

## **Actuarial technology in 2014**

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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

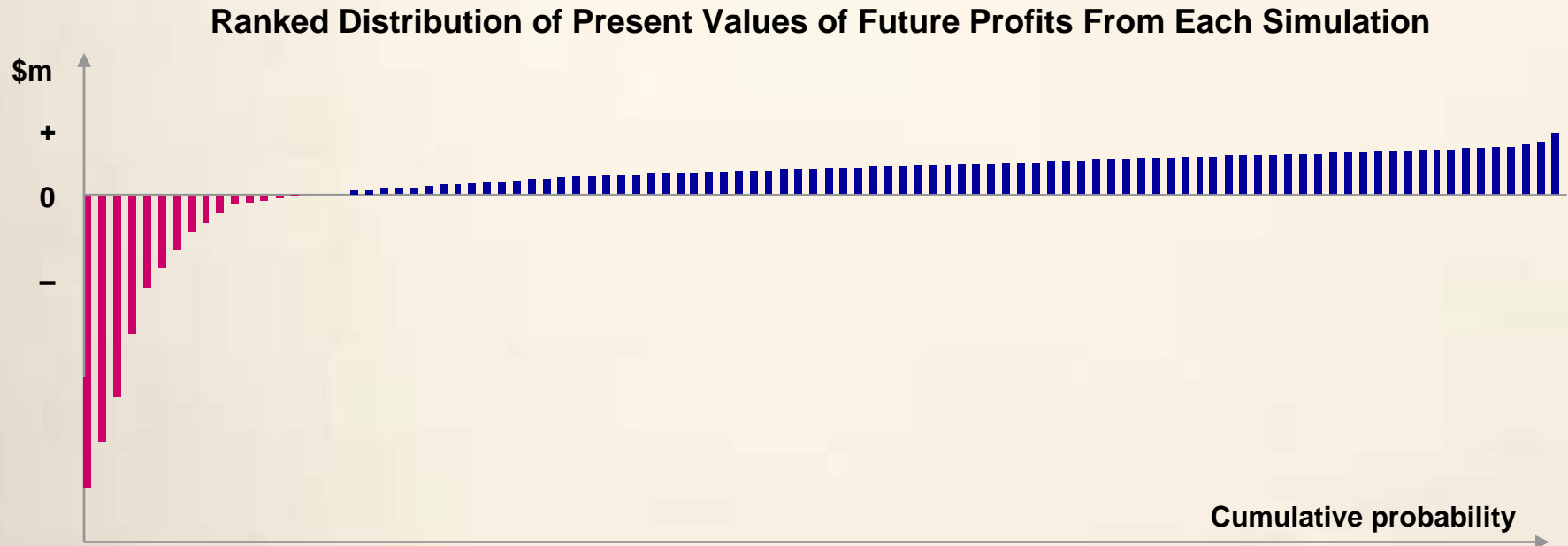
## Is Moore's Law the answer?

- 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!
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- But what will we be calculating?

# The steady advance in analyses needs – your PC will never be fast enough

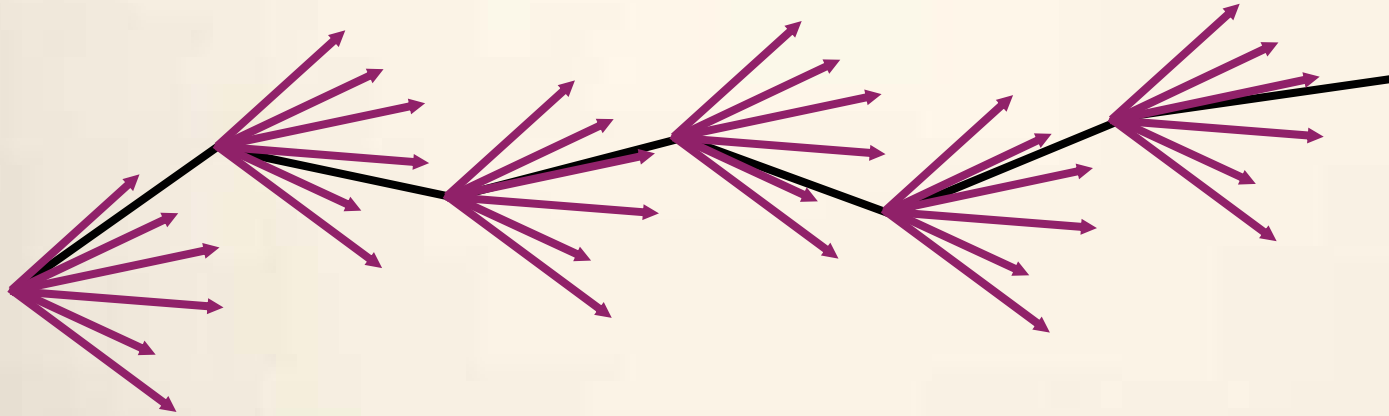
	How?	What?
1974	Commutation columns and <i>real</i> spreadsheets	Factors and asset shares
1984	Mainframe access and APL	Fund-driven products revolution
1994	Spreadsheet programs and vendor system	Cash Flow Testing and product pricing
2004	Multiple vendor systems	Stochastic analysis
2014	Integrated applications	Principles-based balance sheets and decision-making

