Cost of Implementing a Principle-Based Framework for Determining Reserves and Capital
Survey Results

Sponsored by
Smaller Insurance Company Section
Product Development Section
Reinsurance Section
Financial Reporting Section
Committee on Life Insurance Research
Society of Actuaries

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1. Background

Towers Watson was engaged by the Society of Actuaries to conduct a survey to analyze the cost of implementing the proposed principle-based framework for determining reserves and capital. The engagement was a result of a request for proposal published by the Smaller Insurance Company, Product Development, Reinsurance and Financial Reporting Sections as well as the Committee on Life Insurance Research. This report presents the results of the survey and related follow-up discussions, which were conducted December 2009 through February 2010.

2. Key Findings

- **Uncertainty**. In general, most companies have not begun planning for a Principle-Based Approach ("PBA") framework. Roughly 40% are taking a "wait and see" approach and will start to take a look at PBA once it is adopted. Another 40% have begun to analyze PBA but made no formal plans around it. Less than 20% of companies describe themselves as "knowledgeable" regarding the PBA framework, and 0% claim to have extensive expertise. There is also a high level of uncertainty around the impact of PBA, with most companies unsure as to what the impact will be on their reserves and capital. These effects are exacerbated for smaller companies, as the level of preparedness increases with company size.

- **The models need work**. Only 7% of respondents say their existing models are ready to handle the new PBA regulation. 49% say they will be able to satisfy PBA requirements by making enhancements to their existing models. The rest will have to build new models (14%) or are not sure if their models will allow them to meet the requirements of the new PBA framework (30%).

- **IT expenses will increase**. In terms of PBA implementation costs, companies plan to spend the most money on computing hardware and software. This is followed by actuarial staff, consultants and training.

- **Get your wallet out**. On average, in order to implement a principle-based framework for reserves and capital, small companies plan to spend $225,000, medium-sized companies $400,000, and large companies about $650,000. However, the range of responses was quite large, with a few small and medium companies planning to spend up to $1,000,000, and some large companies planning to spend over $1,000,000. Companies with plans to purchase computer grids or upgrade actuarial model platforms indicated significantly higher spending plans. Survey results indicate that ongoing annual calculations will cost about half of that needed to implement PBA.

- **Are you ready for a challenge?** Between 6% and 7% of companies that implemented C-3 Phase II ("C3P2") and Actuarial Guideline 43 (VACARVM) look back on those experiences as being very challenging. In contrast, 41% and 57% of respondents think C-3 Phase III ("C3P3") and principle-based reserves (VM-20) will be very challenging, respectively. Common concerns are the actuarial expertise needed to interpret the requirements and determine margins, modeling processes/controls, and the analysis/reporting/communication of results.

3. Introduction

Actuaries are witnessing never-before-seen changes to the way reserves and capital are determined. Historically, most U.S. statutory reserves have been formulaic and prescribed, and most risk-based capital has been factor-based. These relatively simple calculations required minimal computing power and were adequate when most insurers sold similar products with basic features. However, as companies introduced ever more complex and varied benefits and guarantees and employed increasingly complicated investment strategies to match, the traditional uniform reserve and capital standards have become less suitable. Moreover, the traditional prescribed approaches are widely believed to produce redundant levels of reserves and capital for certain types of life insurance products, thereby forcing some companies to either limit production or commit scarce capital.

Advances in technology and actuarial practice are paving the way for regulators to usher in a new era of principle-based reserves and capital, founded on a framework that will more appropriately reflect product design, experience, policyholder behavior and economic relationships and conditions in a company's reserve and capital requirements.

Although principle-based regulations have been implemented somewhat gradually (C-3 Phase I in 2000, C-3 Phase II in 2005 and Actuarial Guideline 43 (VACARVM) in 2009), some companies have been challenged to keep up with the pace of change. In particular, for many smaller insurance companies, especially those that do not write variable annuities, C3P3, expected to be effective year-end 2011, will be the first principle-based regulation to significantly affect them followed shortly thereafter by principle-based reserves, in the form of VM-20 (It is important to remember that as of the date this report was published, C3P3 and VM-20 are not final and could still evolve as they make their way through the regulatory approval process). C3P3 and VM-20 could be especially challenging for these smaller companies, requiring enhancements to systems and software, staff (both number and skill sets), governance, controls and documentation, operations and reporting framework. Although there are provisions in C3P3 and VM-20 designed to lessen the burden on companies (such as the stochastic exclusion test, alternative amounts using actuarial judgment and single state exemptions), preliminary analysis of the impact of C3P3 on certain product types indicates a potentially significant reduction in required capital for those companies that perform the full stochastic calculations.

