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Enterprise Financial Modeling

A technology answer to challenges of Principle-Based Reserves and Economic Capital

Van Beach, FSA, MAAA

November 13, 2008

Session goals

- Reflect on the evolution of actuarial modeling (including the actuarial/IT relationship) and project future requirements
- Understand 6 key concepts and potential impact of enterprise financial modeling
- Consider the process challenges of PBR and EC
  - Begin thinking about the changes required to effectively meet these challenges
- Provide new ideas and trigger a fresh look at how to use technology to meet the actuarial modeling challenges of today and tomorrow.

A history quiz

- In 1985, actuaries were “liberated” as desktop financial models were introduced.
- What has happened since then?
  - The uses and importance of modeling has increased dramatically
  - Actuaries have taken on more responsibility for non-actuarial tasks related to their models
  - The modeling environment has become much more complicated
  - The volume, complexity, and scrutiny of models has increased dramatically.

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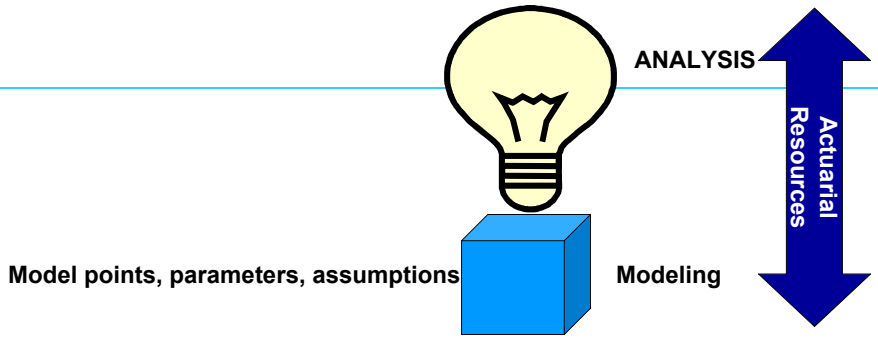

