

ENTERPRISE MODELING

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PRESENTATION OUTLINE

- What is enterprise modeling?
- Managing enterprise models



WHAT IS ENTERPRISE MODELING?



WHAT IS ENTERPRISE MODELING?

- Modeling done in an centrally managed enterprise environment that integrates with the entire enterprise infrastructure and IT architecture standards
 - Better data management with quick, automatic access to quality data and assumptions
 - Enhanced security using permission-based environments
 - Production quality controls
 - Scalable distributed processing for improved performance
 - Standardized modelling efficiency techniques
 - Improved automation capabilities
 - Integration with business intelligence services for reporting
 - Automatic backups and redundancy for robust 24/7 availability
 - Defined roles and responsibilities
 - Official change control and validation procedures



DESKTOP VS. ENTERPRISE MODELING

○ Desktop

- Focused on individual actuarial tasks/calculations
- Ad-hoc, short term,
- Siloed infrastructure with redundant data and models
- Local security and individual user rights
- Models for creativity and individual preference
- Focused on a single model application
- Actuarial independence from IT
- Minimal governance and controls

○ Enterprise

- Broad processes
- Governed and repeatable
- Centralized infrastructure, shared data and reused models
- Centralized security, roles, and audit trails for multiple users
- Automated models for timely and efficient results
- Results are consistent, repeatable, and reproducible, with shorter reporting timescales
- Reduced risk
- Grid scalable, reduced run time
- Actuarial leverage of IT



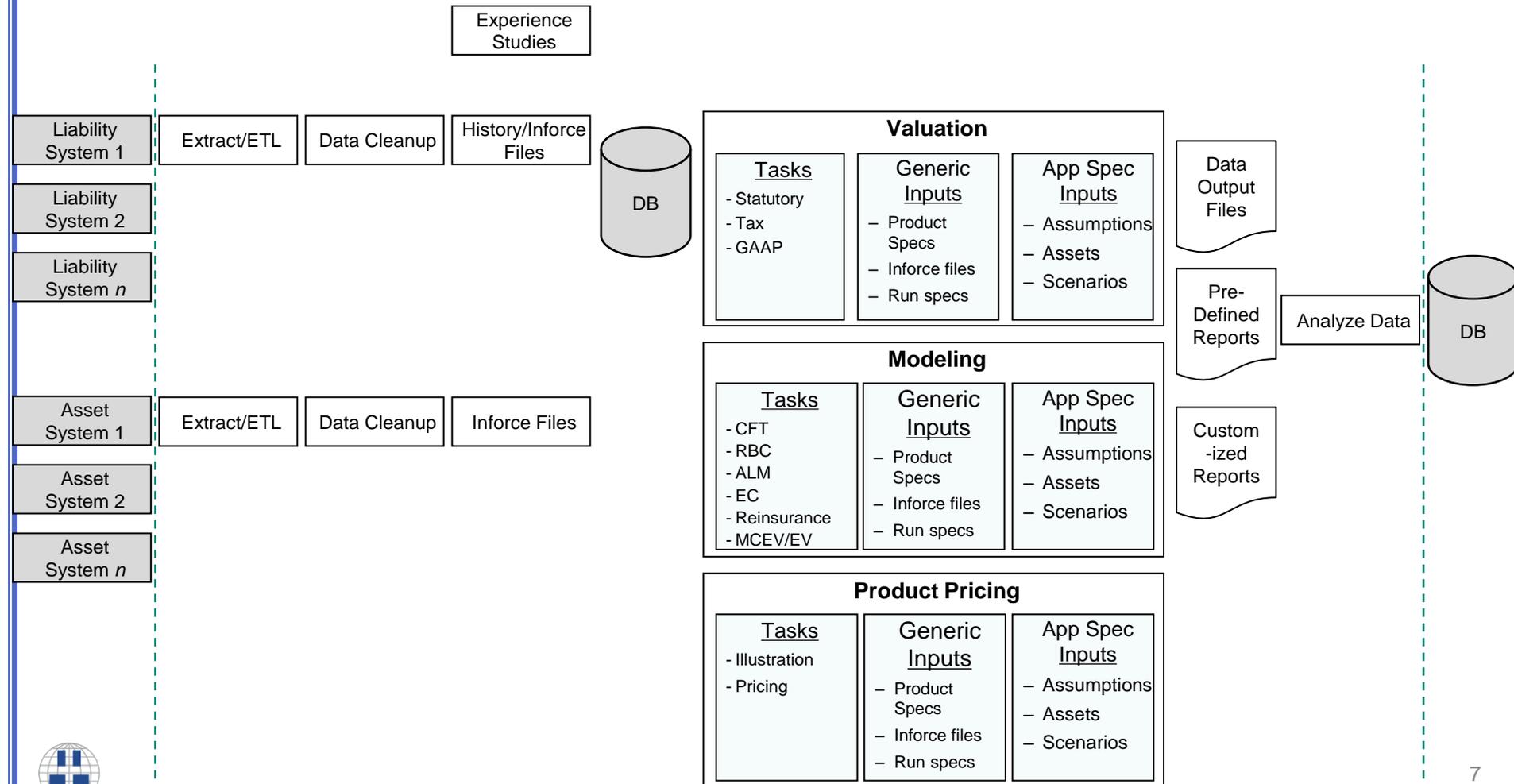
EVOLUTION OF ACTUARIAL MODELING

- Actuarial modeling of cash flows first required by regulators in 1980s
- Since then: C-3 Phase I & II, AG43, PBR, various GAAP requirements, economic capital, embedded values, duration calculations, what-if analyses, etc.
- Most have remained one-off desktop models, **even as complexity increases and results have a more direct and visible role in company financials**, never realizing the consistency and sustainability associated with enterprise processes