# Three major types of analyses requiring a large number of scenarios – extreme event analysis



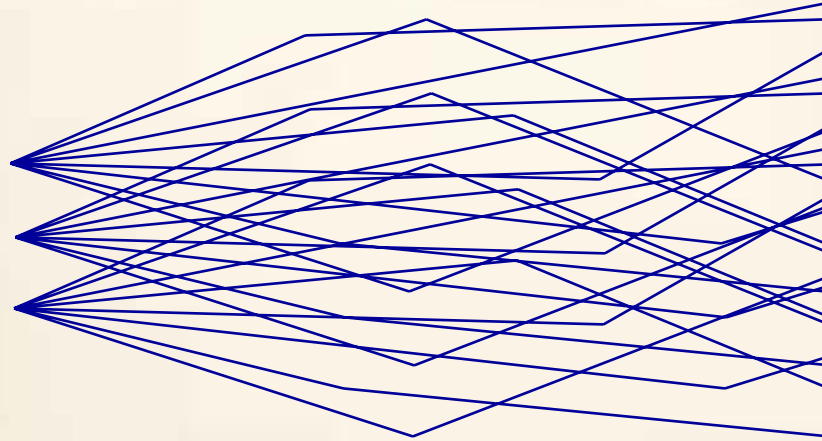
- More scenarios are required to identify the distribution tail
- RBC C-3 Phase II involves asset/liability models
- Pricing VA product guarantees may be liability-only

