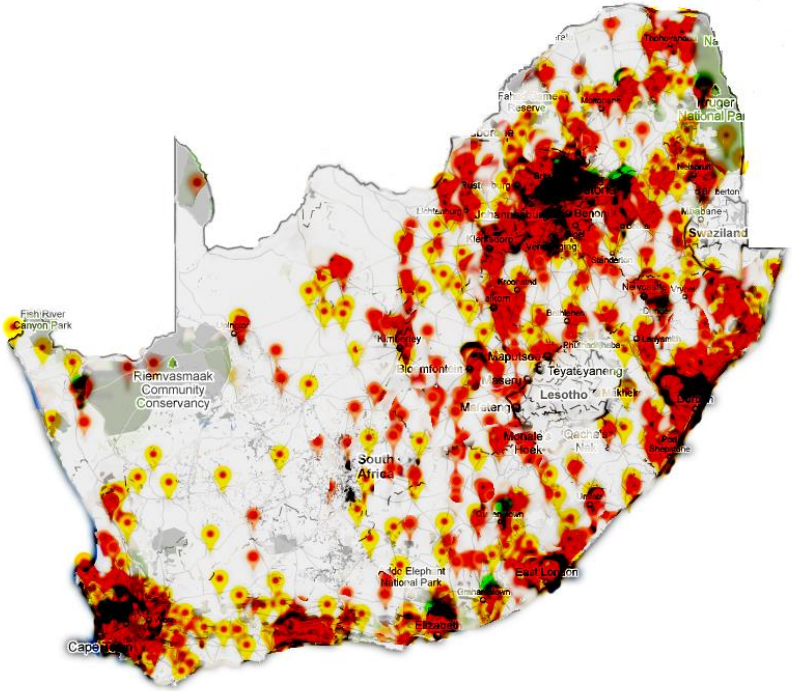
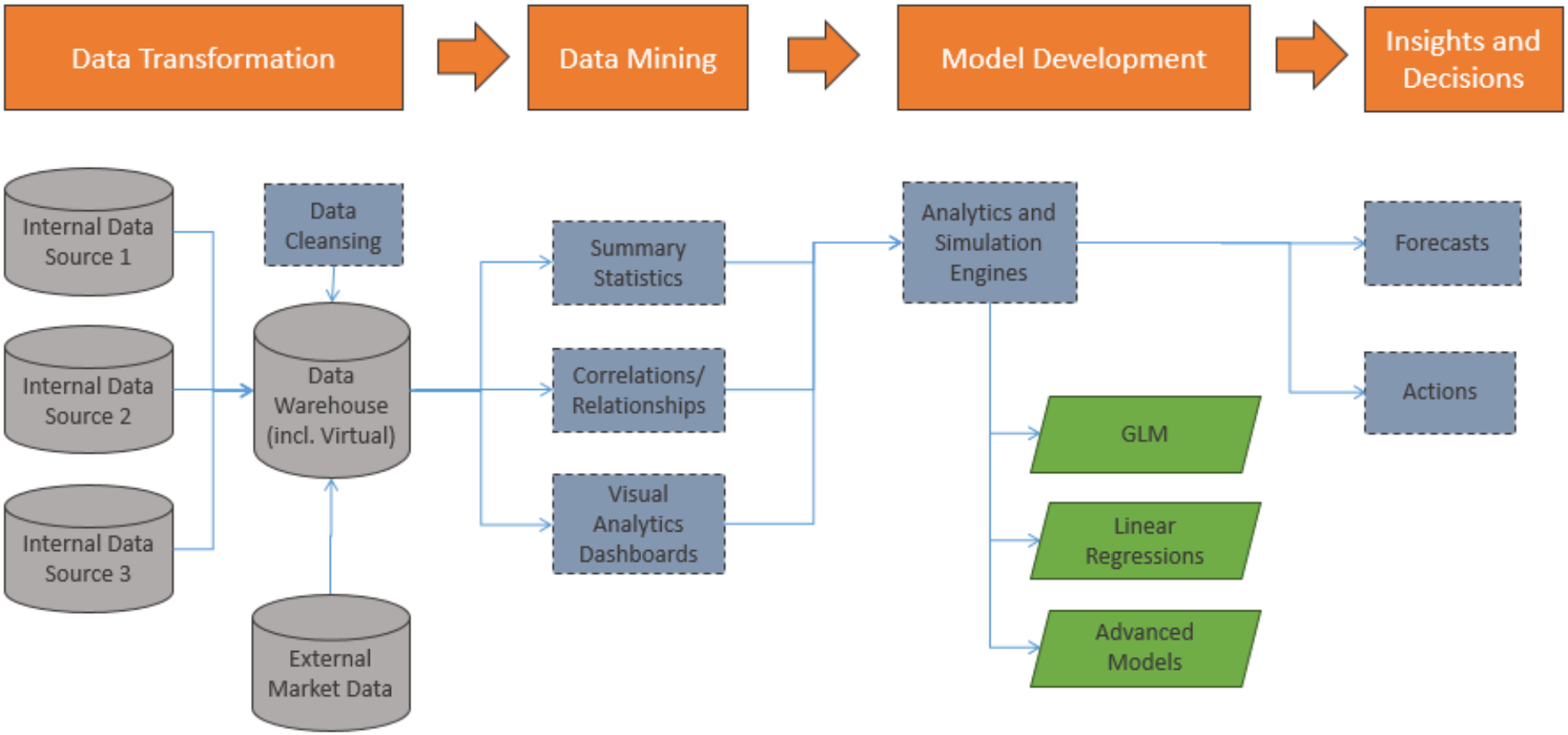