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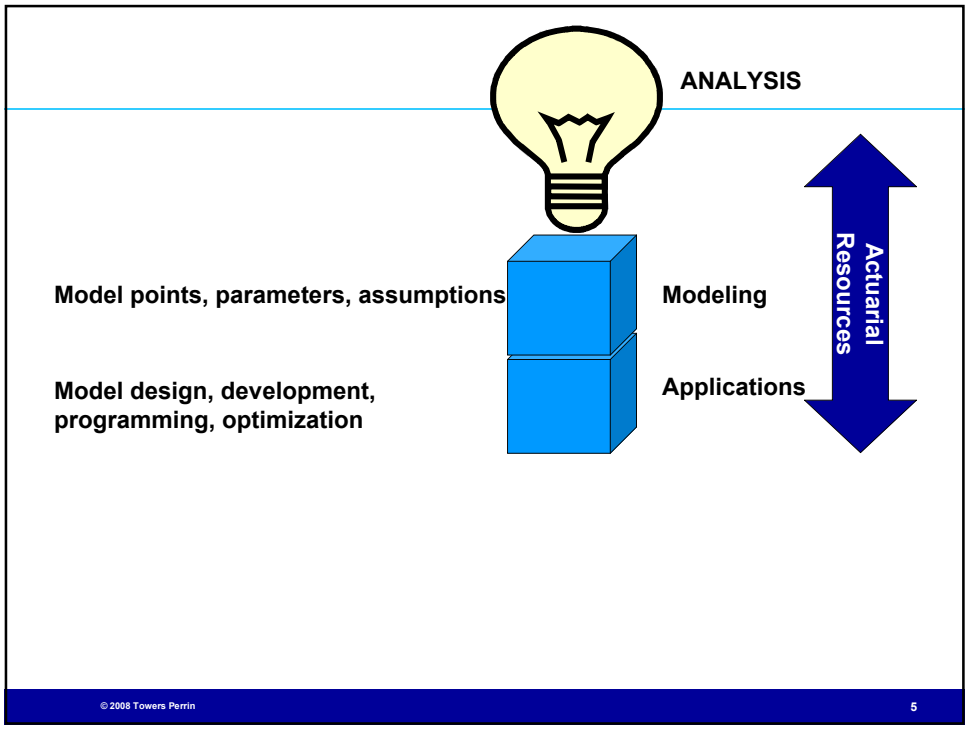
ANALYSIS
Model points, parameters, assumptions
Model design, development, programming, optimization
Modeling
Applications
Actuarial Resources
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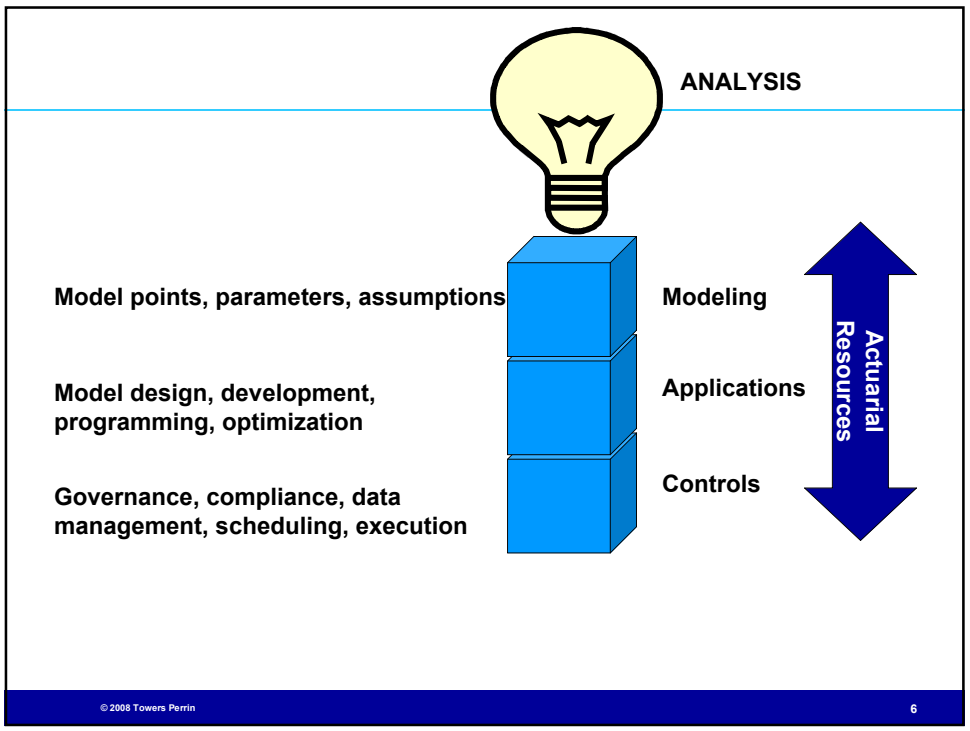
ANALYSIS
Model points, parameters, assumptions
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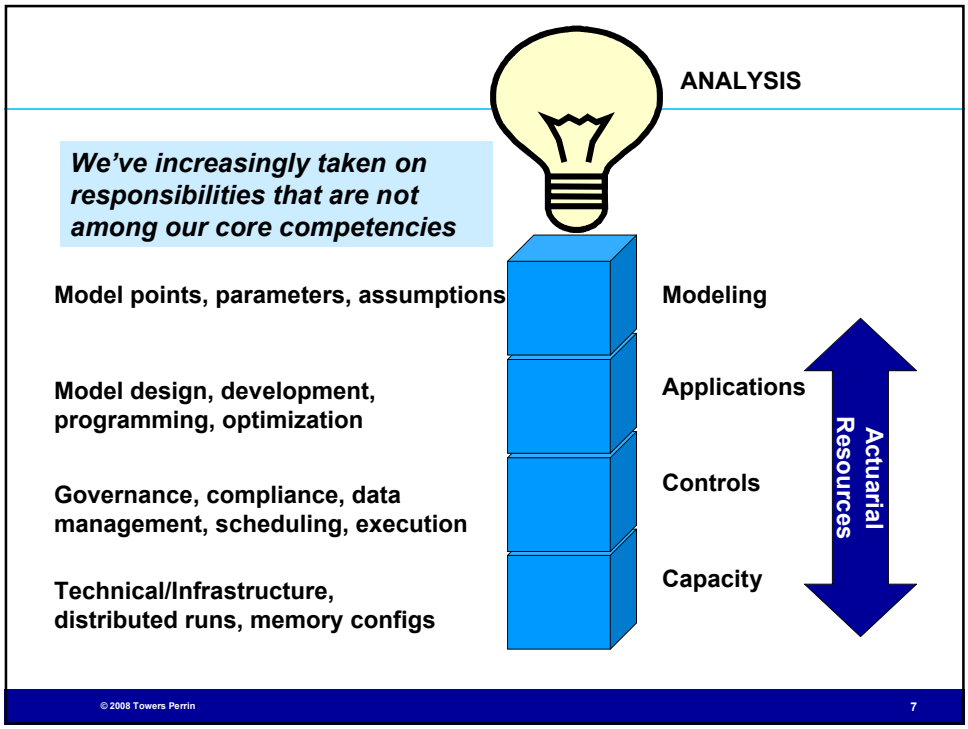
ANALYSIS
We've increasingly taken on responsibilities that are not among our core competencies