# Three major types of analyses requiring a large number of scenarios – stochastic on stochastic



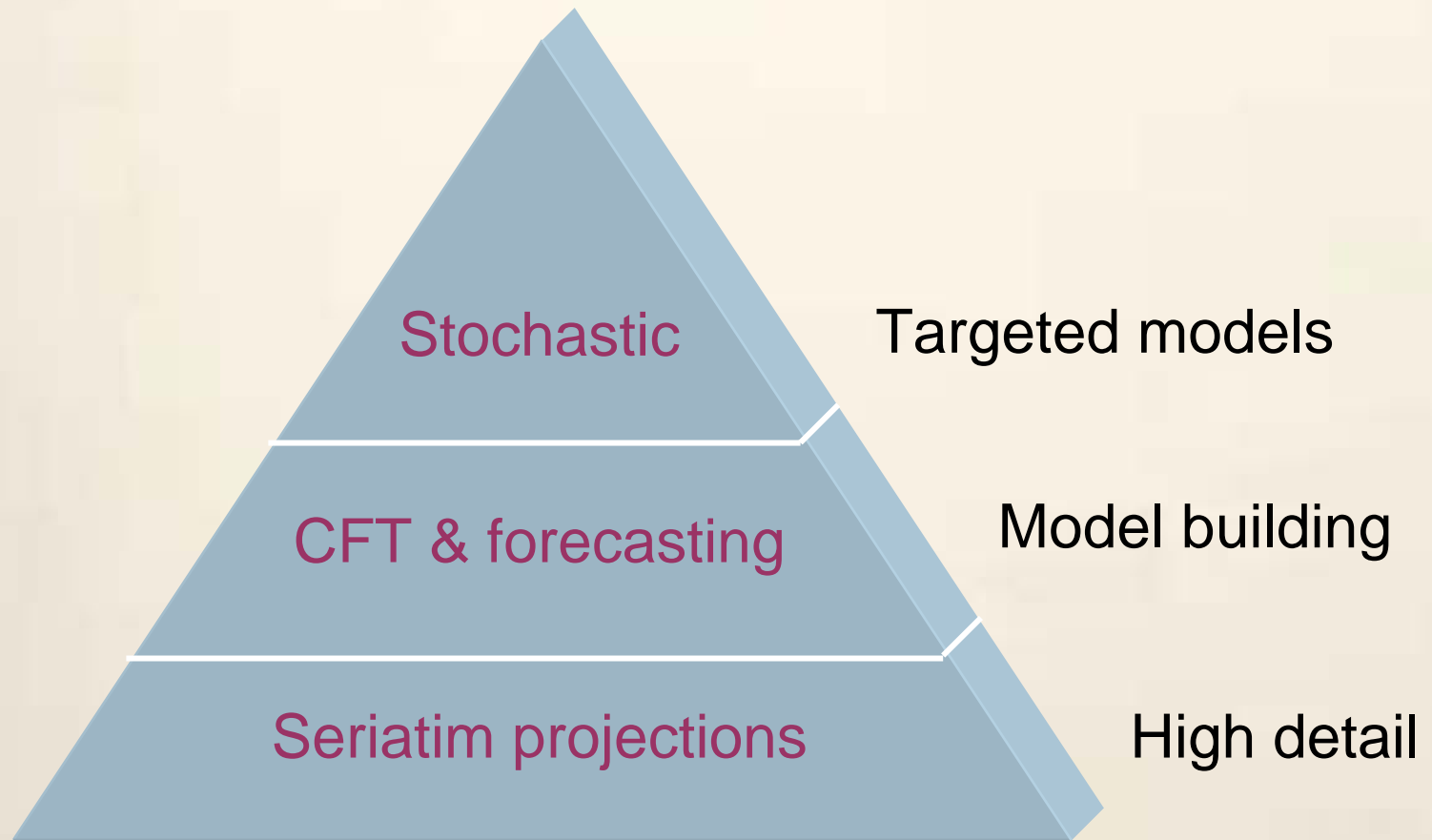
- For example, along each economic scenario path there are -
  - Projections using stochastic input, such as mortality
  - Stochastic projections to measure RBC C-3 Phase II
- Each stochastic layer increases the number of projections

