Actuarial technology in 2014

Southeastern Actuaries Conference
June 25, 2004

Tom Reese, Classic Solutions/Atlanta
Some words of warning about forecasting

“I think there is a world market for maybe 5 computers”
– Thomas Watson, IBM, 1943

“640K ought to be enough for anybody”
– Bill Gates, Microsoft, 1981

“There is no reason anyone would want a computer in their home”
– Ken Olson, Digital Equipment Corp, 1977

“Who the hell wants to hear actors talk?”
– H. M. Warner, Warner Brothers, 1927

“We don't like their sound, and guitar music is on the way out”
– Decca Recording Co. rejecting the Beatles, 1962
Is Moore’s Law the answer?

- Double the transistors per chip every 18 months
- Translate to double processor speed every 18 months
- Your PCs 10 years from now will be 100 times faster
- Problem solved!

- But what will we be calculating?
The steady advance in analyses needs – your PC will never be fast enough

<table>
<thead>
<tr>
<th>Year</th>
<th>How?</th>
<th>What?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>Commutation columns and <em>real</em> spreadsheets</td>
<td>Factors and asset shares</td>
</tr>
<tr>
<td>1984</td>
<td>Mainframe access and APL</td>
<td>Fund-driven products revolution</td>
</tr>
<tr>
<td>1994</td>
<td>Spreadsheet programs and vendor system</td>
<td>Cash Flow Testing and product pricing</td>
</tr>
<tr>
<td>2004</td>
<td>Multiple vendor systems</td>
<td>Stochastic analysis</td>
</tr>
<tr>
<td>2014</td>
<td>Integrated applications</td>
<td>Principles-based balance sheets and decision-making</td>
</tr>
</tbody>
</table>
Three major types of analyses requiring a large number of scenarios – extreme event analysis

- More scenarios are required to identify the distribution tail
- RBC C-3 Phase II involves asset/liability models
- Pricing VA product guarantees may be liability-only
Three major types of analyses requiring a large number of scenarios – stochastic on stochastic

- For example, along each economic scenario path there are -
  - Projections using stochastic input, such as mortality
  - Stochastic projections to measure RBC C-3 Phase II
- Each stochastic layer increases the number of projections
Three major types of analyses requiring a large number of scenarios – dynamic hedging

- Dynamic hedging uses multiple sets of robust scenarios to measure the behavior of liabilities
- The Greeks – Delta, Gamma, Vega, Rho, and Theta
- Value or earnings at risk analysis involves asset/liability models
Different modeling approaches are required to solve diverse problems
Option 1 – Separate system for each focus

- **SYSTEM 1**: Seriatim projections
  - High detail

- **SYSTEM 2**: CFT & forecasting
  - Model building

- **SYSTEM 3**: Stochastic
  - Targeted models
Option 2 – Multiple applications on a common systems platform

1. Seriatim projections
   - High detail

2. CFT & forecasting
   - Model building

3. Stochastic
   - Targeted models

APPLICATION
APPLICATION
APPLICATION
A common platform for applications designed for different types of analyses

- Seriatim applications for detailed formula-based valuations
- Cash flow testing and forecasting applications offering comprehensive features for general needs
- Stochastic applications targeted for special needs
A common platform for applications designed for different types of products

- Mainline products
  - Life
  - Annuity
  - Health
  - Property / Casualty

- “Niche” products
  - Group
  - GICs
  - Structured settlements
  - Terminal pension funding

- “Emerging” products
  - Banking
  - Mutual funds
A common platform – across product types, across analysis types, and across countries
Linking specialized applications to corporate projections – enabled by common platform
Current systems must continue to improve in four key areas

- Quick creation and easy maintenance of input
- Integration with Excel
- Optimal organization of project work
- Intuitive interface, easy to learn

- Support for local practices and products
- Simple to perform ‘What ifs?’
- Separation of modeling platform from the application models
- Customize without sacrificing model integrity

- Easy access to output results
- Efficient support of complex models
- Able to handle large volumes of data
- Able to support large numbers of scenarios

- Auditable models
- Reporting against model integrity
- Transferable within organization
Different types of analyses require increased focus from current systems.
A complete approach is required for increasing analysis capabilities

- Research, advice, and audits
- Implementing custom applications
- Targeted to meet specific needs
- Foundation for system and applications
Actuarial research is needed in addition to the development of new tools and applications

- Identify the “drivers” for each type of analysis
- Reduce the number of model points
  - Different “mappings” depending on analysis purpose
  - Scattered distributions, and other model building techniques
- Scenarios selection techniques
  - Pre-evaluation of scenarios (tails analysis)
  - Combining probability-weighted scenarios (dynamic hedging)
- Approximation techniques for “trees” along “paths”
- Approximation techniques for projecting blocks of business without individual model points
Software products and services will be unbundled, to allow the ‘best in class’ choice for each service.