Model points, parameters, assumptions
Modeling
Model design, development, programming, optimization
Applications
Governance, compliance, data management, scheduling, execution
Controls
Technical/Infrastructure, distributed runs, memory configs
Capacity
Actuarial Resources
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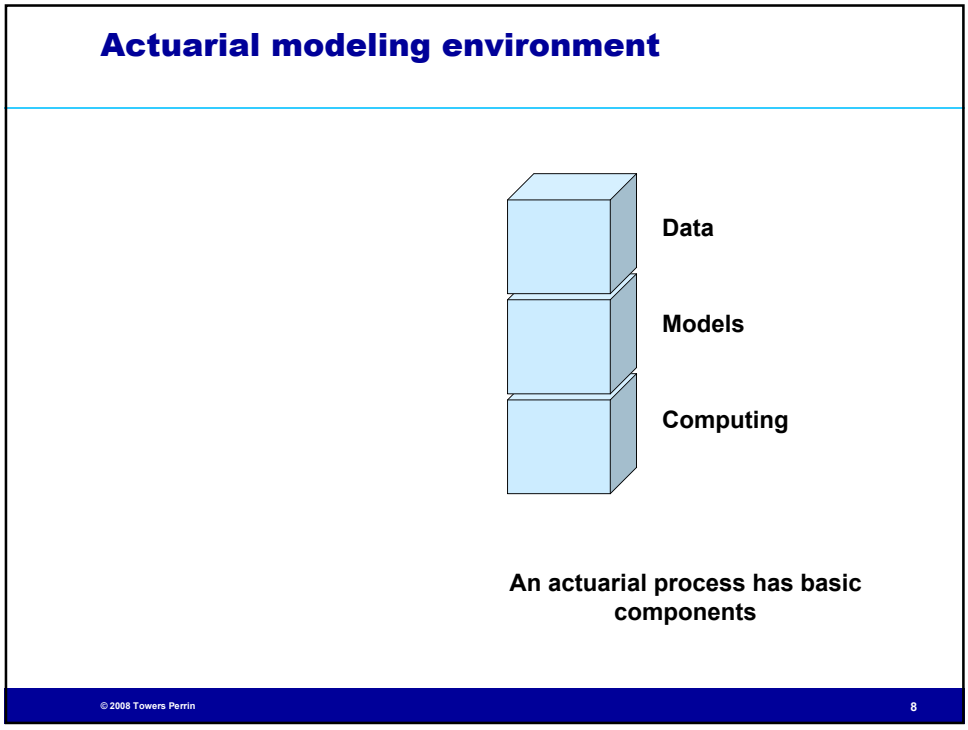
Actuarial modeling environment
Data
Models
Computing
An actuarial process has basic components
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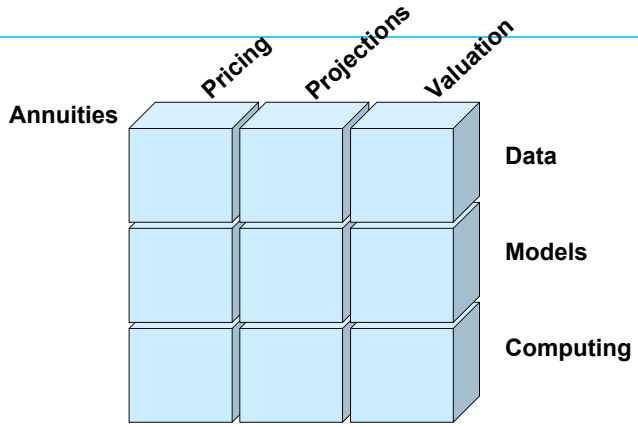
Actuarial modeling environment



