82 - Model Architecture Case Studies: Are Your Models Ready for the Future?

2019 Valuation Actuary Symposium

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Session 82, Model Architecture Case Studies: Are Your Models Ready for the Future?

August 27, 2019

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Source: Society of Actuaries, 2019

Introductions

Corey Carriker, FSA, MAAA

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Corey is a member of Deloitte's Actuarial & Insurance Solutions Practice. He leads the Deloitte's Actuarial Modeling Team and co-leads the Actuarial Modernization offering. Corey specializes in the delivery of Actuarial Modernization programs including the end-to-end design and implementation of data, process, technology, actuarial models, governance, and overall operating model.

Melanie Dunn, FSA, MAAA

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Melanie is a Principal and leads Oliver Wyman's Actuarial office in Seattle. She has extensive experience in model governance and controls, model building and software conversions, model architecture, model validation, financial reporting, litigation support, and mergers and acquisitions. Melanie has spent her entire career with Oliver Wyman, developing and growing strong relationships with her clients and others in the insurance industry.

Charles Deak, FSA, CERA, MAAA

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Charles is a Manager of Deloitte's Actuarial & Insurance Solutions Practice with 10+ years of experience. He specializes in Model Conversion / Modernization projects, leading and supporting a large number of actuarial system conversions, architecting end-to-end solutions, and designing model governance and controls.

Greg MacKenzie, ASA

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Greg is a Consultant based in Oliver Wyman's Atlanta office. He has extensive experience in model building, development, and validation. Greg has a played a lead role on multiple projects supporting clients for software conversions and developing functionality for emerging regulatory changes. He also co-leads Oliver Wyman's model architecture offering.

Agenda

Topic	Content	Timing
Purpose	• Objective of this session • Causes for change to model architecture	5 minutes
Model architecture overview	• End-to-end view of future state model architecture	5 minutes
Case studies	• Small group activities	75 minutes
Summary and Q&A	• Session wrap-up	5 minutes

Purpose

Objective:

- To understand how insurances companies can improve their model architecture in parallel with regulatory changes and the increasing demands of the future

Learning Outcomes:

Attendees should be able to complete the following:

- Describe the role of model architecture in effective actuarial modeling, financial reporting, and analytics
- Apply the principles of model architecture in real-world modeling situations
- Describe best practices and provide examples of common pitfalls for each area of model architecture
- Advocate for strategic investment in a strong model architecture for your organization

Times are changing

Actuaries are facing increasing pressure to meet expectations

Regulatory and accounting changes

- FASB Long-Duration Targeted Improvements (“LDTI”)
- IFRS 17
- Principles Based Reserves (“PBR”)
- VA statutory reform

Management expectations

- “Do more with less”
- Provide strategic insight
- Perform more in-depth and timely analyses

Technology

- Automation
- New tools and techniques

Reconfiguring and improving model architecture will better prepare the modeling function to meet demands of the future.

