

PBA Implementation: Beginning Tales



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01 Executive Summary

Beginning Tales presents the narratives of companies thought to be further along implementation the Valuation Manual (VM) than most others. We canvass their issues including their primary pain points. The common element across all companies was “time.” VM implementation has and will take considerable resources and time.

As 2015 unfolded, January 1, 2017, became the likely operative date of the manual. During the preceding years, 2013–2015, most companies did not engage in VM-specific implementation activities. However, all companies worked on foundational activities. These activities were driven by overall business needs such as the trend toward actuarial and/or financial transformations, risk management needs, heightened awareness of governance, or overall accounting and regulatory regimes and requirements. Activities related to supporting VM-20 included assumptions, experience studies, governance and models.

Entering 2016, most companies have a PBA Implementation Road Map (i.e., a high-level implementation plan) and a Steering Committee. Several significant implementation plan changes occurred between 2016 and when VM was first adopted in 2012. Previous consensus expectations were that level term would not need to have deterministic reserves calculated and VM-20 minimum reserves would be the net premium reserve. The [Report on 2014 VBT/2017 CSO Impact Study](#) published in June 2015 found the Net Premium Reserve to be less than the Deterministic Reserve for most policy years for five of the six companies. Exclusion Test, Net Premium Reserve and Deterministic Reserve implications regarding plans, implementation work activities, and required resources and capabilities may profoundly affect companies in different ways. Being able to calculate and project deterministic reserves will impact some companies and will be a factor in some small companies’ evaluation of electing or forgoing the companywide exemption. Product development teams will have more R&D issues to work through, analyze and understand. The direct consequence is implementing VM will take time and resources.

Overarching general implementation, activities, challenges and issues include:

- Setting assumptions
- Building the initial model to calculate reserves as of the valuation date
- Projecting VM-20 modeled reserves
- Bringing a larger and broader staff up to speed and
- Carving out time and resources.

Common specific top challenging issues and pain points include:

- The process to set mortality assumptions
- Underwriting Criteria Score and the ability to calculate credibility by amount rather than by count
- The process to set asset assumptions
- Developing margins and in particular on dynamic assumptions (e.g., premium persistency) and
- Model granularity (e.g., varying individual asset defaults and spreads by weighted average life, PBR credit rating and projection year).

Details underpin the common pain points, reflecting the saying “The devil is in the details.” VM, all 392 pages, contains a tremendous amount of detail—details that take implementation teams time to interpret, to evaluate, to discover significant factors affecting outcomes, to implement, and to understand the operational and financial impacts.

Introduction

This report, *Beginning Tales*, continues the implementation journey started in *PBA Implementation: A Guide*. *Beginning Tales* does not duplicate descriptions or explanations of Valuation Manual (VM) content contained in the Guide. The reader is referred to the Guide for background and details. *Beginning Tales* does not assume subject matter expertise but does assume some degree of familiarity with PBA implementation issues.

It is now a few years later. Our Guide's case study companies have a Road Map and have begun their journey. What have they done? What have they encountered? And where are they headed? Their stories may be helpful. The stories, in a few words can be summarized as: They have traveled far but have even further to go, they still have many questions, and VM-20 has and will take considerable resource and time. Time is a central theme.

"It takes a lot longer to implement than to read and understand."

"For model results—there a lot of things you can't predict in advance—it takes time to work through."

Our companies have discovered that not all has unfolded as presumed in formulating their Road Maps. The most significant plan changer is that in 2013 the consensus expectation was that many or most Level Term products passed the Deterministic Exclusion Test and hence the VM-20 minimum reserve would be the Net Premium Reserve (NPR). As of early 2016, the consensus expectation is that Level Term products fail the Deterministic Exclusion Test. It is less clear whether the minimum reserve will be NPR or the Deterministic Reserve (DR), that is, which of these two calculations is larger and for which policy years. The [Report on 2014 VBT/2017 CSO Impact Study](#) found the NPR to be less than the DR for most policy years for five of the six companies. Exclusion Test, NPR and DR implications regarding plans, implementation work activities and required resources and capabilities may profoundly affect companies in different ways. As of early 2016 VM proposals are being considered that would remove the Deterministic Exclusion Test for Level Term. Not only has VM changed since its original 2012 version, VM will continue to change.

Whose stories? *Beginning Tales* is based on formal discussions with a dozen participants from a diverse group of companies. A deliberate emphasis was made to include companies thought to be further along VM-20 implementation than most others. The mix of participating companies includes many involved in the Guide but also includes a handful of newcomers. In addition *Beginning Tales* reflects discussions with scores of companies and regulators over the past several years. Three of the newcomers used the first PBA Implementation Guide extensively to help them form a Road Map. *"We used the Guide and made some tweaks—we found it very valuable."*

Rather than look at distinct journeys via separate case studies, *Beginning Tales* looks at the challenges, issues and lessons learned that our fellow travelers have encountered at the beginning and middle of implementations. Each company was sent a similar list of talking points, but the discussions were unique.