Multiple uses, within a given LOB or department

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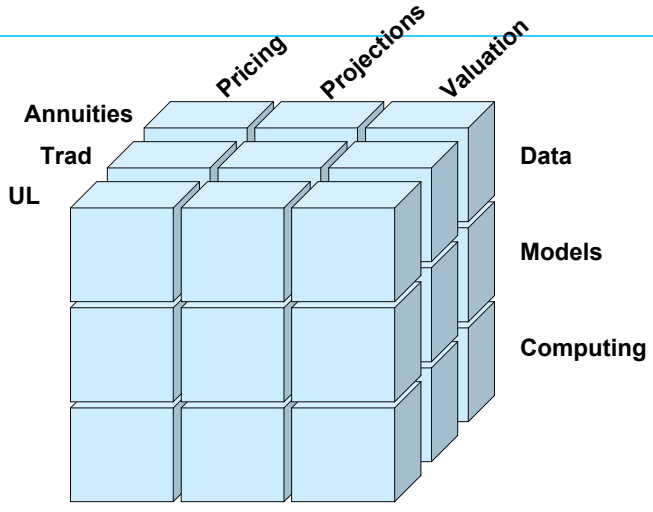
Actuarial modeling environment



Multiple departments or LOB's, each with the various uses…

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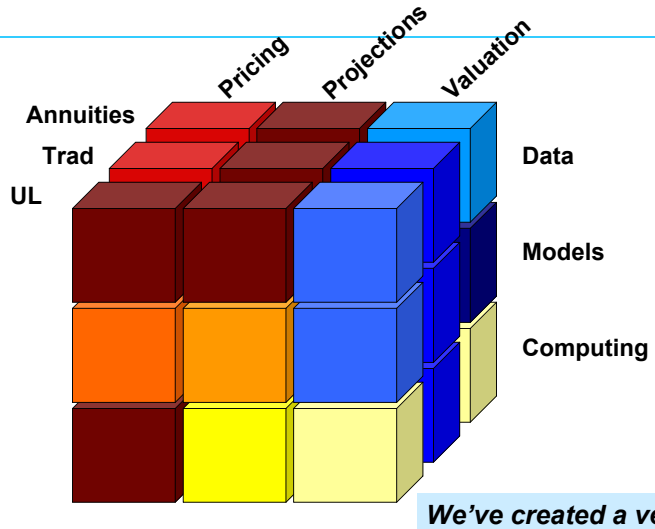
Actuarial modeling environment



…and each component is different.

We've created a very complicated actuarial environment

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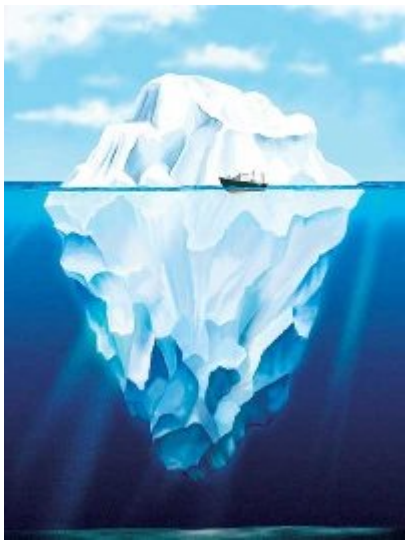
The view of the actuarial environment held by an increasing number of senior managers



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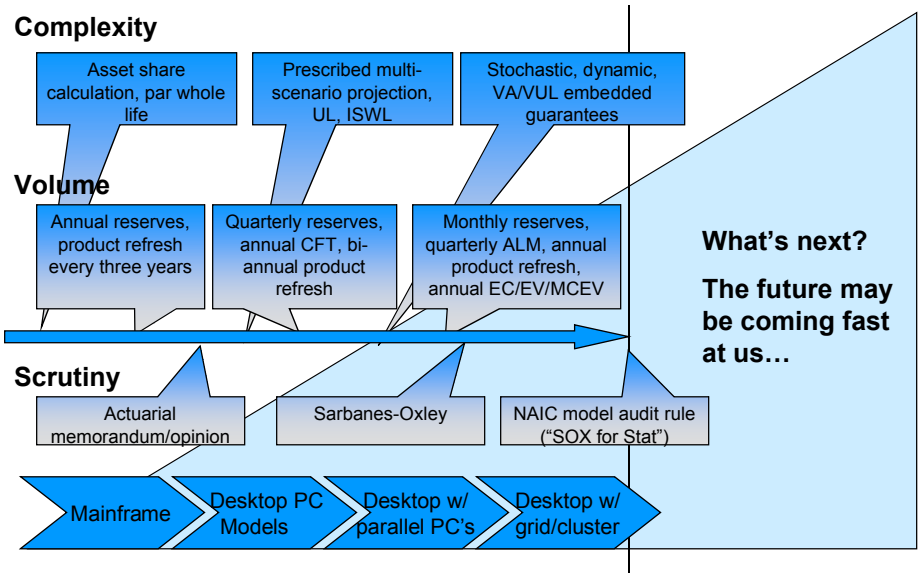
Evolution of Financial Modeling