These concerns have led the SOA to commission this study of the cost to a company of implementing a principle-based framework for determining reserves and capital. The results presented below will help actuaries, regulators and insurance company management (smaller companies in particular) better understand the costs and considerations associated with implementing a principle-based framework over the near term.

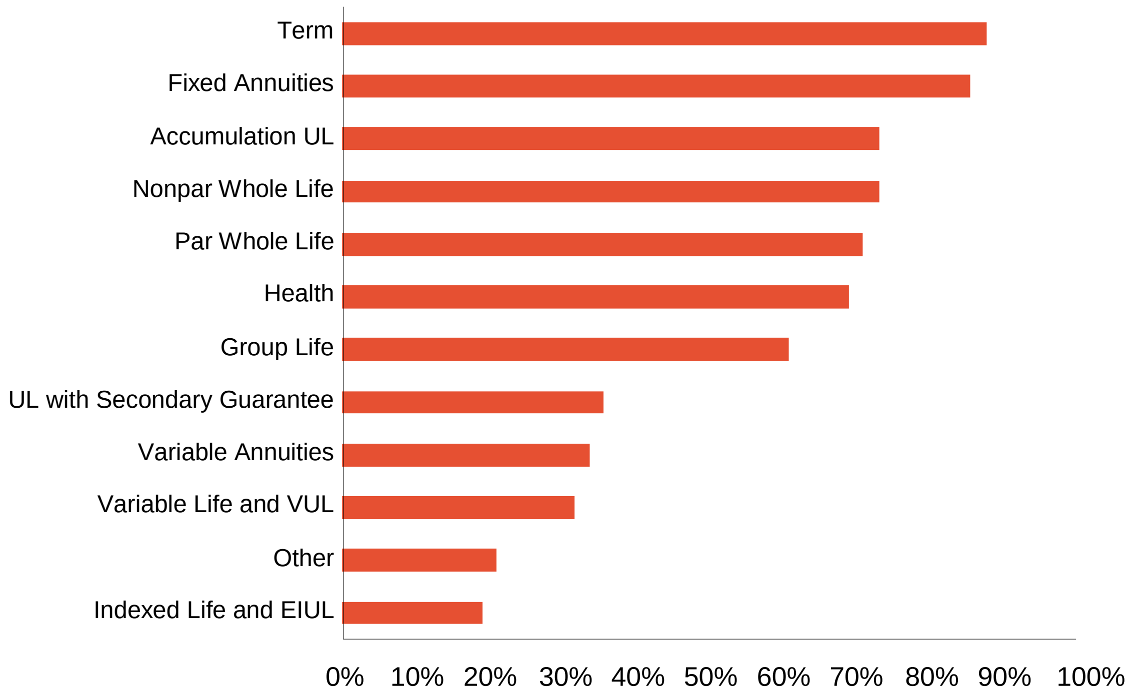
4. Participant Profile

The survey was distributed to approximately 250 life companies in early December 2009 and was closed January 15, 2010, with 48 complete responses. Individuals responding described themselves mainly as the in-house appointed actuary or chief actuary; two consulting actuaries responded on behalf of the clients for whom they serve as appointed actuary. To gain additional perspective, actuaries from various-sized companies appearing to be further along in terms of PBA implementation were invited to participate in follow-up interviews. Five interviews were conducted; anonymous insights from those interviews appear throughout this report. Most companies that responded were primarily in the life insurance business (63%), were organized as a stock company (60%), and were based in the United States without a foreign parent (92%).

Company size was an important attribute of this survey. 25 respondents were classified as small insurance companies (less than $1 billion in statutory assets at 12/31/08 including separate account), 15 as medium ($1 billion to $20 billion), and 8 as large (greater than $20 billion). In addition to overall size, companies were also asked what types of products they carried on their books (see chart 1). Ninety percent of respondents thought their company had products that fall within the scope of the proposed principle-based framework. Of the remaining 10% of respondents that were unsure, all worked for small companies.