Model architecture overview

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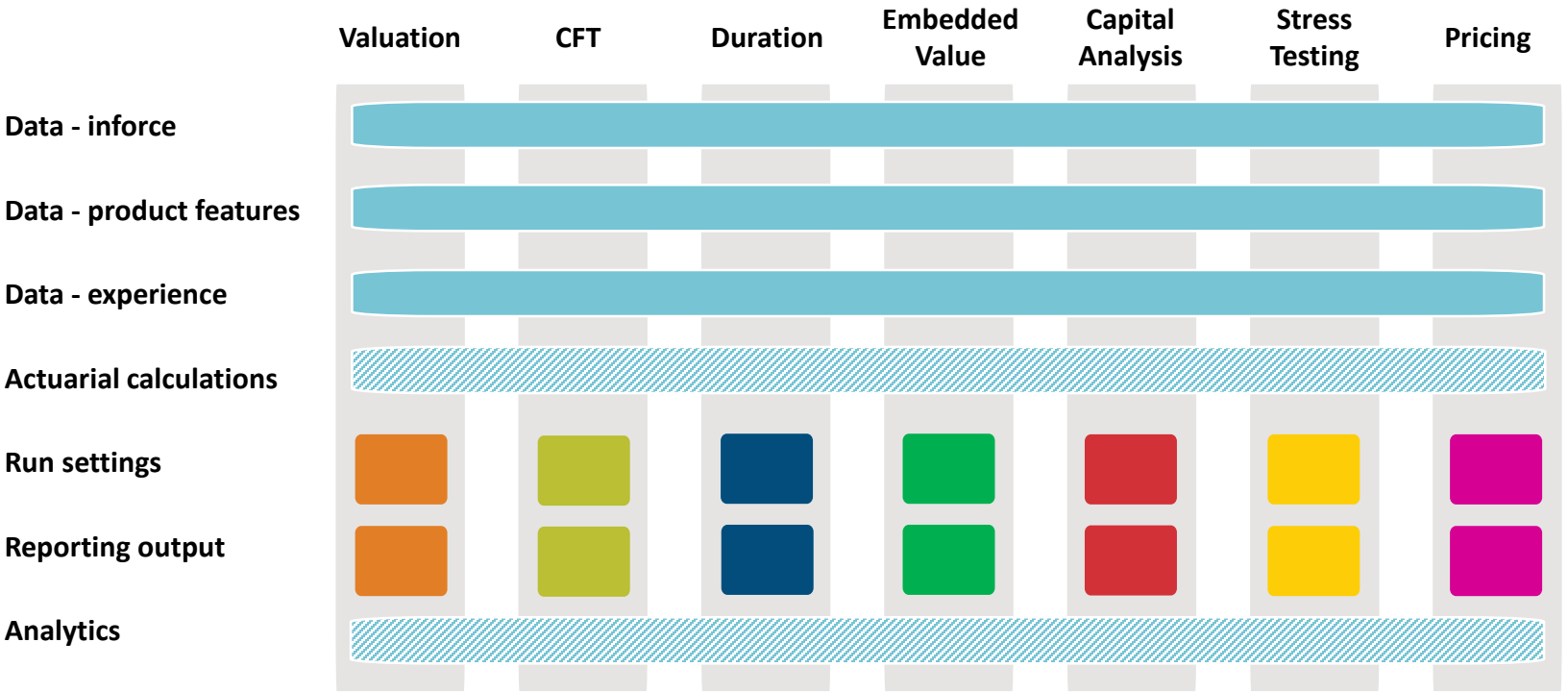
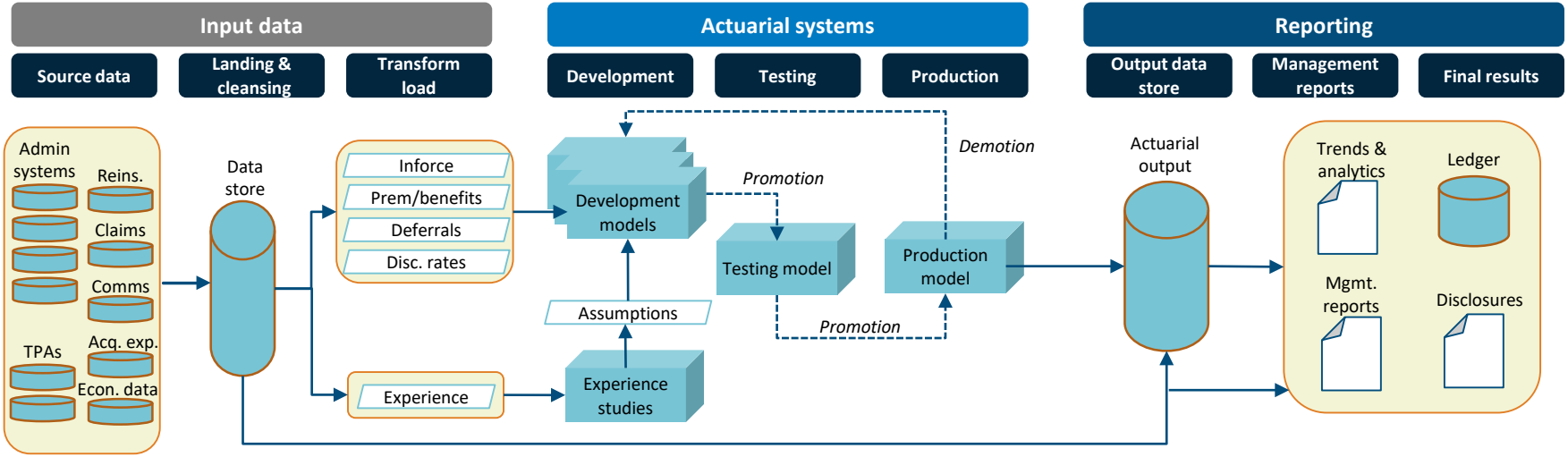
Model architecture