At the time of the *Guide*, virtually all companies had not yet begun planning or taken steps to implement VM. VM was, by and large, a concern—but one in the distant future. The *Guide* focused on processes and foundational infrastructures. Thirty months later, companies are at wide range in the stages of planning and implementing. Some companies said VM-20 only minimally affected their existing products and supporting process, and thus they were

not far from implementation. On the other hand, although they have a plan framework, they do not want to be blindsided by surprises and thus wish to understand more.

When a significant new requirement is on the horizon, company actuaries often like to know where they stand in comparison to the industry and their peers. Are we alone in the challenges we face? What issues do we have in common with others? Can we learn from what others have already done? Are we ahead or behind the curve? Since these are not *Concluding Tales*, *Beginnings Tales* will be more helpful for companies about to begin or have recently begun the journey and not as helpful to companies that are far along the implementation journey.

Wherever you stand on any issue, you are likely to find yourself in a position similar to one of the participating companies (but not necessarily the same company on each issue). Regarding their views and issues on VM-20 elements, an analogy is the story of Goldilocks and the three bears—too hot, too cold, just right—too big, too small, just right. To convey Goldilocks's experiences, the authors use words such as *many*, *some*, *most*, *all* and *several* (e.g., many companies have ...). However, these words do not attempt to precisely or accurately depict either the proportion of the participating companies or the industry being described.

We canvass the issues starting out with general issues and then cover the biggest issues companies struggled (or are struggling) with—the primary pain points. Most companies tend to feel good regarding what they have addressed. Companies have varying degrees of work still in front of them.

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USAGE

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04 Planning and Steering Committees

Many companies have formed a steering committee, but nearly all are different in some regard. Several steering committees were formed a few years ago. One was formed as recently as the end of 2015. Some committees are strictly formed from within the actuarial function, and some have broad representation from throughout the company and/or senior management. Some consist of a single steering committee directly overseeing the project work teams. A few consist of several layers. Some small companies did not have a committee—unless one called the entire actuarial department a committee. Most committees are meeting once a month and sometimes more.

For some companies, the board and senior management want to see that VM-20 is performed properly but expect PBA implementation and operations to be handled downstream without requiring more board time than absolutely necessary. At the other end, one company, due to their challenges in implementing AG38D, realized they would need many more resources and time than initially thought to implement VM-20. This company stepped up involvement of senior oversight, incorporated VM implementation milestones into objectives, including senior management, increased the size of the team dedicated in full or in part to VM-20 activities, and planned for realistic calendar time to complete project activities.

In all cases, the PBA plan was part of a larger project plan. The PBA plan defined milestones but typically did not specify details beyond indicating the timeframe, the assigned project team, and an estimated amount of resource and work effort, for example, the target months of activities as well as a target completion month—build XYZ or test and validate ABC. As the calendar moved closer to a requisite work activity, detail was developed by the project team. Top-down was the universal approach. One participant advised having the right people on the team, “Our modeling team is working closely together with the VM-20 subject matter experts.”

All plans reflect their overall business strategy, some more than others. One company described the PBA plan as “weaving in the strategic view.”

Some companies have informed the board, and some have not. Typically the communication has simply been that something is coming and more will have to be done. Communications have not gone into details.

Some companies will price products during 2016 and launch January 1, 2017. Others intend to take the full transition period. Others will launch certain products on the operative date but are currently going through the process to be ready, just in case.

2013–2015 Activities and Current PBA Readiness

All companies work on what we called foundational activities in the *Guide*. These activities were driven by overall business needs such as the trend toward actuarial and or financial transformations, risk management needs, heightened awareness of governance, or overall accounting and regulatory regimes and requirements. Focus areas related to VM-20 included the following:

- Assumptions
- Experience studies
- Governance
- Models

Wherever a company fell on the spectrum in 2013 regarding assumption setting, assumption governance, experience studies, governance, models, and model governance, all companies devoted considerable time, energy and resources toward these areas from 2013 to 2015 and plan to continue to do so in the near future.

Some activities included assessing processes from inputs to throughputs to outputs. Other efforts entailed streamlining, enhancing and modifying processes, removing redundancies, attacking areas of manual intervention, converting systems, and supporting items not included in models—corporate models, risk management models, pricing models and asset adequacy models. Companies enhanced, formalized, discussed and articulated governance oversight, policies and responsibilities.

VM-20 General Themes

We take a moment to consider general themes across companies and across VM-20 issues before outlining specific issues. Although driven by general business needs, companies incorporated VM-20 requirements into their 2013–2015 activities to varying degrees, for example, a specific VM-20 requirement regarding governance while addressing general governance policies.