Chart 1

Percentage of Participants with the Following Products



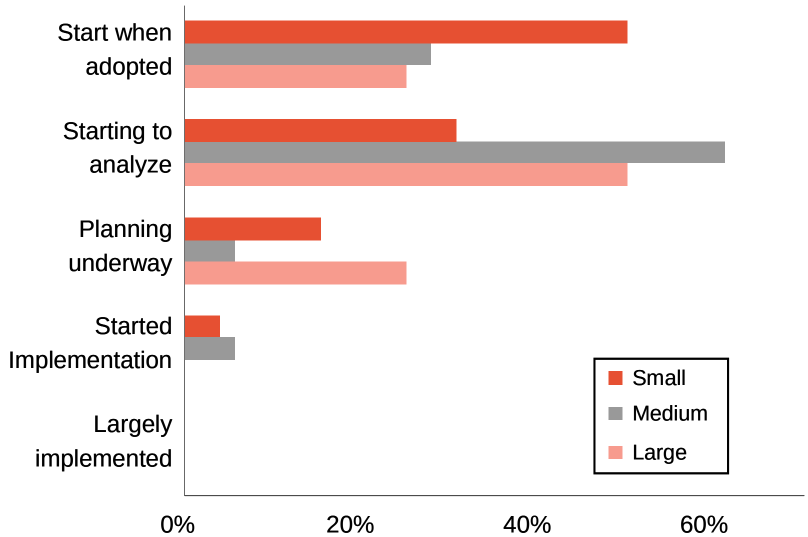
5. Survey Results

Although many survey questions asked for differentiation between C3P3 and VM-20, results were usually quite similar for both. Discussion of results below will differentiate between the two only when results differed materially.

Status

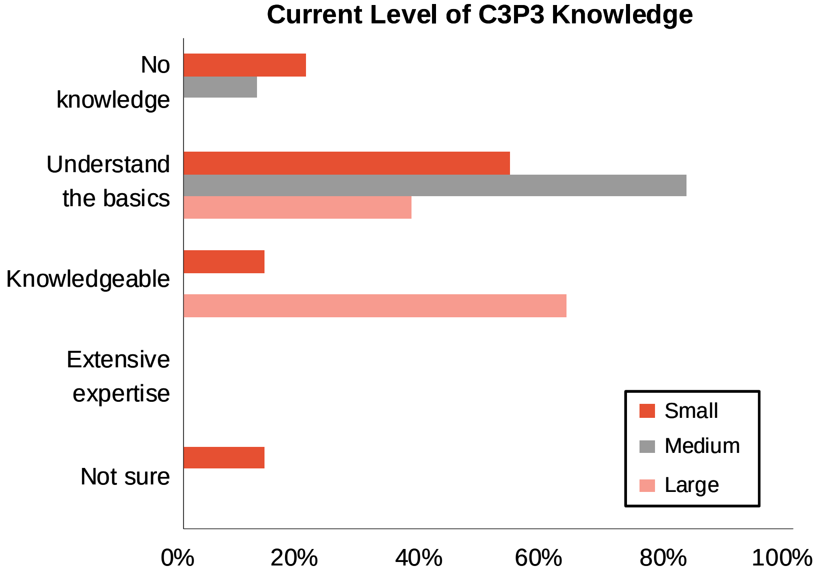
Most of the companies have not begun planning for a PBA framework. Roughly 40% are taking a “wait and see” approach and will start to take a look at PBA once it is adopted. Another 40% have begun to analyze PBA but have made no plans around it. Less than 5% of companies have started implementation. As would be expected, larger companies are further along than smaller companies (see chart 2), as are companies that list life insurance as their primary line of business. On average, companies appear to be a little more prepared for C3P3 than they are for VM-20, most likely due to C3P3's earlier anticipated effective date.

Chart 2
C3P3 Preparedness by Company Size



The level of knowledge regarding PBA is low, especially among small companies. Less than 20% of companies overall describe themselves as knowledgeable regarding the PBA framework, with larger companies appearing to be more knowledgeable than medium and small companies. No respondents claimed to have extensive expertise (see chart 3). One chief actuary we spoke with stated that PBA is fairly far down on the list of things he worries about, but that he also didn't want to lose sight of it because he felt the situation could change very rapidly.