Ideally, the setup for data, calculations, and analytics can be leveraged across functions



Model architecture flow

Upcoming regulatory changes demand the industry evaluate the entire ecosystem in which the model operates and evolves



While inforce data is generally currently available, **additional data extracts, reconciliations, and controls** will likely be required and **historical data quality and granularity** should be addressed

Regulatory changes lead to increased scrutiny, increasing the requirement for **strong governance** and a **foundational model design** that is **scalable, "future proof", and auditable**

Back-end data storage and reporting to the ledger will need to be **updated, scaled**, and ideally **automated** for management reporting and extensive new **disclosure requirements**

Case studies

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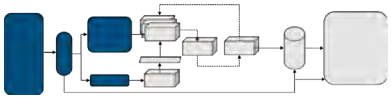
Case study: Production needs actuals for year-end



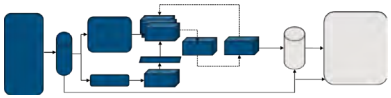
SCENARIO: ABC Life is executing year-end GAAP financial reporting. Under LDTI, the production team needs actual information including claims, lapses, and other items which contribute to the calculation of reserves. In order to get the information production needs, they need to talk to multiple areas of accounting and finance. This may cause delays and sometimes emergency runs are required due to incorrect input data or data that was not transformed appropriately. How can this process be improved? What are some potential solutions to alleviate pain points of these processes?

KEY CONSIDERATIONS

- Coordination between actuarial and IT / accounting / finance
- Data sources and timing
- Controls / reconciliation of actuals
- Governance on inputting data into production models

1. **WHAT** • What are some practical solutions and how have you overcome similar challenges?
2. **WHY** • Why are certain pieces of information difficult to obtain in a timely manner?
3. **HOW** • How do you ensure the data was input correctly and reconciles?

Case study: IT needs a 2 month lead time to fix a data error



SCENARIO: ABC Life has just implemented a structure where their inforce files are created entirely via an IT-controlled process such that it feeds the company's actuarial calculation models without any additional modifications. Upon review of the new inforce file and quarterly results, Jill, the actuarial owner of the VA model, notices one of the VA plan codes is being incorrectly mapped. Jill would like to make an emergency fix to the inforce data to avoid having to calculate a new topside to correct the error. What are the pros and cons of making the change directly to the inforce data as opposed to calculating a topside? How could this error have been prevented?

KEY CONSIDERATIONS

- Coordination between actuarial and IT
- Lead time required for IT development
- Controls benefits from IT ownership / automation
- Governance on emergency changes, topsides, and production models

1. **WHAT** • What does the process look like for getting production data into actuarial models?
2. **WHY** • Why is some data transformation / mapping often performed by the actuarial function?
3. **HOW** • How are your data processes being impacted by regulatory changes?