Analytics life cycle



Data

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Chicken or egg – investment based on value, but not easy to show value without investment.

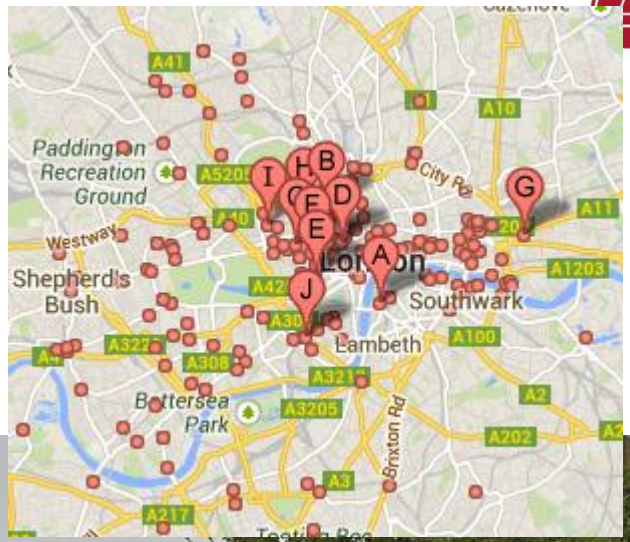
Systems – design with end in mind, so need for analysts to be involved in the design of systems.

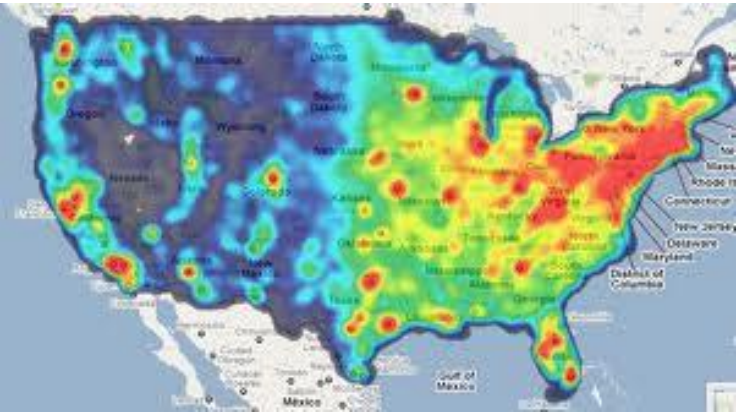
Enhancement – about bringing different sources together – social media, market data, economic models and relationships

Don't despise the pre-analysis. Many an insight gained.

Need to understand exposure to understand correlation.

Perspectives of data





At every level of detail, information reveals insights about the risk.

Need the right platform – Account vs Portfolio data in models/analytics

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Interface:
- record pricing information
- display benchmarks and portfolio summaries

Business Logic:
- Read data AAL and accumulations from exposure management tables
- Transform data aggregations and groupings for accumulation reports
- Fetch information on similar risks
- Produce referral or review lists

Data store:
- Store quote and pricing information
- Retrieve portfolio information

Analytics – Meta Models

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Models – put into two camps

- Predictive – analysis of past trends, knowledge about the environment used to project into the future
- Volatility – analysis aimed at understanding sources / drivers of uncertainty in order to quantify future risk

Key to understanding the two are dependency models – analysis of relationships in order to predict an outcome based on the input variables i.e. another set of observed variables

A third is emerging, we believe: "Meta models" – models to approximate the behaviour of models or to interrogate the output of model.