# Three major types of analyses requiring a large number of scenarios – dynamic hedging



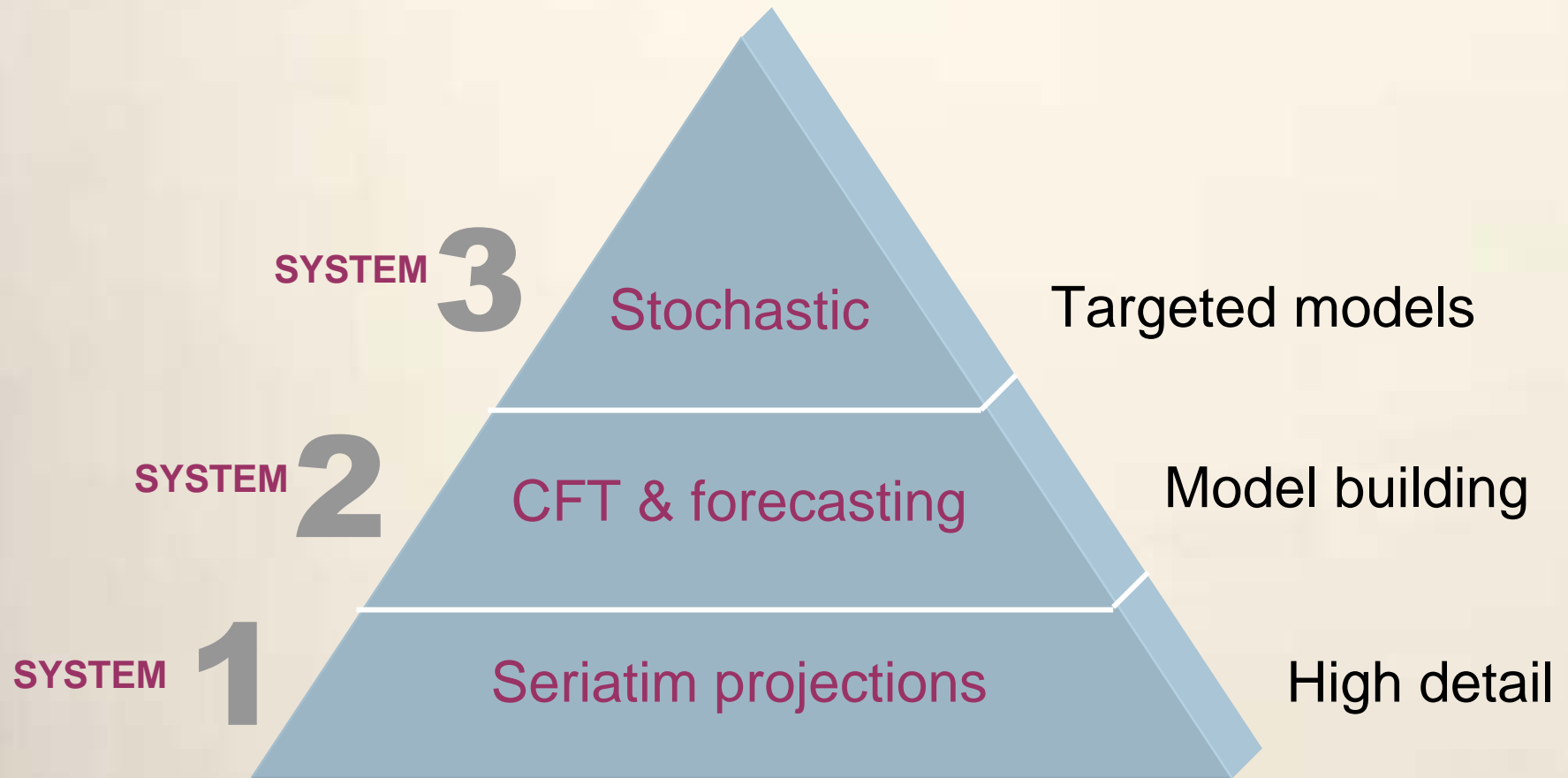
- Dynamic hedging uses multiple sets of robust scenarios to measure the behavior of liabilities
- The Greeks – Delta, Gamma, Vega, Rho, and Theta
- Value or earnings at risk analysis involves asset/liability models