Observations on actuarial calculation model inputs

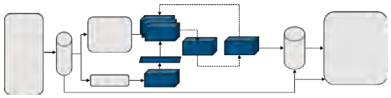
Changing requirements provide an opportunity to revisit data infrastructure, input processes, and ownership holistically

Potential Implications

- Single source of data which is clean and reliable for all modeling processes
- Movement to entirely IT-controlled data processes will require increased interaction and communication between IT and actuarial
- Automated processes and controls reduce the likelihood of errors and controls failures as well as the onus placed on model owners
- Insurers will need to manage more granular input data to feed downstream calculations

Movement to centralized data repositories and IT-controlled / automated processes will result in significant process efficiencies and ease the burden of new requirements

Case study: Too many models



SCENARIO: Jim owns several models that support valuation and forecasting for Universal Life (incl. IUL, VUL, ULSG). Currently, separate models exist for STAT and GAAP. Jim is proposing the models be merged across valuation bases to streamline assumption updates, but he would like to split out the models by product group to reduce complexity and model size. What are the costs / benefits of what Jim is proposing? Note models were originally split due to timing of reporting, data availability, and the desire to complete runs in parallel. Reporting and data receipt schedule:

- GAAP is reported quarterly on business day 3; data is available on business day 1
- STAT is reported annually on business day 10; data is available on business day 2

KEY CONSIDERATIONS

- Splitting by product group may require results be aggregated outside of the model (e.g., LRT, CFT)
- Different stakeholders / owners by valuation basis
- Data sources, timing, model run time, model size
- Single, vendor supported, or in-house models

1. **WHAT** • What does the current model division structure look like at your company?
2. **WHY** • Why are models structured the way they are? Are there opportunities for improvement?
3. **HOW** • How do you see the model structure changing moving forward?

Observations on model inventory

Consolidating models can decrease redundant development efforts; however, strong modeling standards and governance processes are required

KEY RECOMMENDATIONS FOR MODEL CONSOLIDATION

COMBINE MAJOR PRODUCT GROUPS IN A SINGLE MODEL

- Division of models within a single product group (e.g., by valuation basis or by sub-product) often leads to duplication of development efforts

STANDARDIZE OBJECT NAMES

- Clear naming convention to indicate purpose of all inputs, tables, calculation files and outputs
- E.g., consider including “STAT” in the name of inputs and outputs specific to stat reporting

OTHER MODEL DEVELOPMENT CONSIDERATIONS

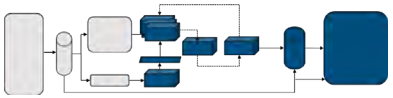
VERSION CONTROL

- As models are consolidated, version control is increasingly important to allow parallel development
- Assign a model steward to act as the gatekeeper for model development
- Regression test to prevent unintended changes

MODEL ALIGNMENT

- To the extent models cannot be consolidated, frequent collaboration can help prevent inconsistencies across pricing, valuation, hedging, etc.
- Establish clear governance framework for all models regardless of function

Case study: Populating LDTI disclosures



SCENARIO: A large public company is required to populate the detailed disclosure (see provided handout) per FASB's Long-Duration Targeted Improvements. After reviewing the disclosure, management realizes their current infrastructure cannot easily populate the disclosure. What should management consider for their back-end processes in order to easily populate the disclosure?