Meta models

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- Approximation
  - Using models with highly desirable characteristics to target the sluggish ones, or to bypass them entirely.
- Interrogation
  - Better harvesting the great information that sits within capital model output but currently is unused.

Deep dive studies

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- Portfolio and Capital usage models:
  - Capacity based models
  - marginal impact
- Feedback pricing models
  - Market optimised models
  - Emerging risk models
  - Portfolio rate change and benchmark pricing
- Meta Models
  - Model overlays
  - Economic models

Capacity based models

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Market interest starting to emerge in using capital analytics at a "per risk" level.

- At least one London Market insurer runs its model daily to evaluate marginal impact
- Benefits: Better portfolio steering, charging for aggregate

Some options:

- pre-run marginal impact for a variety of theoretical risks and select the closest matching
- build an algorithm based on current portfolio but must be nimble yet comprehensive

Imply a gradual move towards airline-style capital driven pricing at an individual risk level?

Marginal Impact

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Standalone capital requirement

Risk C £20m

Risk B £40m

Risk A £60m

Risk	Capital / Aggregate	Allocation
Risks A, B and C	£100m	N/A
Remove Risk C	£85m	Risk C £15m
Remove Risk B	£70m	Risk B £30m
Remove Risk A	£55m	Risk A £45m

- Metrics to look at:
  - Return on marginal impact
  - (1 – AOP Loss ratio) / Marginal impact
- This model works well for renewal books.
- For new business more challenging as have to add risk to portfolio model

Market Optimised Models

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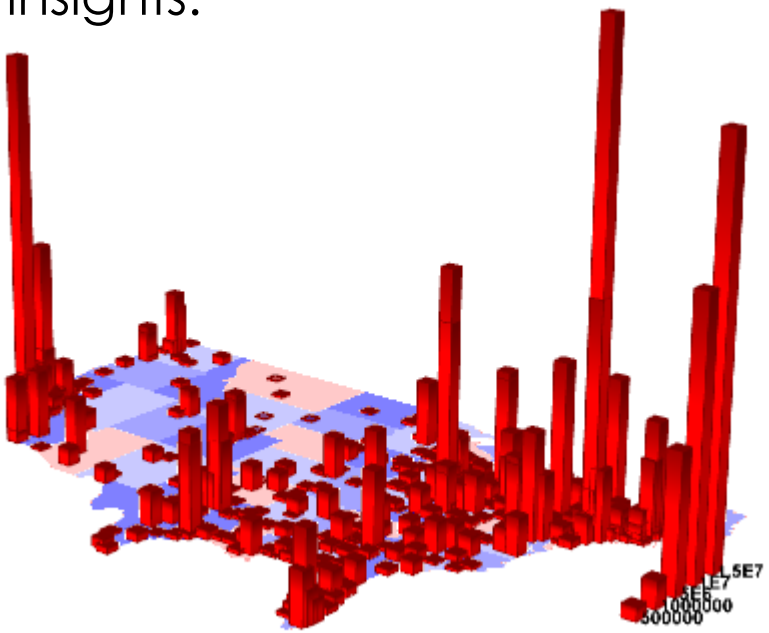
- Personal lines pricing market has seen structural change with aggregator models.
- Insurance becomes absolutely commoditised, price the main differentiator
- Winners Curse a big issue - Strategy crucial

Market response models interesting insights:

- Implement rating structure
- Set risk limits for rating cells
- Updating rating cells relativity based on portfolio movements
- Continually monitor competitor rates
- Research and price testing targeted segments