# Different modeling approaches are required to solve diverse problems

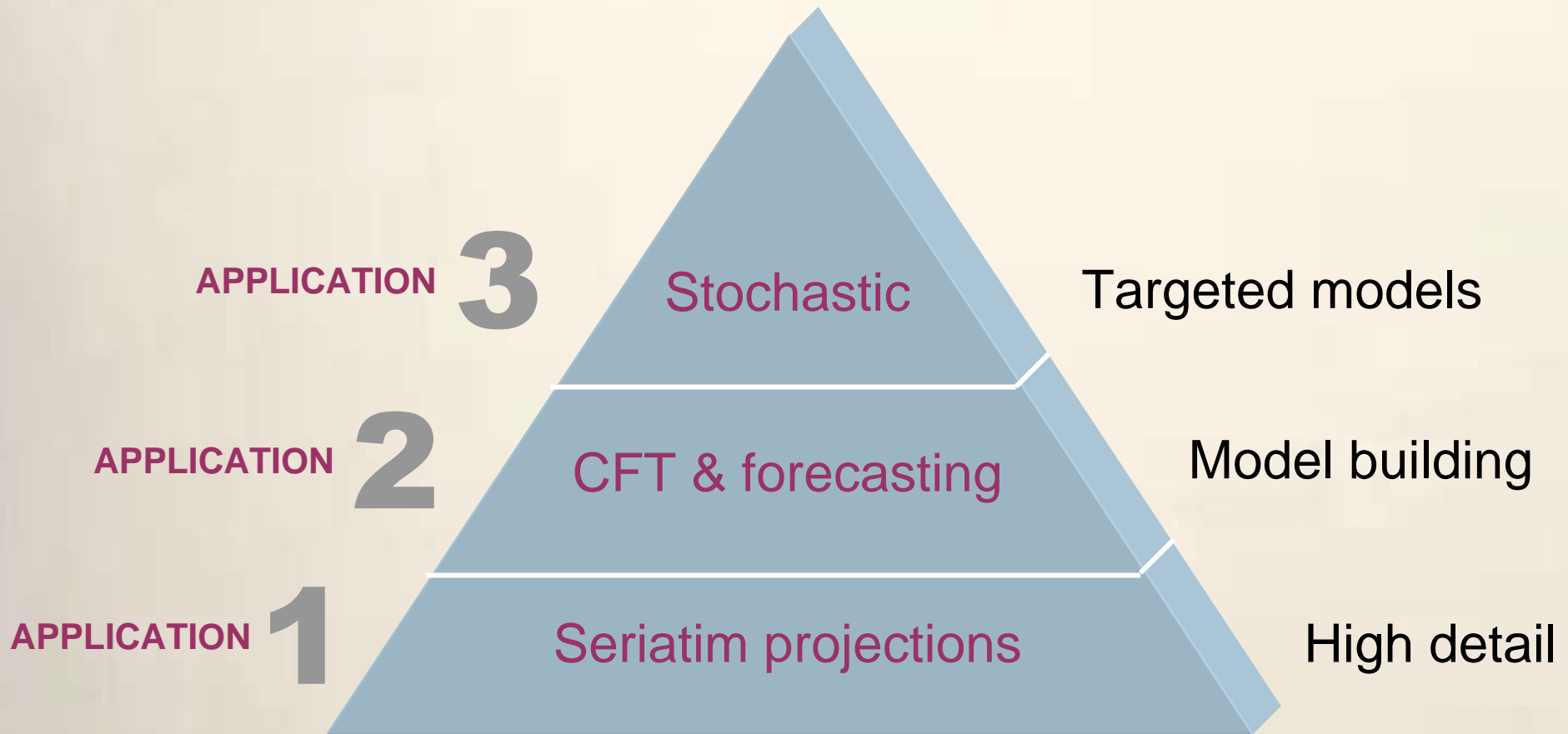




# Option 1 – Separate system for each focus



# Option 2 – Multiple applications on a common systems platform



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