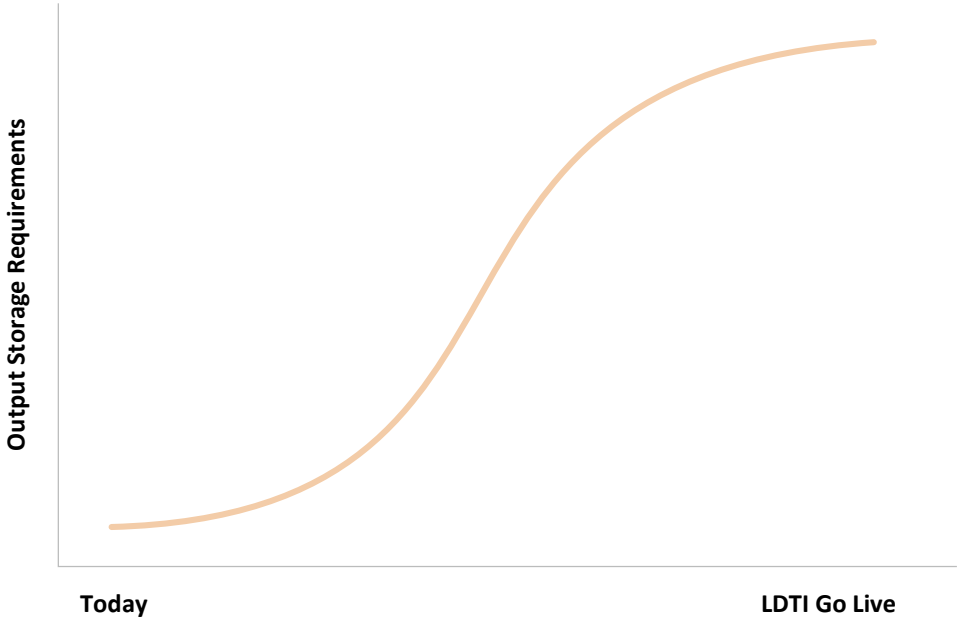
KEY CONSIDERATIONS

- Coordination between actuarial and IT / accounting / finance
- Modeling capabilities
- Results storage solution
- Automation opportunities

1. **WHAT** • What changes to the model need to occur to support the runs required?
2. **WHY** • Why does model output get manipulated? Can we reduce these instances?
3. **HOW** • How will the way results are stored and accessed change going forward?

Assess your storage capabilities

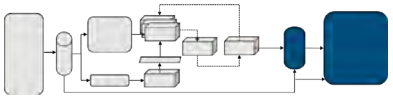
Disclosure requirements require an increase in the volume of data which must be stored, controlled, and reported



Future state storage considerations

- **Numerous runs** for each line item in the disclosure
- **Cohort** level calculations and **aggregation**
- Utilizing a **single, controlled, and reconcilable output repository** with back-end adjustments minimized
- **Vendor solutions** and **automation tools** can support efficient storage

Case study: Management wants more insight



SCENARIO: After presenting financial results to management, multiple questions were asked with respect to the movement in reserves and DAC. Your team was asked to conduct further analysis which management needs ASAP in order to gain comfort on the financials. After spending multiple days and nights digging through results, you provide the explanations to management. How can this process be improved?

KEY CONSIDERATIONS

- Coordination between actuarial and IT
- Results storage solution
- Talent
- Automation opportunities

1. **WHAT** • What output data by the model is produced for investigation purposes?
2. **WHY** • Why are you asked to investigate / how can you anticipate it better? (provide examples)
3. **HOW** • How can you change models to embrace new technology to improve explanations?

Enabling strategic analysis

Embracing and developing new tools can enable insurance companies to provide not only insight on actual experience, but also forward-looking analyses

Today → **Future**

React – address inquiries from management and other stakeholders on an as-needed basis

Anticipate – Standard multi-level reporting and analyses completed and provided to management

Foresight – Forward-looking analyses about what may happen in the future using flexible tools and technology

Table stakes

- Typically done through **cumbersome** querying and investigation
- Provides **requested explanations** only

Business insight

- Executed through **standard templates** in Excel with ability to **analyze key drivers**
- Inability to **slice and dice**

Strategic analyses

- Utilize tools such as Tableau or others, to develop **executive dashboards** and dynamic **drill-down capabilities**
- Increase **speed to act** in the market

Summary and Q&A

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Learning outcomes

Attendees should be able to complete the following

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Questions?