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Subprime crisis rapidly has mutated into the largest financial crisis since the Great Depression

Lehman Files for Bankruptcy, Battles to Avert Liquidation
AFP 15 September 2008

Bush Signs $700 billion Bailout Bill
AP 3 October 2008

UK Unveils 875 billion Dollar Bank Rescue
AFP 8 October 2008

Yamato Life Becomes 1st Japan Financial Firm to Fail on Subprime Crisis
Kyodo News 10 October 2008

Fed in Fresh $37.8bn Lifeline for AIG
F.T. 9 October 2008

Iceland Nationalises Banks and Russia Provides Pounds 3bn Loan
DT 8 October 2008

Fortis Thrown €11bn Lifeline by Governments
AP28 September 2008

Aegon to Book $573M for Bad Credit
AP 9 October 2008

Fed to Lend up to $85B to AIG; Rescue Heads Off a Bankruptcy Filing
17 September 2008

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The response will require new tools, new skills, and new technologies

"Insurers will be seeking solutions capable of capturing and correlating every risk from every corner of the enterprise."
Jonathan Steiman, Datamonitor

"The biggest impact will be on insurers strengthening the technology solutions, and staff skill sets, which allow them to understand their financial market risks."
Donald Light, Celent

"Despite financial difficulties, it will be important for insurers to avoid cuts in analytics projects that help improve decision making and add a certain level of objectivity to the process."
Karen Pauli, Tower Group

"Cutting IT spending is not a viable option. There is too much risk in not updating infrastructure."
Howard Mills, Deloitte

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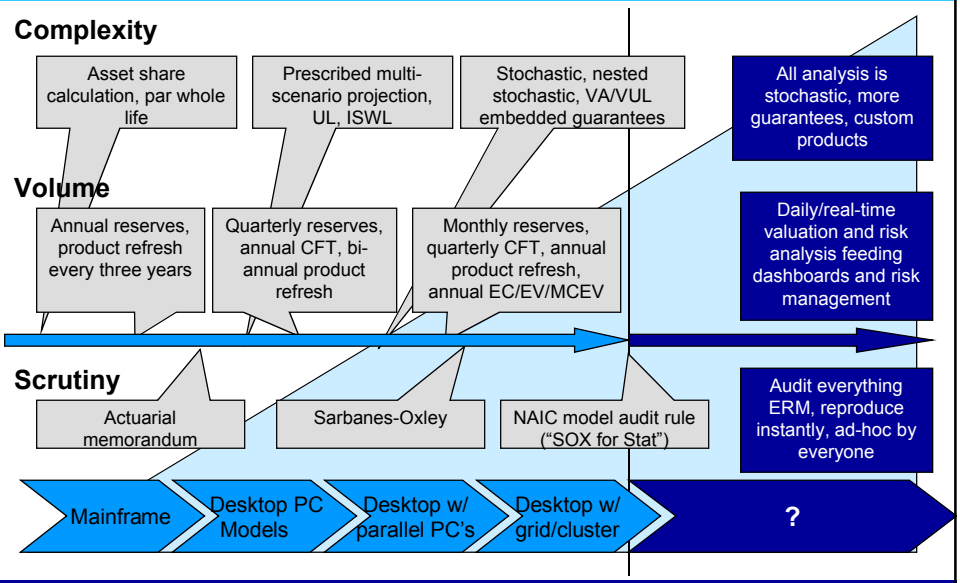
Evolution of Financial Modeling



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Do you have this feeling?