Chart 3
Current Level of C3P3 Knowledge

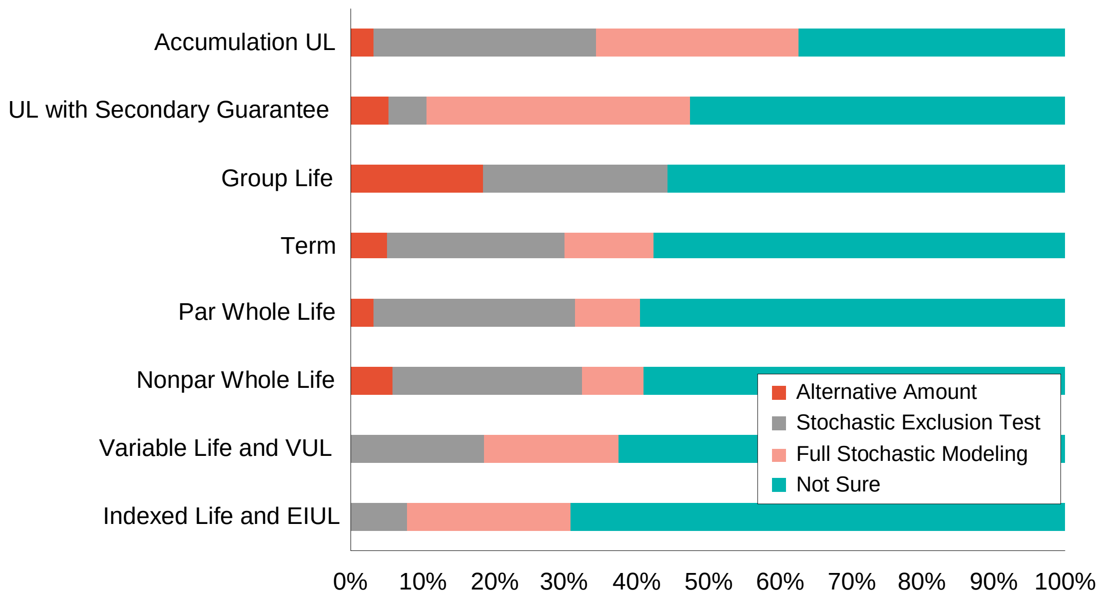


Plans

The proposed PBA framework includes stochastic exclusion tests and allows alternative amount methodologies as a means to reduce the workload that comes with full stochastic modeling. Large companies were more likely than small companies to favor full stochastic modeling over the alternatives. One of the large company actuaries we spoke with said they would do full stochastic modeling only if a product failed the stochastic exclusion test, at least in the short term. Most companies were unsure which method they would end up implementing for any given product (see chart 4).

Chart 4

Planned Method to Implement C3P3



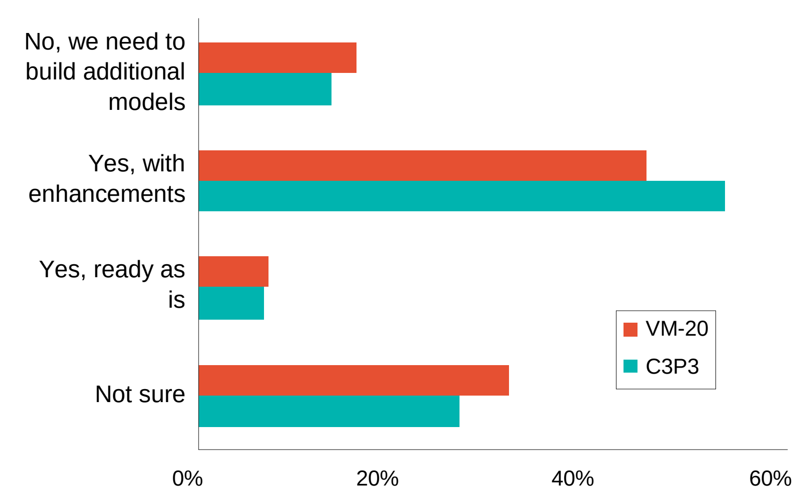
The product with the least companies using the stochastic exclusion test was universal life with secondary guarantees, where almost half the respondents planned to implement the more computationally intensive full stochastic approach. Most of these were large companies, 85% of which plan to have access to grid computing by the end of 2011. Only 15% of small companies plan to have access to grid computing by the end of 2011, thus limiting the possibility for smaller companies to calculate PBA reserves and capital using the full stochastic approach. As expected, the vast majority of companies that currently have grid computing access were required to implement VACARVM. One company we followed up with noted that network storage space and computer memory were just as important in their PBA implementation as computing power. Distributed processing can be difficult and costly to implement, and companies often go through various iterations, from master-worker setups, to cycle-stealing grids, to dedicated grids with high-end blade systems that can run simultaneous calculations besides PBA, e.g., ALM duration studies, dynamic hedging analyses, and economic capital calculations. One company actuary even referred to one of their grid iterations as sneaker net, i.e., "running around from PC to PC getting the darn thing to run."

Only 7% of respondents say their existing models are ready to handle the new C3P3 regulation. 49% say they will be able to satisfy PBA requirements by making enhancements to their existing models. The rest will have to build new models (14%) or are not sure if their models will allow them to meet the requirements of the new PBA framework (see chart 5). One of the companies we followed up with converted from one actuarial modeling platform to another in order to implement stochastic modeling in general. Once on the new platform, the same stochastic models would be used for various purposes, such as Cash Flow Testing ("CFT"), PBA, IFRS, and Economic Capital. Such conversions can be very labor intensive and time consuming, taking anywhere from 6 to 18 months depending on the number and variety of products.

Some of the companies we followed up with had done trial C3P3 runs using the life components of their CFT models. Instead of going through the whole margin-setting exercise, they had made relatively simple modifications to CFT assumptions. The goal of the exercise was to make sure their models could handle the calculations. More robust margin-setting would be tackled at a later date. Of course, since many CFT models were developed years ago and have not been thoroughly reviewed in some time, model compression and assumptions will have to be looked at carefully before CFT models are used for PBA purposes. This process can also be very time consuming.