One factor underlying current PBA and specific VM-20 readiness was imminence. As long as VM-20 was not imminent, many companies followed from afar or had a small, advanced team. Typically the teams had either VM-20 as one of numerous work responsibilities intermittently, or one to three staff were fully dedicated to VM-20. During Q3 2015, as the operative date became more imminent, likely Q4 2015 activities and 2016 planned activities were being ramped up, and additional project team members were being mobilized. Year 2016 plans included more concrete, tangible, specific objectives, timelines and milestones.

The small advanced project team typically consisted of personnel from the reporting or valuation function. Most product development areas were not closely involved. Beginning in the fall of 2015, VM-20 began drawing the

attention of many product teams. However, most activities are not scheduled to begin until sometime in 2016: some at the beginning of the year, and some in the spring, summer or fall.

Many of the participants found or were in the process of finding many of the same VM-20 issues as challenging. Challenging as in difficult or challenging as in taking a long time. At a high level, the number of steps may seem long, but quite manageable. As teams worked into the details, much like peeling an onion, there was another layer of detail to work through, and thus, the number of considerations, judgments, choices, analyses, discussions and back and forth all took a long time.

Forming and vetting interpretations on some VM sections and subsections took considerable time. All companies are still deliberating some aspect of VM.

All companies added VM-20 model calculations. All had NPR capabilities supporting their current product portfolio. The majority could calculate modeled reserves. Some or many had coded the DR but may not have run the model yet. Most companies running test models first used temporary placeholders or shortcuts—in either the anticipated assumption, the margin and/or the method. Many of these interim approaches are still in place. Most companies have not done much yet with the new calculation capabilities. That is, they have built the car but have yet to take it out for a test drive. Most are still working out additional details or further evaluating choices permitted within VM. The intent is to have fewer placeholders and/or to-be-determined choices before commencing with activities such as pricing products. Of those able to calculate modeled reserves, only a few had made headway on being able to project modeled reserves.

Overarching general implementation, activities, challenges and issues included:

- Setting assumptions
- Building the initial model to calculate reserves as of the valuation date
- Projecting VM-20 modeled reserves
- Bringing a larger and broader staff up to speed
- Carving out time and resources.

Common specific top challenging issues and pain points included:

- The process to set mortality assumptions
- The ability to calculate limited fluctuation by amount rather than count
- The process to set asset assumptions
- Developing margins and in particular on dynamic assumptions (e.g., premium persistency)
- Model granularity (e.g., varying individual asset defaults and spreads by weighted average life, PBR credit rating and projection year).

Where do they want or need to be at the operative date? VM-20 applies prospectively. Most or all companies are reflecting that VM-20's materiality will initially be small, so not everything needs to be 100% perfect or final. Most companies are beginning to take a look at different interpretations of VM-20. They are comparing their initial interpretations versus how others are interpreting VM-20.

Assumption Setting and Input

Let's talk about assumptions, first in general, and then about issues specific to the more material assumptions. All companies have devoted a fair to considerable amount of resource to assumptions. Efforts spanned the beginning-to-end setting process including data analysis and policies related to recommending and approving assumptions. Data management underlying experience studies was scrutinized and enhanced, including:

- Managing data
- Capturing data
- Storing data
- Cleaning up data
- Analyzing data
- Assessing assumptions and margins
- Expanding the quantity, quality and credibility of company data across more assumptions.

In most instances, efforts entailed formalizing what was already done. All companies either introduced or enhanced and refined existing governance, assumption review, recommendation, approval and sign-off policies, controls, and required analyses supporting assumption setting and margins. Formalization included, for example, defining impact analysis, sensitivity tests, use of means and variances, credibility, granularity, sources of data, predictive analytics, methods etc. In general, all companies started with what they were doing and to various degrees centralized assumption setting across functions such as pricing, reporting, risk management and business planning and/or formalized the process in which the analysis was conducted, recommended, discussed, reviewed and discussed yet again.

The outcome was that after a period of months or years, focus on materiality of assumptions, the timing of changes and the intelligence/reports to support the assumption setting and margin process has transformed, evolved and been substantially strengthened. And yet, no company considers the job done, but rather has a never-ending continuous improvement process following the initial transformation. None of the companies tackled assumptions as strictly a PBA issue. Instead, the processes reflected business needs. To various degrees companies have incorporated VM-20 assumption setting into the overall assumption process. One company opined, "Assumption setting has not been terribly difficult—it's been part of a larger process. VM-20-specific assumptions are part of the next big push."

Even companies that considered their processes robust, flexible and controlled at the onset have found that specific VM-20 assumption and margin requirements take considerable time and resources. Given the resource and attention devoted to assumptions in the past five years, the demands to establish VM-20 assumptions are revealing: "We thought it [mortality] would take a long time and planned for it, but it took longer and involved more people than we had anticipated. We will address the specific issues related to various assumptions later."