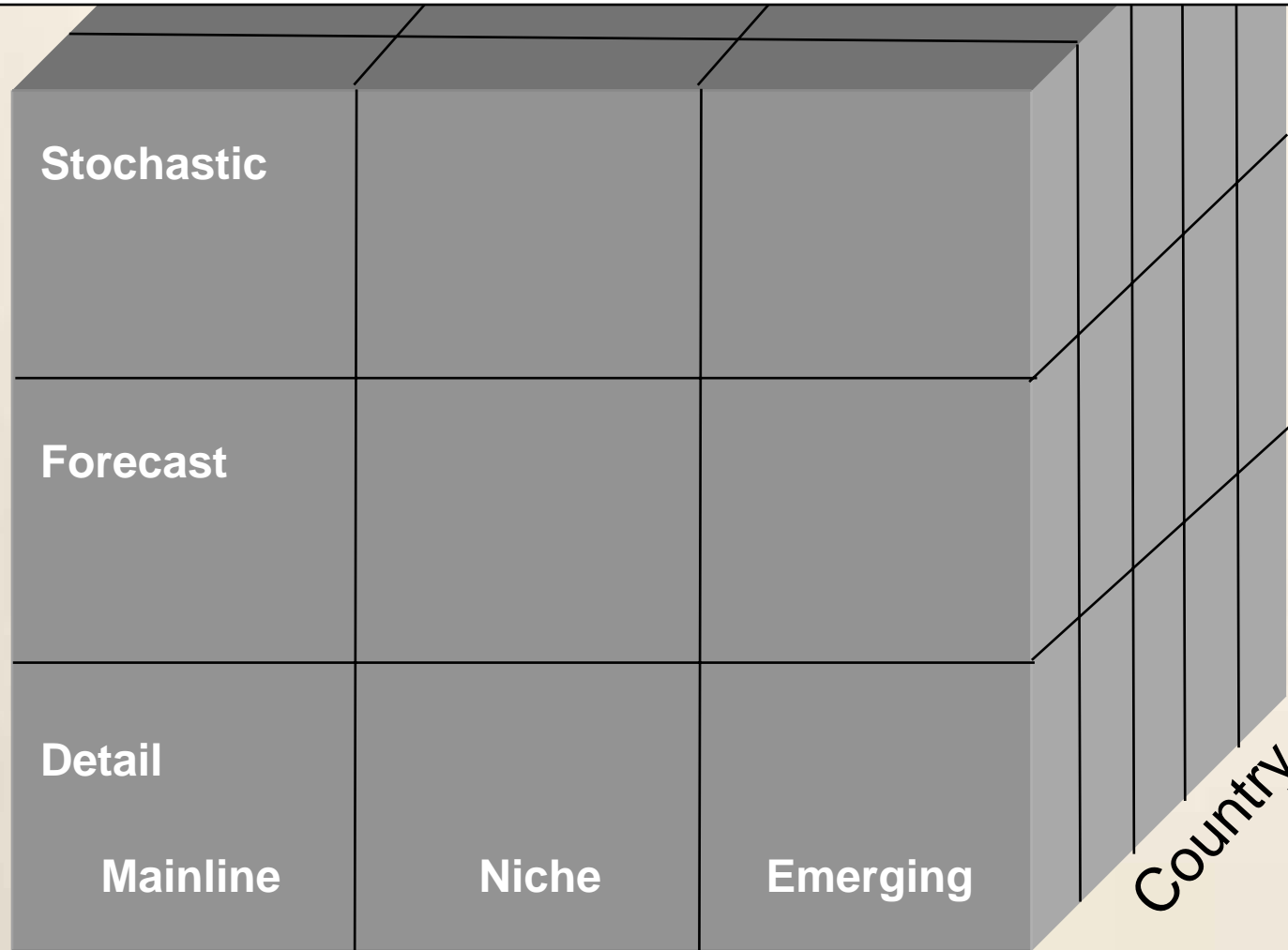
- Seriatim applications for detailed formula-based valuations
- Cash flow testing and forecasting applications offering comprehensive features for general needs
- Stochastic applications targeted for special needs