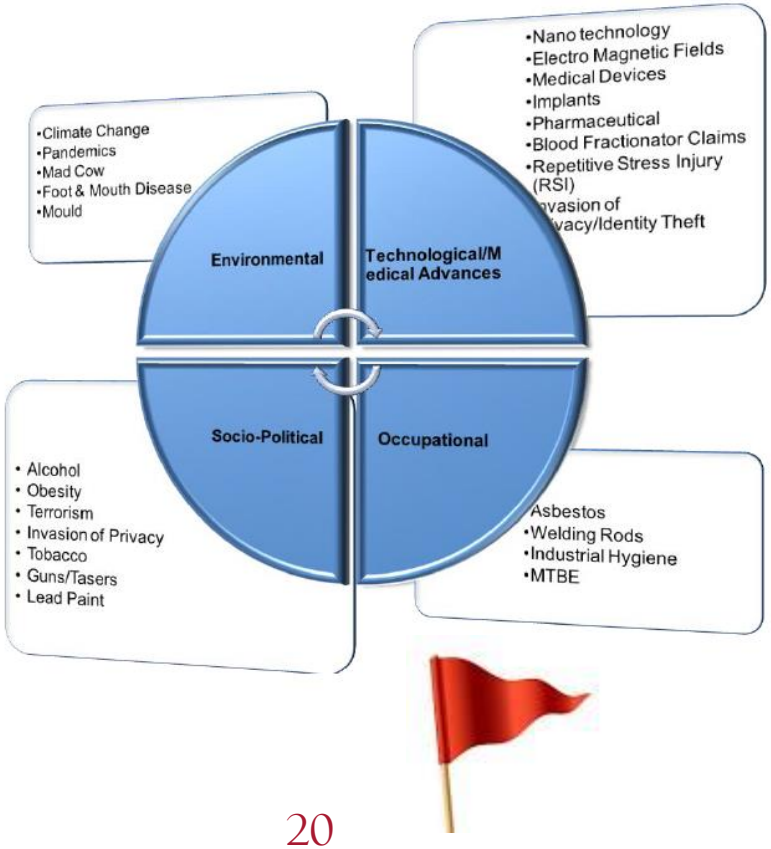
Emerging risk modelling

Tiered approach

- Regularly identify categories of emerging risks (Casualty Aggregate WP, internal)
- Allocate exposure / limit at risk level to the risks, but needs granular information
- Monitor and model
- Reverse stress testing to test adequacy of portfolio capital requirement

Results

- Portfolio level - identify emerging risks and risk limits for emerging risks in line with risk appetite
- Dashboards - For each policy can calculate and show exposure or limits to peril
- Aggregate exposure at portfolio level and investigate accumulations and percentiles.
- Frequency / severity models for allowance in risk model