In addressing specific VM-20 requirements, several companies were methodical and systematic in their approach. One template approach was to address all issues related to one product working through the entirety of all assumptions from beginning to end. Universally, term was the first product tackled. This could indicate that most if not all companies who sell significant amounts of level term are likely to implement VM20 on January 1, 2017. What was learned was applied to the second product. The order depended on their product portfolio, but an

example would be ULSG, IUL, whole life and combo products with LTC. Each product has its own unique challenges ranging from premium persistency, crediting strategies, dynamic lapse rates, shock lapse rates, mortality deterioration etc. By being systematic, the assumption-setting methods and processes had consistency and were similar and/or different as dictated by the needs.

Placeholders were used universally in establishing assumption processes and/or setting up initial models. Frequently, placeholders were formed by using pricing assumptions with some consideration for a margin or by using asset adequacy assumptions with consideration to add or adjust margins. Planned and/or subsequent work efforts analyze methods and assess alternatives to implement each assumption and margin.

7.1 Mortality

Perhaps the most challenging assumption has been mortality. Although the VM-20–modeled reserve mortality assumption is highly prescribed, there is a significant degree of judgment and degrees of freedom in what and how this assumption is set. That said, VM-20 requires documentation and disclosures accompanying areas of judgment: what, how, rationale, demonstrations etc.

A beginning step is determining mortality segments and segment data. Mortality segments can be defined top-down or bottom-up. That is, how granular are segments defined. Some questions regarding mortality are the following:

- How are segments subdivided into classes and how are classes aggregated?
- Which blocks, products and types of business are included, excluded, grouped or not—closed blocks, acquired blocks, subsidiaries, distribution channels?
- What is the number of exposure years to define the period used for the experience study?
- How far back (issue years) does the study go?
- Has underwriting over the years been similar or different?
- How does one account for changes in underwriting? For example, how is the underwriting underlying the data in the study relevant to how the company underwrites today?

The next decision is the selection of mortality tables. In determining applicable industry tables, a first step is becoming comfortable with the underwriting criteria score (UCS). Applying the UCS and mapping the company's underwriting guidelines to the criteria may not be straightforward. What do you do if your underwriting guidelines and processes do not map well to the UCS? How does one reflect differences? VM permits companies to move up or down tables. How does the actuary justify to themselves that the approach is acceptable and reasonable? What justification is needed for auditors and regulators? In determining company tables, many companies started with their pricing tables. However, there was no easy automatic choice. Companies considered if the pricing table was appropriate—why or why not?

The authors found that all the companies had the utmost professionalism for these endeavors as well as all the VM judgment areas. Each step was or is deliberated similar to a craftsman paying attention to the smallest detail in producing their art. Actuaries viewed their responsibility quite seriously: “We wanted to make sure that a reasonable approach was indeed reasonable.” One company asked, “What does compliance look like?”



A few companies had already built capabilities to calculate limited fluctuation by amount. All had previously been calculating by count. This was far from an easy task, and implementing by amount was a considerable effort. Many companies were about to begin or had just recently begun this endeavor. Many companies are presently using a credibility factor determined by count as a placeholder.

Most companies have not decided which credibility method to use. They are building capacity to calculate it both ways. For nearly all companies, deciding the credibility method was a future decision point to be made, typically a Q2–Q3 2016 activity.

Nearly all companies wanted higher credibility whether their credibility factor was toward the left or right side of the margin table columns. For some, higher credibility was desired on the entire portfolio. For some, a few mortality segments had lower credibility than other segments. In setting assumptions and use of noncompany data some companies were uncertain if or how reinsurer data could be used.

Many companies are blending the industry and company tables outside their model system and then importing the blended mortality rates. As a placeholder some companies are using company experience and did not blend since their sufficient data duration exceeded the level term period. However, these companies had not yet modeled UL with lifetime secondary guarantees.

Many parts of the calculations and processes were often described as just one of many prototyping and testing exercises. Processes would be moved onto other platforms (databases, programs, systems) and into production at the appropriate time.

Regarding VM-20 projections, most (possibly all) companies had not reflected projecting mortality valuation assumptions. A few companies began doing so in 2015, but only to a few of the assumptions.

The above is only a few paragraphs and takes only a few minutes to read. Even companies that have been through a similar exercise for AG38D found setting VM-20 mortality to be a substantial effort. Most companies took several hundred work-hours spanning many months to work their way through the issues, and many still have work remaining to do.

7.2 Assets

Those companies that have made their way through setting asset assumptions found the VM-20 details to map assets and determine assumptions, including defaults and spreads, to be an overwhelming or difficult process. This effort was not commensurate with the resulting impact on the assumptions. Two companies said almost the same thing verbatim: “Assets are awfully complex for what it gets you” and “We found VM-20 details to map assets an overwhelming difficult process and unnecessary for the outcome.”