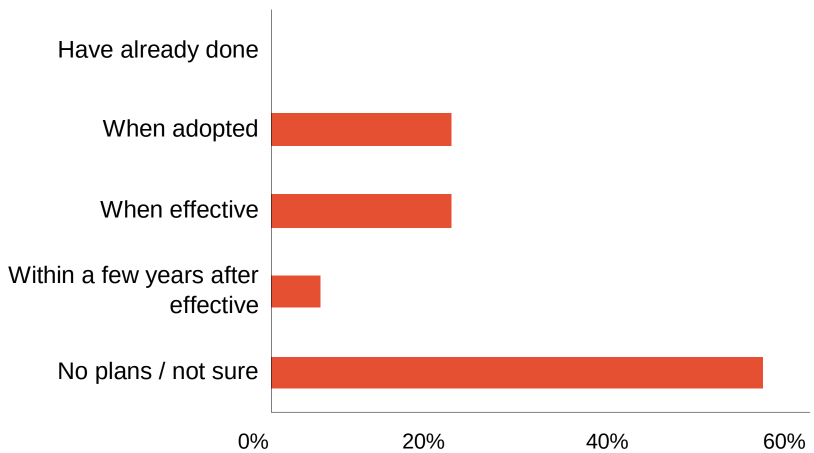
Chart 5

Are your models ready for PBA?



Most of the five companies we followed up with were focusing on getting a time zero (i.e., valuation date) C3P3 calculation in place. Being able to project future C3P3 amounts was not a near-term priority due to the nested stochastic modeling approach usually required, but some companies we followed up with indicated that being able to project stochastic reserves and capital was a “need to have” down the road. Over half the survey respondents have no plans when it comes to projecting C3P3 and VM-20 amounts for use in Product Development and ALM (see chart 6).

Chart 6
When will you include PBA in Product Development and ALM?