Rate change and technical pricing

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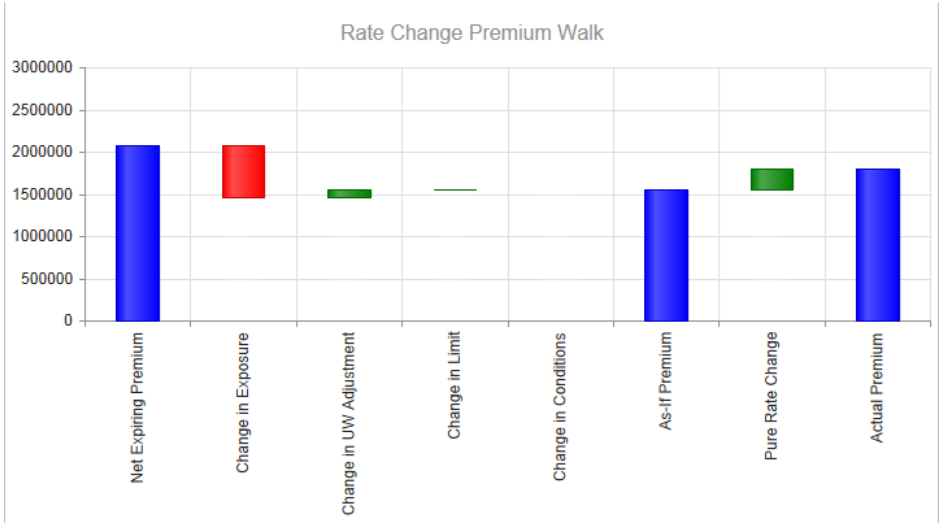
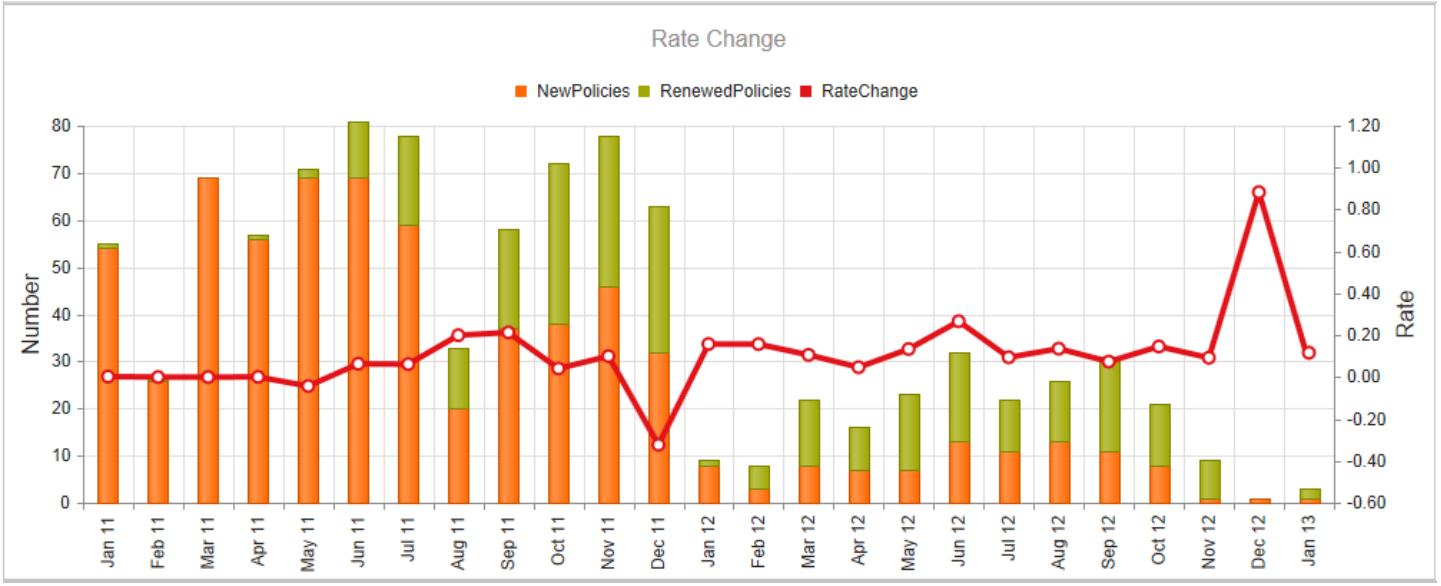
- Key driver of model development
- Requires better data and more sophisticated pricing tools
- Account and portfolio view

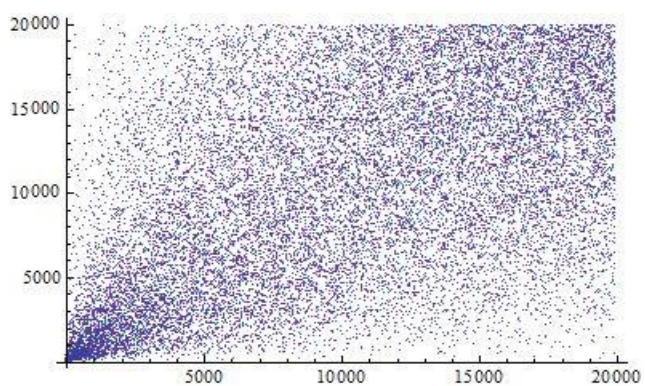


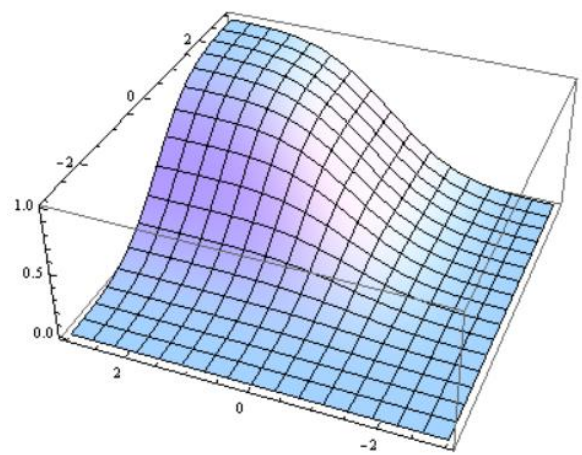


Meta models and model overlays

Investment in the UK has focussed very heavily on certain technical aspects of volatility modelling. Implications:

- Many instances of significantly over-engineered model components
- Very important but difficult aspects are not understood(e.g. dependencies)
- Senior management get frustrated with the time and resource intensity of model runs
- The only person who understands model output is the capital actuary.