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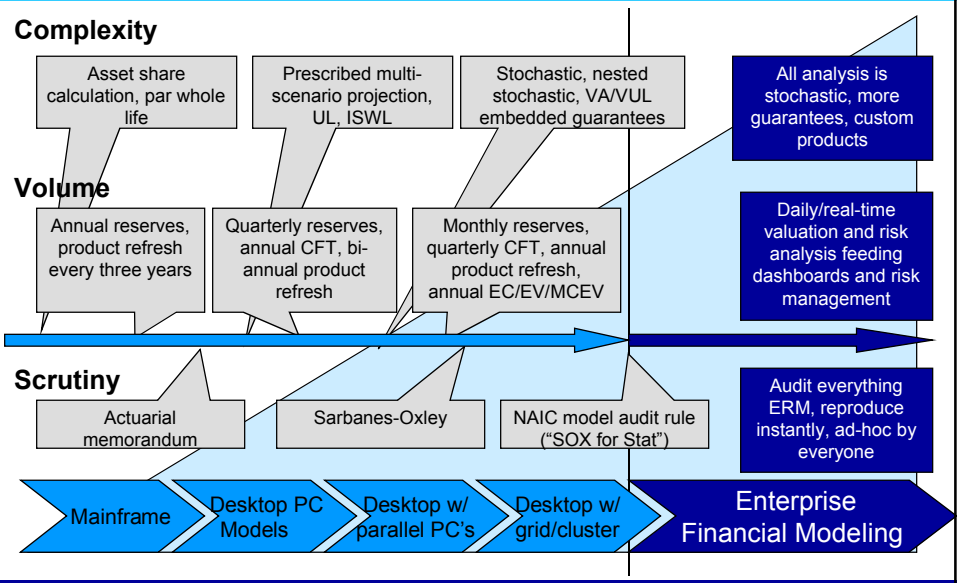
Evolution of Financial Modeling



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Enterprise Financial Modeling

- Yesterday - desktop
  - Focused on individual tasks
  - Input, model, and output are self-contained and duplicated
  - Siloed, fragmented infrastructure (computing power, security, etc.)
  - Independent, isolated
  - Actuarial independence from IT
  - Independence at the expense of redundancy, inefficiency, and complexity.
- Tomorrow - enterprise
  - Management of broad processes
  - Input, model reused where appropriate; output is associated
  - Centralized infrastructure (computing power, security, etc.)
  - Collaborative, transparent
  - Actuarial leverage of IT
  - Smart interdependence, managed autonomy, focus on process

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"We have a pretty good process in place..."

- Centralized
  - The model used to price a product is saved on the network for the next person. Problem is that no one knows exactly where or which model was actually the "final" run.
- Version controlled
  - Make a copy of the model folder for each iteration, incremental naming convention
- Automated
  - Wake up at 2 am to check the status of run or start a new run. Worse, you have to drive into the office to log on.
- Integrated
  - Get an e-mail of an inforce file, run a series of Access queries, Excel manipulations, incantations and black magic, VBA scripts, etc. to produce the model file
- Reusable
  - Copied

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"We have a pretty good process in place..."

- Repeatable
  - Call the actuarial student who rotated to a new position (or the actuarial student who went to a new company) for help on how to finish a quarter-end process.
- Secure
  - A threatening post-it note on the "monster" machine alerting everyone that an important job is running.
- Collaborative
  - Zipping up a model and e-mailing it to a co-worker.
- Managed
  - Send a nasty e-mail because the overnight run did not complete as the grid was 100% utilized – hopefully someone will admit what was being done
- Audit-ready
  - Break into a cold sweat as you try to match year-end numbers (the folder said "year-end") for the IRS audit.

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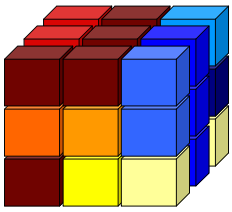
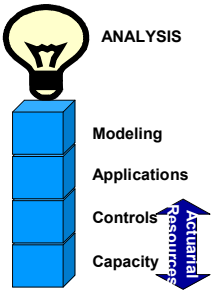
It's time to rethink the value that IT and technology can provide





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Six steps to an Enterprise Financial Modeling environment

- **Power-up –** Consolidate and leverage grid/clusters and 64-bit computing. Utilize advanced database tools for data management and analytics.
- **Centralize –** Manage information, infrastructure, applications, roles, users, etc. centrally. Enable all types of users to access and use actuarial assets collaboratively from anywhere within the enterprise.
- **Track –** Create fully reproducible and traceable model results including all aspects of the modelling process - applications, assumptions, input data, output results, etc.