Many companies had less granular assumptions regarding defaults and spreads by class and by time. First, companies have not been using the PBR 21 credit rating scale and/or did not reflect notches. Some companies were big fans of the 21 class rating and thought they benefited. Some companies did not like it, and some were indifferent. Second, many companies used constant rates over the projection period and/or weighted averages on asset classes and did not vary assumptions at individual CUSIP levels across time. This required changes in processes, coding, validations etc.

Recall that VM-20 has a credit quality constraint on the reinvestment strategy: The strategy cannot produce reserves less than would be obtained by substituting an alternative investment strategy in which all fixed income reinvestment assets are public noncallable corporate bonds with a credit quality blend of 50% PBR credit rating 3 and 50% PBR credit rating 6. Many or most companies had to modify the reinvestment strategy due to the credit quality constraint and hence increase the reinvestment benchmark credit quality.

Once one gets past the mechanical aspects, many other issues require judgment and care, including determining model segments and selecting starting assets. For investment strategy, that is, buy/sell rules, the types of assets etc., companies were intending to use existing asset methodologies from asset adequacy testing or risk management models. The VM-20 requirement is general: The model strategy may be representative of and consistent with company investment policy for each model segment. The model strategy rules for buy/sell decisions are permitted to range from complex to simple. What remained unknown for most companies is to what extent, if any, existing methods introduced anomalies or distortion into reserve results. Regarding starting asset selection, most or all companies were intending to use a pro-rata approach versus newly purchased assets during the year of issue. When asked, one participant responded, as if by asking the question, that the authors were irrational to consider anything but pro-rata.

7.3 Margins

Margins are not new to actuaries. However, the context is entirely new. Actuaries set margins, using judgment and industry-accepted or company proprietary methodologies for pricing, risk management and many other purposes. The new context has actuaries asking many questions such as what is reasonable, is our approach VM-20 compliant, and what needs to be demonstrated? Another new context is how to set margins in light of credibility, uncertainty or reflecting data availability and sources such as incorporating industry data that may or may not directly relate to a company's products, distribution etc.

For nonprescribed assumptions, participants strived to have reasonable assumptions, but to some extent remained uncertain whether or not the margin was too conservative. Many companies were still in evaluation mode—assessing methods, analyzing data (or in some cases looking to industry data)—and had not evaluated the margins impact on modeled reserves, either on single assumptions or in aggregate. Particularly challenging are margins related to assumptions underlying nonguaranteed elements.

An overriding challenge is ensuring the margin increases reserves and that the direction of the margin could vary by policy year. The first challenge is model capabilities and required coding changes. The second challenge is how to meet the first without adversely increasing runtimes. This was not a concern for products needing only to calculate deterministic reserves. What remains an unknown is the impact on runtimes for stochastic reserves.

As with mortality, all the participants had the utmost professionalism for setting margins and were or are being thorough. But professionalism and care takes time and discussions with colleagues and peers, which are all subject to the approval and review policies outline at the beginning of this Assumption Section.

Several common foundational elements to establishing margins included ascertaining materiality, establishing criteria based on defined metrics, and heavy reliance on sensitivity tests. For some companies, sensitivity tests played the central role underlying setting both assumptions and margins. Some companies were advanced regarding the type and nature of sensitivity tests that would be performed. Some had not gotten there yet.

7.4 Other Assumptions/NGEs

For level term lapse assumptions at the end of the level term period (and beyond), companies used a variety of assumptions. Some companies set the shock rate at 100%. Some used a shock rate at less than 100% to reflect postlevel profits. Some had not decided. One company asked if VM-20 permitted a shock rate less than 100%. Some applied different margins to the level period and postshock period. If so, due to uncertainty, postlevel margins were higher. Recall that VM-20 requires higher margins the greater the uncertainty. Many companies stated they had a lack of postlevel credible data.

There was a much wider range regarding approaches to UL assumptions, specifically, surrenders, lapses and premium persistency. Companies varied with respect to how closely integrated these assumptions were. Some companies used dynamic assumptions incorporating credit rates and competitor rates reflecting the specific scenario. Some companies did not. In general, but more so regarding policyholder behavior for UL, many companies are looking at various industry reports and studies to see how others are setting assumptions, data, approaches and methods. Some companies had historically relied on their own company experience. Reflecting industry experience in setting assumptions and/or margins was relatively new for some companies. Many companies began taking studies such as the *2014 Post Level Term Lapse & Mortality Report* and the *Premium Persistency Study of Flexible Premium Universal Life Products Report* into consideration in setting assumptions.

08 Model

The first Road Map milestone for each product regarding models was the initial build of VM-20 calculations. The order typically started with building NPR calculations, then calculation capabilities for deterministic reserves, then stochastic exclusion ratio tests and, finally, stochastic reserves.