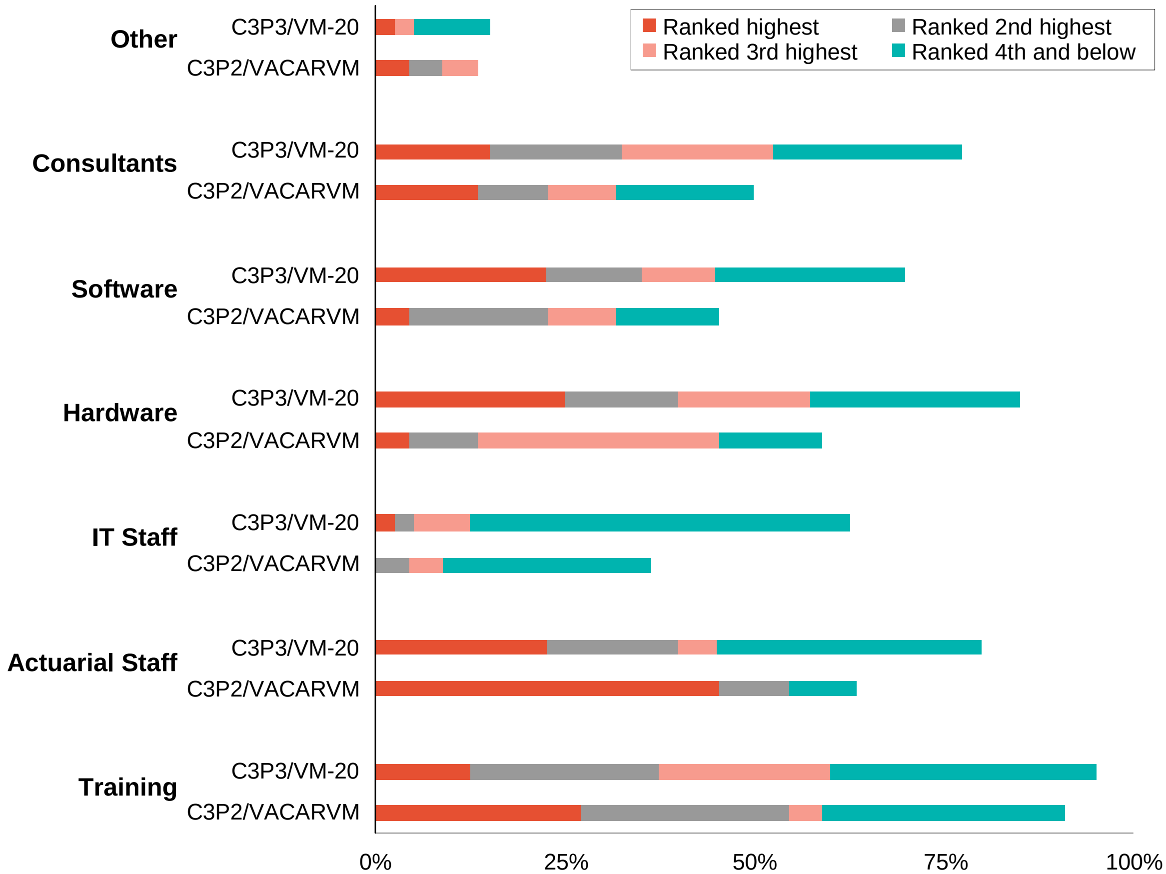
Costs and Resources

When asked to comment on what they thought would be their top spending categories for C3P3 and VM-20, the most frequent answer was computing hardware, followed closely by actuarial staff, computer software, consultants and training (see chart 7). It is interesting that all five categories showed up about equally as a top spending category, indicating a level of uncertainty as to where companies will end up spending their money.

About half the respondents had been through C3P2 or VACARVM implementation. Their top spending categories were actuarial staff and training, with a much smaller percentage ranking computing hardware, consultants, or computer software (see chart 7). Presumably this was due to the significant hardware and software investments already made by many variable annuity writers in hedging platforms; many companies were able to leverage these models and capabilities for C3P2 and VACARVM requirements. To get the actuarial resources needed for C3P2 and VACARVM, the medium-size and large companies we spoke with used a combination of hiring, reassigning priorities, and the targeted use of consultants.

The relative rankings of some spending categories vary significantly from C2P2/VACARVM implementation to C3P3/VM-20 implementation. Companies expect to spend less on actuarial staff and training under C3P3/VM-20, but more on consultants and computing hardware and software (see chart 7). Differences aren't as noticeable for the other spending categories.

Chart 7 – Spending categories ranked by those that have or will implement

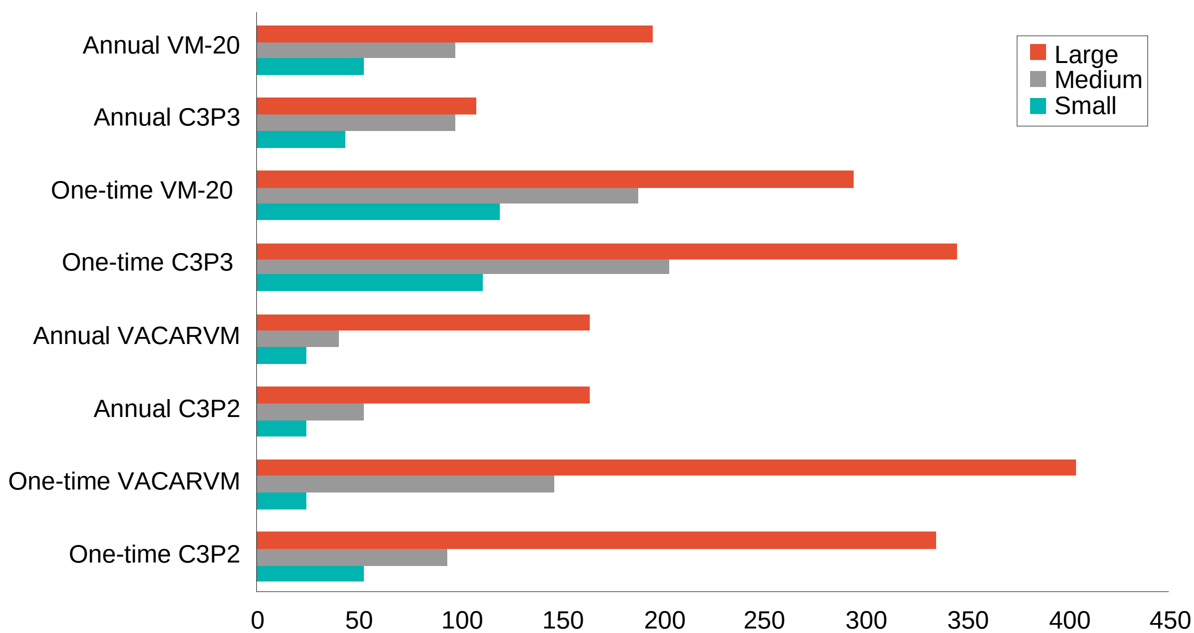


When asked where in the company training was needed to implement a principle-based approach to reserves and capital, companies responded about the same regardless of size. Approximately 60% of all respondents said training was needed in Valuation, Financial Reporting, and Modeling, with other areas of the company barely registering as needing training. Some companies we followed up with were hesitant to invest significantly in training on subjects that continue to evolve. They would rather wait until the new rules are adopted. During follow-up, companies indicated what they used for PBA training: review of the regulations, industry articles/surveys/seminars/webinars, NAIC and ACLI meetings, via volunteering, consultants and share-forums.