# A common platform for applications designed for different types of products

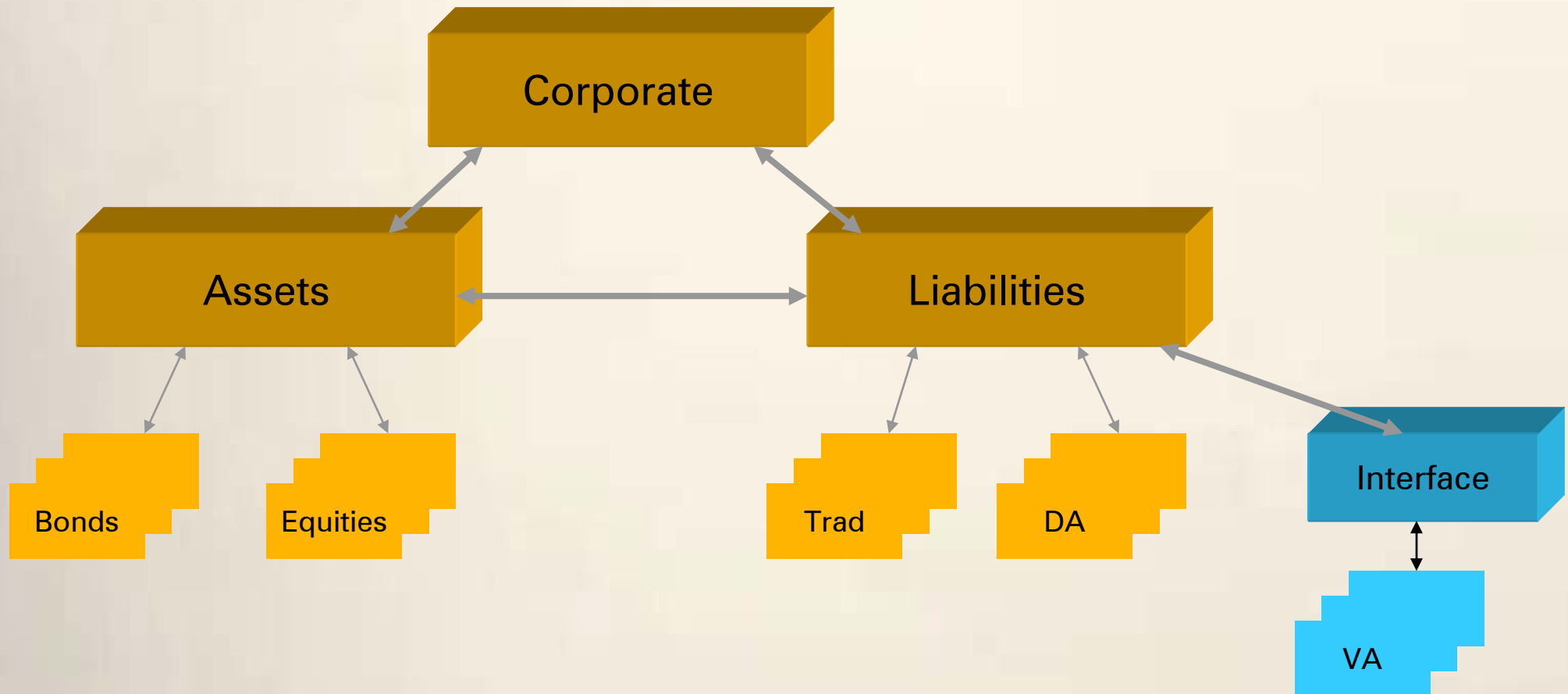


- Life
- Annuity
- Health
- Property / Casualty
- Group
- GICs
- Structured settlements
- Terminal pension funding
- Banking
- Mutual funds