Where are companies in the implementation journey? That depends on when the question was asked. At the onset of *Beginning Tales* in November 2015 most participating companies had built VM-20 calculation capabilities, but many had not yet begun running the models; that is, they had updated models but have not had the time or resources to run and/or analyze model output. Those activities were scheduled for later in 2016, typically after the Actuarial Opinion Memorandum is filed in March. An analogy is they had built the car but had not taken the car out for significant test drives to evaluate how the car performs under a range of conditions. A primary issue regarding models was the model's capabilities to project reserves. At some companies, product teams had begun running the models.

A common approach was similar to the approach described for assumptions—a series of progressions along each front—moving from current framework to future PBA framework. For example, build the calculation test environment with any number of placeholders and or shortcuts. Next create a fully VM-20 compliant calculation test environment. Often companies started with one block or product and proceeded through the product portfolio. Calculations may or may not have used placeholder assumptions depending on status of assumption development.

By late February 2016 some or many companies had been both busy and productive. They were far enough along to make comments such as “Compared to existing statutory reserves and our initial model results for industry studies, we didn't get the results we expected.” They didn't have all the answers yet, but they were progressing according to schedule.

All companies had used or are using placeholders for assumptions and margins. Most companies used placeholders or short cuts for various elements of the calculations such as grading default and spread rates from current to long term or satisfying the starting asset constraint. Many companies built certain parts of the calculation and/or determination of assumptions outside the main system and calculation engine. Many placeholders are intended to be short term. Some are intended to be adapted into a Section 2.G compliant simplification, approximation or efficiency. The latter will require providing demonstrations and refining the placeholders. Some companies have already been performing sensitivity testing regarding simplifications and approximations.

Only one company stated they were able to support 100% of the required calculations. However, it remains in a test environment, and a significant effort will be needed to move into production. Some companies were close, calculation-wise, on many products but had a nontrivial amount of work remaining. Model validation has been a slow process due to the scope and sheer number of model parts affected.

Most companies are leaning toward extremely granular models: seriatim liabilities, granular assumptions, assets etc. That may reflect that the initial product focus has been on term and has not required extensive stochastic calculations. It may also reflect that most companies have focused on valuation—calculating a reserve as of valuation date—and have not dug into projections.

Most companies have looked at calculating deterministic reserves using the two permitted methods: gross premium valuation (GPV) and direction iteration method (DIM) versus GPV. Nearly all were not sure which method they would use. Most had not studied the issue enough, but all had included it as a decision point to be made later. Some companies thought their current process did not support GPV due to the 2% starting asset collar and required manual intervention. However, others found that GPV did not take many iterations, usually just two iterations to satisfy the starting asset requirement. Some thought DIM was preferred as being more automated. The downside, however, was slower model run time.

Building VM-20 reserve calculations was a first step. But the main challenge was the ability to project reserves.

8.1 Projections

The companies furthest along were ahead of software vendor capabilities to support their needs. That was not the case for one company. They had a proprietary system and had made the necessary changes and validations to both calculate and project modeled reserves. Two other companies took between 4 and 10 months to program outside-the-box code and interfaces to calculate a few of the inner loop valuation assumptions. They are using a vendor system as the calculation engine but import the appropriate assumptions of inventories to project reserves; that is, they had to do a considerable amount of outside-the-software programming process building to model reserves. Even if vendors supported inner loop calculations, audit reports did not always contain the requisite cash flow and other output data for the modeling team to validate or understand results.

Since some companies had not yet gotten to projections and/or modeled reserve, they were not sure about what projected valuation assumptions their system supported.

The model and projecting reserves are a means and not the end. Many companies are trying to get their arms around the trade-offs between efficiency and fidelity in performing projections for pricing and business planning with the initial focus being pricing. Questions and considerations are wide-ranging. How are sensitivity tests performed on projected reserves or project stochastic reserves? How are individual cells priced? Should a cohort be a single issue year or multiple issue years?

Other than list the many questions or issues they might face, our participating companies did not have much to say yet about what they have faced. And thus this part of the story is short. However, all companies considered projecting reserves to be a critical aspects of implementing VM-20 as an enabler to design and price products and to inform other strategic business decisions.

09 Product Development

The first application of VM-20 model calculation capabilities, and in particular projection capabilities, is product development. As of November 2015 only a few product teams had been actively assessing VM-20's impact on products. By the end of February 2016 a few more companies modeling and product teams had been analyzing NPR and for level term, DR versus NPR. A few more were imminently about to handoff models to the product team. Or the intended sequence and timeframe to develop and launch products had already been planned, or a current assessment was being undertaken by project teams. On the other hand, some or many companies had not yet started product development activities.