ACTUARIAL END-TO-END PROCESSING

- Actuarial department work spans from upstream admin system extracts to downstream final reporting



STEPS TO ENTERPRISE MODELING

- Executive sponsorship and a culture ready for modeling standards
- Model inventory and risk assessment
- Assess core actuarial cash flow projections across modeling platforms, rationalizing their use
- Assess roles, centralizing modeling work where possible
- Design and construct a modeling structure that works with enterprise infrastructure and IT architecture standards
- Design and set up *functionally separate* components on the new enterprise modeling structure, leveraging existing capabilities if possible, and satisfying each modeling application:
- Perform baseline model testing/validation (initially and periodically)
- Review controls for production and model changes

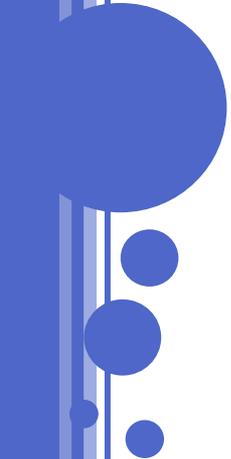


MODEL RATIONALIZATION AND FIT FOR PURPOSE

- Is the model good enough to do the job it was designed for?
- “All models are wrong, some are useful”
- “A model that is perfect in every respect is as useful as a map with a scale of one”
- Although model rationalization often results in fewer models and modeling platforms, the goal of “one corporate model” is often hard to achieve in practice



MANAGING ENTERPRISE MODELS



MODELING ENVIRONMENTS

- Production environment
- Development environment
- Test environment
- Staging environment

Does your company have a production-grade modeling environment?
For most or some modeling processes?



MODEL INPUT MANAGEMENT

- As with any model, garbage in → garbage out
- Automated data extracts reduce the chance for human error
- As with inforce files and assumptions, product specifications, run time parameters, and the underlying code itself are inputs to the process and should be locked down in a production environment
- Version control tools exist and can help with managing and archiving different iterations of the model and its input data



MODEL OUTPUT MANAGEMENT

- Model output should be linked to the input and model version used to create the output for control, reproducibility, and facilitating understanding of results
- Choice of output to discard, archive, and/or upload to data warehouse can vary by model application (e.g., baseline vs. sensitivity, deterministic vs. stochastic, frequency)
- Back-end calculations (e.g., discounting, aggregating, CTE calculations, topside adjustments) should be done within the enterprise production environment
- Reporting tools



COMMUNICATING MODEL RESULTS

- In order for senior management to confidently report on model results and use them for decision making, communication of model results should be
 - Reliably timely
 - Effective
- Must be able to explain financial results
 - At various levels of granularity
 - Why results have changed over time
- Other tools for getting comfortable with and communicating results



MODEL GOVERNANCE

- Like all governance, it is an measured approach for controlled decision making and organized activity, primarily aimed at reducing risk
- A model governance document establishes the rules, roles, and controls related to models
- It really comes down to execution and enforcement
- Visibility of model governance is increasing under PBR



ROLES AND RESPONSIBILITIES

- Separation of duties
- Who does what when where?
 - Model steward, model architect, data steward, extract programmer, program developer, tester, actuarial “coder”, user of model output, power user, SME, software vendor, etc.
- What responsibilities exist outside the model team?
 - IT department
 - Software vendor



MODEL PRODUCTION PROCEDURES

- Repeatable processes for updating and running the production model should be the same each cycle (absent any structural changes to the model)
 - Formats for input data
 - Default routines for moving to the next reporting cycle
 - Naming conventions
 - File structure
 - Modeling efficiency techniques
 - Automation routines
 - Priorities for managing the production queue
 - Validation procedures
 - Use of production controls



TYPES OF MODEL CHANGES

- What can change in the model?
 - The underlying code
 - The input
 - The input specification structure
 - Output items
- Causes of model changes
 - Significant changes in product design or regulations
 - Changes to data sources
 - Other model enhancements

What is the level of model change governance at your company?
How frequently are changes made to your production models?



MODEL CHANGE PROCEDURES

- Typical controls used with model changes
 - Access rights, automated logging of each change, testing requirements, and the following controlled steps:
 - Change request, solution proposition and selection, programming and coding, software testing, user acceptance testing, release and deployment
 - Multiple approvals and signoffs along the way
 - Priorities for managing the change queue
- Change controls can vary by model application



MODELING CONTROLS

- Controls are used to regulate model processes
- The use of controls in modeling continues to increase due to regulations and increased focus on model risk
- Controls will vary with the model environment, model application, and model software being used
- Controls will also vary depending on whether the process is a model update, model run, or model change



QUESTIONS