Meta models and model overlays

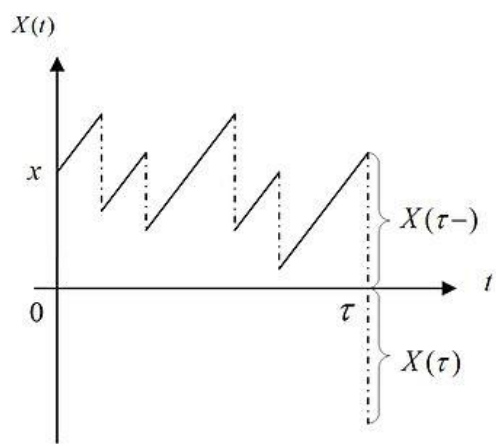
A big question: Optimise your portfolio and build an efficient frontier for risk / return

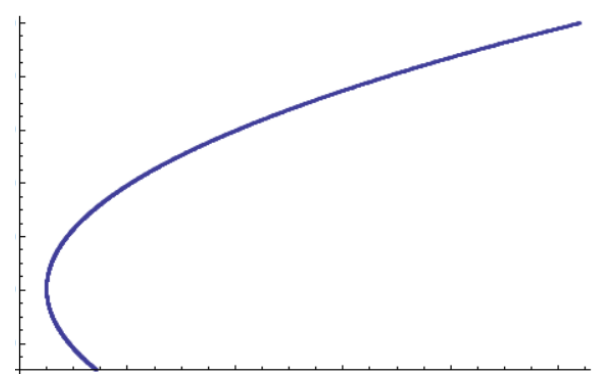
Old paradigm:

- Spend many hours in the office re-running your model

New paradigm

- Research occurring on using closed form ruin models
- Post simulation processing / meta models





Meta models and model overlays

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A big question: Help management understand the model

Old paradigm:

- Spend many hours trying to train the Board to be quasi-actuarial

New paradigm

- Simplify the models ("*Remember that all models are wrong; the practical question is how wrong do they have to be to not be useful*" – *George Box*)
- Make models interactive and put them on their desktops
- Use them daily

Economic risk models

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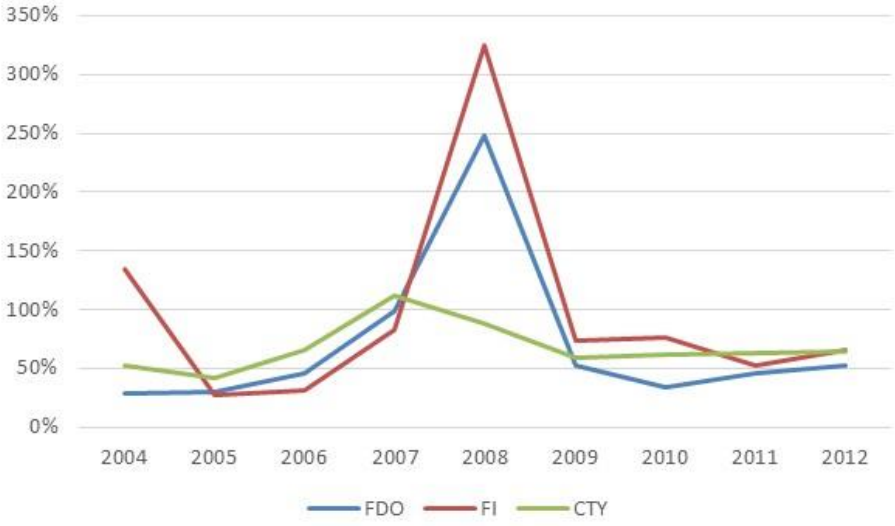
Rating factors dependant on economic cycles:

- Can impact multiple classes
- Impacts on certain industries more pronounced and more exposed to either frequency or severity losses
- Some classes have little or no claims in the good times, but completely different story during recession



Approach:

- Economic Scenario Generator
- Actual rating factor linked to economic indicator
- Inflationary loadings vary using ESG
- Have risk limits vary – need view of in force book

Business analytics – In summary

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Using quality data to drive optimal decision making

- Putting processes in place to get quality and sufficient quantity of data
- Large data sets needs applications and processing power that can interrogate – fast and efficient
- Invest in the people needed to exploit it – Have the quants and analysts and ACTUARIES!
- Know what to do with it – when to run what model
- Meta Models - Make it alive, nimble, up to date and on the desktop of the people making the decisions.