Large companies think the one-time implementation cost of C3P3 and VM-20 will be less than that of C3P2 and VACARVM. Small and medium-size companies think C3P3 and VM-20 will cost more. On average, small companies spent about $75,000 to implement C3P2 and VACARVM, but expect to spend around $225,000 to implement C3P3 and VM-20. Medium-size companies spent about $250,000 to implement C3P2 and VACARVM, but expect to spend around $400,000 to implement C3P3 and VM-20. Finally, large companies spent approximately $800,000 to implement C3P2 and VACARVM, but expect to spend $650,000 to implement C3P3 and VM-20 (see chart 8). Across the board, companies felt that ongoing annual calculation costs would be roughly half of these one-time implementation costs.

Chart 8

Average Budget ($000) for PBA Implementation by Company Size



Concerns

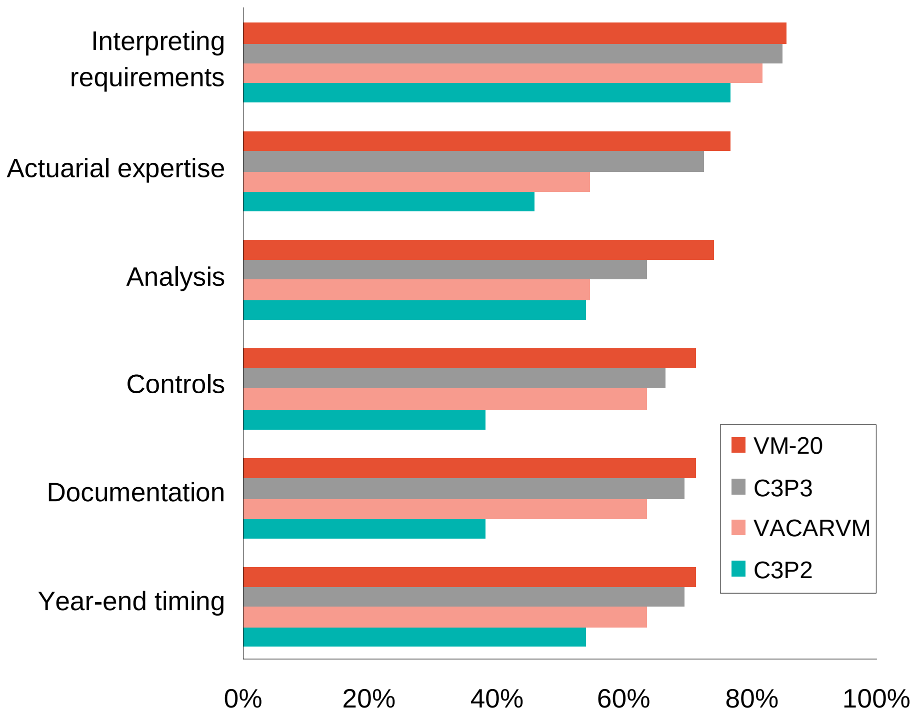
The top six concerns of companies as they set out to implement PBA are assumption setting, determining margins, modeling controls, modeling processes, reporting results and computing capabilities. Each of these six concerns resonated strongly with companies of all sizes, with 50% to 65% listing them as areas needing improvement to ensure successful implementation of a principle-based framework.

Perhaps assumption setting and determining margins will eventually move off the list as two of the companies we followed up with indicated assumptions seem to be moving from principle-based to prescribed as C3P3 and VM-20 evolve. One company we spoke with indicated that reporting stochastic results to senior management is a new paradigm: "The perception is that hedging can only help to make results smoother, and that's not always the case. The level of volatility will quickly take senior management out of their comfort zone. It's up to the actuary to understand the volatility via scenario analysis and other tools, so that they can explain results to senior management and answer their what-if questions." A different company indicated that senior management will be very interested in the increasing movement of dollars between the reserve account and surplus account. Another company we spoke with had used third-party peer review to help get comfortable with the results.

With regard to setting margins, some companies indicated the following two publications as being helpful: the Canadian Institute of Actuaries' Education Note entitled "Margins for Adverse Deviations" (November 2006) and the American Academy of Actuaries Practice Note entitled "Practice Note for the Application of C-3 Phase II and Actuarial Guideline XLIII" (July 2009). The use of sensitivity tests was also deemed important when determining which assumptions to focus on and which assumptions aren't that important.