# A common platform – across product types, across analysis types, and across countries

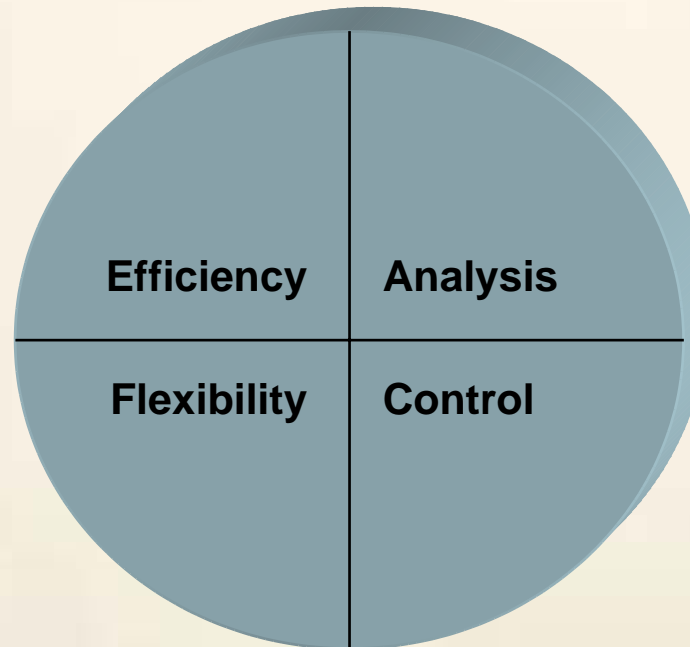


# Linking specialized applications to corporate projections – enabled by common platform



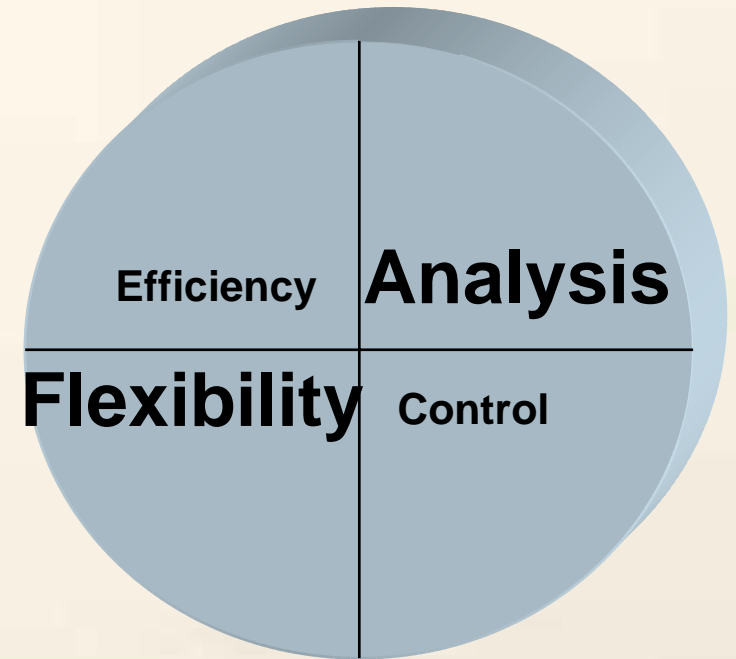
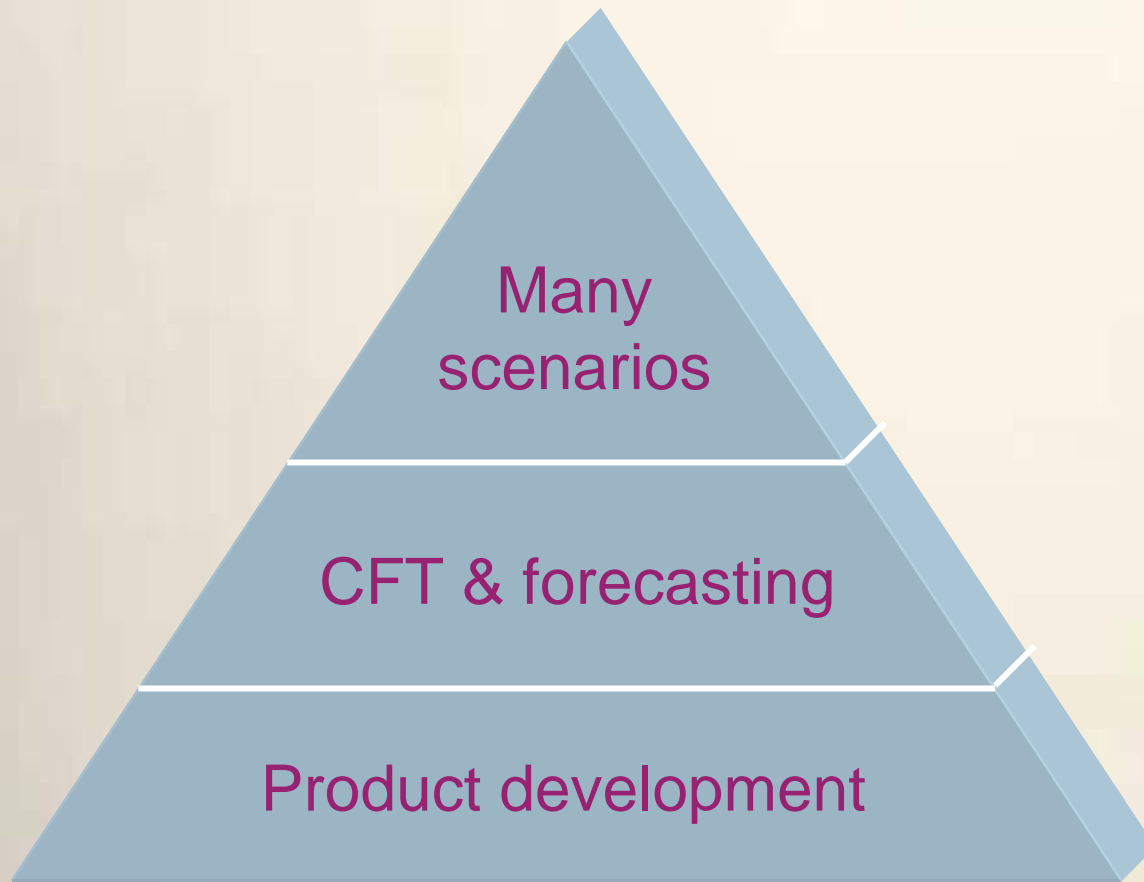
# Current systems must continue to improve in four key areas

- 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

Advisory services

- Research, advice, and audits

Model  
implementation

- Implementing custom applications

Applications

- Targeted to meet specific needs

Modeling  
Platform

- 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