Six steps to an Enterprise Financial Modeling environment

- **Integrate –** Build an end-to-end process by interacting with existing enterprise components (e.g., data stores, security, workflow systems, computational grids or clusters, etc.)
- **Automate –** Define processes and utilize scheduling and workflow orchestration for efficient, repeatable results.
- **Manage –** Control users, processes and resources through defined protocols. Define actions that are registered, monitored and configurable. Monitor, assess, and improve.

Levels of impact

- Individual user
- End-to-end process (data to models to reports)
- Across functions (e.g. pricing, corporate ALM, valuation) within a product line
- Across product lines (e.g., annuities, UL, LTC, etc.)
- Across periods (e.g., from one quarter-end to the next)

What will you gain from EFM?

- Net gain of 2 actuaries
  - Gain (at least) 1 good actuary through efficiency gains
  - Get rid of one bad one through tracking and transparency
- Actuaries become more valuable
  - Faster results
  - Focused on the “right” tasks
  - Leverage IT
  - Provide accessibility for all types of users and visibility of results
- A good night’s rest…
  - Confidence that results are good
  - Jobs run on schedule
- Address key issues of PBR and EC…

Principle-Based Reserves

Challenges of PBR

- Models and projections now part of the reserve process
- Create statutory income volatility
  - Close scrutiny will follow
- Pressure to complete large volumes of work to meet financial close
- Process changes may be the biggest challenge
  - More scrutiny – reserve changes impact statutory income
    - And more inputs to control and audit
  - Many more steps in the end-to-end process
  - More complicated period-to-period process

End-to-end process – calculation requirements

Calculations before PBR

- Deterministic reserve calculation

Calculations after PBR

- Deterministic reserve calculation
- Stochastic ALM projection
  - Model point aggregation
  - Investment/disinvestment
  - Policyholder behavior
  - Management actions
  - CTE calculations
- Comparisons between deterministic and stochastic reserves
- Hedge effect, sensitivities, etc.
- Allocation

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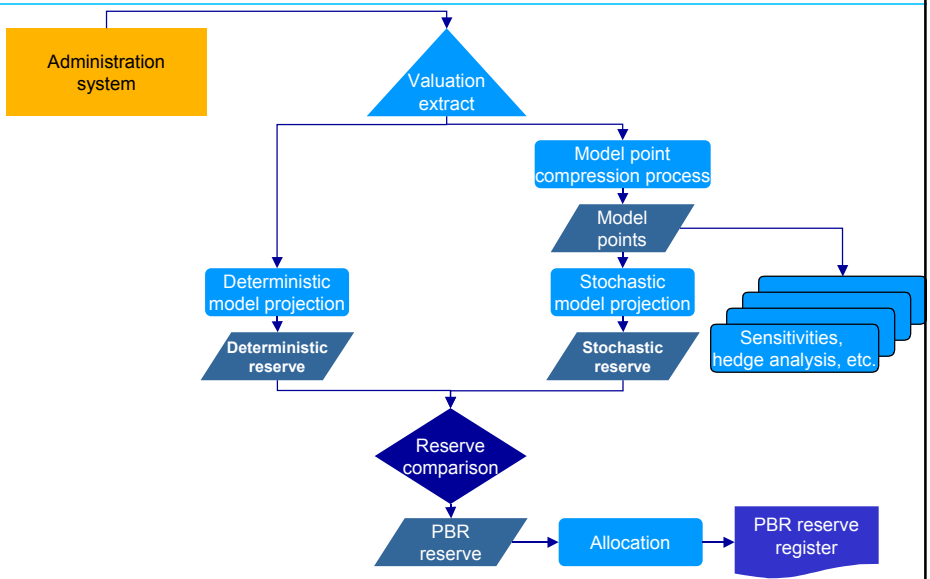
PBA valuation process



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Period-to-period process

Data refresh before PBR

- Seriatim policy detail
- Valuation assumptions

Data refresh after PBR

- Seriatim policy detail
- Valuation assumptions
- Expense assumptions
- Experience assumptions
- Policyholder behavior assumptions
- Asset detail
- Asset projection assumptions
- Macro-modeling assumptions
- Scenarios

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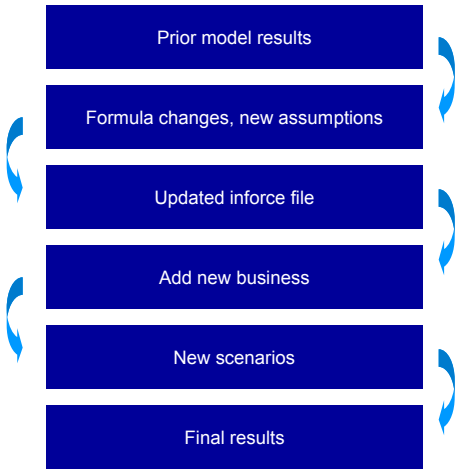
Period-to-period process