One common pain point was that very few had robust and efficient projection capabilities. Companies were struggling with how to strike a balance between accuracy and efficiency. Most companies had not yet dived into the issue regarding using time zero assumptions versus using projected valuation assumptions. Another pain point was pricing based on both modeled reserves and formulaic reserves. This issue was both conceptual and process driven. Conceptually, one issue is determining product pricing for cells based on reserves determined for a cohort. What should the cohort be? An example of process or method is that many companies did not model assets inside the pricing models, instead using an input vector of portfolio yields.

Although there is a fair amount of uncertainty and much speculation, most companies intend to use NPR to calculate tax reserves—and keep watch for information from the IRS.

When? Many companies' 2016 plan has pricing a term product in either the summer or the fall. Other companies are getting ready but have not committed to developing a term product. A couple of companies did not intend to price any VM-20 products in 2016. The remaining companies intended to build the necessary capabilities to be able to if they decided they needed to launch a product by January or early 2017.

Some smaller companies are considering reducing secondary guarantees to reduce the demand from VM-20 requirements.

10 Production and Reporting Cycles

In this section we take a broad view of production to mean not just a locked-down controlled and automated process but also as one component to meet deadlines—be it reporting, business planning, pricing or risk management. One participant said, “Being able to support a calculation in a test environment does not mean we have figured out the start to and process and/or work flow.”

Several companies had not thought out the details related to production and were quite unsure how long becoming operational or in production would take. Most companies thought they had tight quarter and turnarounds. Many companies would not want to expand the deadlines but wondered if that would be possible with modeled reserves and the associated controls, validation and analysis. Most companies had not remapped what a new quarter and schedule and/or process would look like.



Like thinking ahead several moves in a game such as chess, it is never too early to begin thinking about post-implementation and operating in a production environment. During implementation many moving parts are found spanning inputs, throughputs and outputs that are constantly changing methods, assumptions, processes and a myriad of other choices. Eventually decisions are made in the entire VM 20 process. Then the process is moved into production. But while there are so many moving parts, it makes no sense to be in production. Thus, it is not surprising that none of the companies had reached activities in the plan related to production.

Several companies have been operating in a PBA paradigm for variable annuities. The following summarizes their experiences in moving implementation to production for AG43.

Production is important for controls *and* for meeting deadlines. Automation reduces process-step errors but does not eliminate errors built into the process. Automation simply helps you reach your mistakes faster. Analysis and validation will be important off-cycle and on-cycle.

As the production process moves the testing environment processes from an open-system to varying degrees of a closed-locked-down-system, analysis and validation can be derived from the testing environment.

Consider the following activities undertaken during implementation:

- How was the model validated?
- How did you make sure all inputs were accounted for correctly?
- How did you get comfortable that the dynamic lapse rate was right? That both the calculations and the formula and parameters were reasonable?
- How did you analyze and validate scenario results?
For example, what model audit reports were used to make sure cash flows make sense?
- Did you have a matrix of various products, product features, cells and conditions that were used during implementation?
An effective matrix is robust so that various events are triggered regarding events, actions and optionality—policyholder actions, company actions, count party actions etc.—and that NGEs, liability and asset optionality appropriately reflect internal and external scenario conditions, and that the fringes of product parameters and premium and benefit periods are in effect.
- Many other validation, control, analysis and review steps.

The overwhelming advice was to productionalize such activities and use the same/similar validation tools including the test matrix for production purposes for regression testing, analyzing and validating results off cycle and on cycle,

10 PRODUCTION AND REPORTING CYCLES

and introducing new products, reinsurance treaties and assets. In addition, the tools and the matrix cannot stand still and must be subject to the same change control policies as the model and other parts of the production process.

For example, in implementing AG43 several companies developed internal independent means to calculate values to validate their vendor system. Validation did not necessarily mean complete replication of the vendor results. They reproduced results or the standard scenario but made simplifications to build a functional approximation for stochastic reserves. The matrix included dimensions such as ratchets, roll-ups, varying degrees of in/out of the money, various combinations of riders, various scenarios, and various liability cells of issue age and issue year. The matrix and tools were moved into production subject to the same change controls. In addition, after quarter-end they used their independent model to produce a set of sensitivity runs derived from equity and interest rate shocks. Using regression analysis, they have found the set sensitivities to be invaluable in predicting and explaining results for the next quarter-end.

When new products are introduced, the matrix and tools are used as part of the validation process, for example, did they code it right, and a host of other validation steps. The matrix, tools and sensitivity set is used off-cycle when assumptions are unlocked and other changes are being made. It is used on-cycle to validate actual results.

Given that they are still in a testing environment and still tweaking most of the steps in the process, these companies are still some time away from moving VM-20 into production. But they have confidence in their ability to execute in the planned timeframe and assigned resource. Once past testing, they will make the process secure and controlled, and the process will include the requisite validation tools and analytics used during implementation. Although production activities are in the future, they are developing and thinking about what audit controls will look like.