Capture changes between each set of runs for analysis of movement

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Meeting the challenge

- Increase capacity
  - Grids/clusters (speed)
  - 64-bit computing (memory)
  - Wide (but managed) access to computing resources (throughput)
    - Enable off-hours calculations

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Meeting the challenge

- Control, validate, update, compare
  - Control the end-to-end process
    - Automate
    - Lock away production version
    - Save and relate all input, calculations, output for a fully reproducible result
  - Validate through analysis of trends, sensitivities, etc.
    - Database analytics can help with understanding of volumes of data
  - Update the model
    - Track all changes to production version
    - Keep record of what changed, who changed it, why did it change
  - Compare with prior results to assess impact of changes

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Meeting the challenge

- Define processes and improve upon them
  - Automate as much as possible – remove the risk of human error
  - Leverage existing data stores, security models, etc.
- Work smarter, not harder
  - Technology can provide answers, IT can help

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Economic Capital

Challenges of Economic Capital

- Huge volumes of model runs
  - Stresses and stochastic
  - Data can become overwhelming
- Enterprise-wide calculation
  - Consistency is a key challenge
  - Input and access from all corners of the enterprise
  - Aggregation must be consistent, accessible, managed
- As process matures, effort must decrease
  - Unsustainable at initial levels

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Challenges of Economic Capital

- Process changes are again a big challenge
  - More scrutiny – especially in light of financial crisis
    - Huge volumes of input and data to control
  - Varied sources of input
  - Consistency and ensuring calcs are as intended
  - Making calculations available for use by local units
- Focus has been on methodology and theory
  - Creating an audit-ready, repeatable, embedded process has not been achieved
  - When AM Best calls, how will you demonstrate governance and controls?

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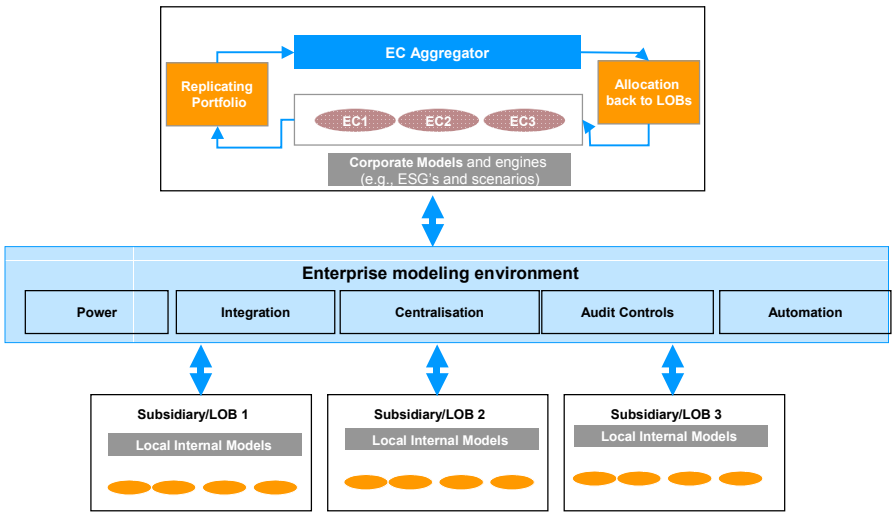
Economic Capital deployment model



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Meeting the challenge

- Increase capacity
- Control, validate, update, compare
- Define processes and improve upon them
- Ensure calculations are consistent and aggregation models widely available
- Operationalize the ERM strategy
  - Embed EC into the "corporate DNA" through technology
- Work smarter, not harder
  - Technology can provide answers, IT can help

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Final thoughts

Technology will not replace the actuary, but technology will make a better actuary (at minimum it will take some really boring work off our plates)

To maintain an equivalent level of confidence in results, as a process grows the number of actuaries involved must proportionately decrease

The great part about automation is that a process will do exactly as you tell it… which is sometimes the worst part as well. At least when you start asking questions about what happened, the technology won't lie…

When AM Best calls, what would you rather have – a technology-based EC process or documentation of manual steps… what would AM Best rather see?

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Questions?

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