11 Output

One company has already created the output—content and structure—the way they need it based on both VM-20 requirements and business requirements. They were the exception. Many companies have milestones regarding output, but it is one of those things to be figured out in the future; that is, how will data flow from the model to the end: reporting structure, reports and audit information. The basic tale from our participants is that “Output issues have not been discussed at the level of detail as other issues.” Output is important, but they simply have not gotten to that part of the implementation journey. In general, output has not received the degree of attention that assumption setting, governance or model calculations have drawn. Output data were not necessarily a Day 1 concern for implementing PBA or launching products. Smaller companies tended to have more manual steps in the output process: from exporting model to loading into a database, or importing and parsing into Excel and performing analysis.

Governance

Similar to assumption setting, when it comes to governance in all aspects from assumption governance to model governance to corporate governance, all companies have devoted significant amounts of time and resources to governance at all levels of the company. But also like assumptions, governance has been addressed to reflect a company's holistic business needs.

Many companies have not addressed VM governance requirements. Some companies were not aware of the details. However, they were not alarmed or concerned. They still held governance as extremely important. Their view was that if they had a strong governance framework in place, it would not be an issue to incorporate VM requirements. But if they had weak links in their framework, VM requirements could be problematic. So for 99 reasons they had been strengthening all aspects of governance, and when VM requirements are effective, it will be the 100th reason. Model governance has been a primary area of focus for all or most companies. During the last several years, all companies have assessed and enhanced their model governance principles and practices. For most companies, this has engaged many levels of senior actuaries, staff actuaries and IT spanning many months and years. Some are still working out model governance issues such as authority levels to authorize change and whether authorization is by an actuary or by IT.

Some companies have addressed specific VM requirements. For these companies, VM-G requirements emanated from other governance business needs such as risk management, SOX or MAR. They had the same holistic perspective as those that have not addressed VM-G, they simply addressed VM governance requirements earlier in the implementation journey.

The takeaway is that company actuaries are focusing specific VM-20 implementation activities such as assumption setting, calculations and projections before VM requirements *and* simultaneously working toward continually improving overall governance activities.



13 Documentation and Reporting

With much attention on assumption setting and models, several companies were uncertain regarding the timing of other VM requirements including the VM 30, 31 and 50/51 requirements. Companies tended to be less familiar with documentation requirements, typically working on hearsay that more was required but unsure of how much more.

Like output, activities supporting documentation tended to occur later in the implementation road map timeline.

The AOMR tends to be one of the more manual processes such as populating narrative language as well as numbers populated within the narrative. AOMR appendix data tend to be easier as they are closer to (or the same as) automated reports coming from the model and/or database. For many or most companies, narrative data are populated by hand and then validated manually by another. Language tends to be “cut and pasted” from other various reports on related topics.

Concerns regarding VM-50/51 were correlated to company size. Medium and larger companies were not concerned because they were already participating in various data calls. On the other hand, smaller companies that were not participating were not sure how long or how much resource it would take.

14 Companywide Exemption

If eligible, small companies are evaluating whether to take the permitted VM-20 companywide exemption. Some companies intend to elect the exemption. At many eligible companies management is predisposed to think that VM-20 is not worth it unless it can be demonstrated otherwise. Several actuaries have said, “A problem is that management thinks the companywide exemption is an exemption from the entire valuation manual, not just VM-20.” Many companies plan to conduct a basic cost-benefit analysis in 2016. Their primary concern is becoming less competitive if they elect the exemption. Using various placeholders in the assumptions, margins and methods, verify they pass the stochastic exclusion test, estimate deterministic reserves, and estimate costs to adapt their current model methodologies and processes to be VM-20 compliant.

Resourcing and Staffing

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Through late 2015, most companies had a small team devoted to VM 20 issues. For many companies, only one to two people were fully dedicated, if any at all. Most team members had been devoting about 20–50% of their time. Nearly all companies were ramping up the size of the team and the amount of time team members devoted to VM-20. For example, most product development teams had not been engaged, but nearly all product teams had numerous VM-20 milestones as part of their 2016 plans. Very few companies added staff specifically for VM-20. More often than not, staff additions were increased resources to strengthen the modeling team, with VM-20 being just one of the needs. Some companies redeployed existing resources.

Communications with Regulators

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Many companies have not had discussion regarding VM with their regulators. Several companies have had general discussions with the regulators but nothing specific. Some companies did not see the need at this point. Some have had frequent discussions with the regulators. In these discussions, regulators were asking most of the questions regarding how things were progressing versus the company asking the regulators about the reasonableness of their methods, demonstrations or documentation.

Technology

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Technology continues to be addressed but is not a concern for most or all companies. Technology needs are part of their continuous process to increase capacity, update grids etc. No company stated they had spent resources specifically for VM-20. Some life valuation and/or modeling departments had been added or reassigned to existing servers or grids to gain additional processing speed.