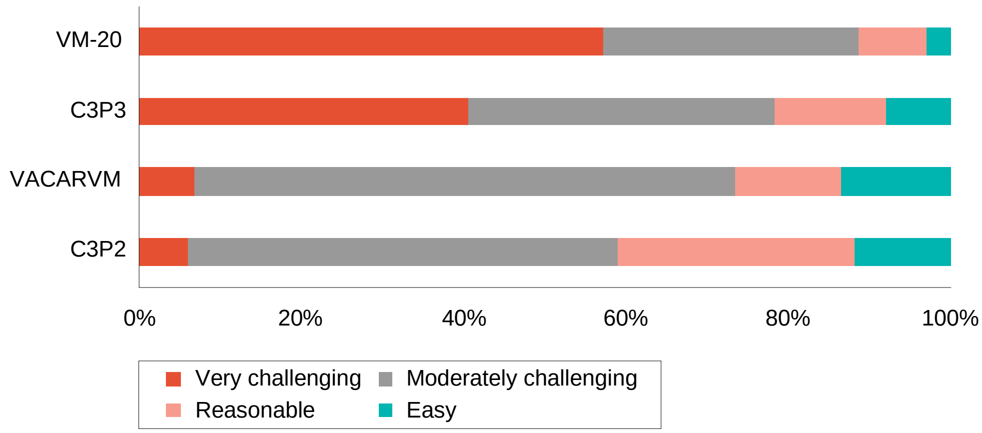
Companies subject to C3P2 and VACARVM were asked to list their challenges when implementing C3P2 and VACARVM. All companies were also asked to list the challenges they expect to have when implementing C3P3 and VM-20. Out of 17 choices, the same six challenges were always at the top of the list: interpreting requirements, actuarial expertise, analysis, documentation, year-end timing and controls. Respondents were more likely to list challenges for VM-20 and C3P3 than for VACARVM and C3P2 (see chart 9). One company we spoke with indicated that when interpreting the requirements, surveys and share-forums can help to get an idea of how industry practice is evolving, but eventually the company has to educate itself about the regulation and needs to decide where it is going to take a stand and get comfortable.

Chart 9
Top implementation challenges



When it comes to the overall experience of implementation, 57% anticipate that VM-20 will be really challenging and 41% anticipate that C3P3 will be very challenging. However, in retrospect, only 6% to 7% of companies that were subject to VACARVM or C3P2 consider those efforts to be very challenging. Perhaps this is because once a challenge is over, in retrospect, it seems less challenging. After all, you made it through in one piece. Or perhaps this is because larger companies with more resources are more likely to be subject to VACARVM and C3P2 (see chart 10). But when answers were broken down by company size, it was found that for each PBA implementation task, large and medium companies were slightly more likely to find each task very or moderately challenging. During follow-up, one company indicated reserve implementation is likely more challenging and costly than capital implementation because of the frequency, granularity and urgency of the calculations, as well as the increased number of controls involved due to reserves being reviewed by outside auditors.

Chart 10
Overall Experience with PBA components



Impact on Results

When asked to compare estimated C3P3 results with current capital requirements by product, roughly half of respondents indicated they weren't sure, another third thought results would be about the same, and the rest were about evenly split between higher and lower capital requirements. Two products that stood out more than the rest were accumulation-type universal life and term insurance; respondents generally believe that C3P3 will result in lower risk-based capital for these products.

Respondents were a little more sure when it came to reserves. Companies were generally of the opinion that VM-20 would not result in reduced reserve levels, although some companies we followed up with noted that there was the perception, especially in pricing, that XXX and AXXX reserves calculated under VM-20 will be lower.

6. Conclusions

The conclusions for this survey and follow-up interviews are:

- There was a wide variety of responses regarding level of preparedness. Somewhat surprisingly most companies were very unfamiliar with PBA, having perhaps attended a meeting or two at an actuarial conference, and in general were taking a "wait and see" approach. A few companies were participating in the development of the regulation, although no one claimed to be a PBA expert. Based on variable annuity writers' experience with C3P2 and VACARVM (it was a major effort), and based on the significant list of concerns all respondents had, companies should start educating themselves on PBA.

On a related note, once educated, companies should do some high-level planning to be in a position to successfully implement the new requirements.

- Although spending plans can vary significantly depending on the individual company situation, the averages in chart 8 show that costs are likely to be quite significant. Companies should start to budget for it now, so they have the cash available when the time comes to purchase computer software/hardware or hire new staff or consultants.

- Chart 5 indicates many companies will have to make changes to their models, but also that many companies are unsure what needs to be done to their models for C3P3. Companies should evaluate now whether or not their models are capable of supporting their intended C3P3 approach. Enhancing models, let alone building new ones, is a significant effort that can require much time and resources.

- Given the high level of uncertainty around PBA, and concerns about the amount of work required, smaller companies and those without grid computing capabilities would benefit by paying particular attention to simpler alternatives to full stochastic modeling. The draft PBA proposals contain provisions designed to lessen the burden on such companies (such as the stochastic exclusion test, alternative amounts using actuarial judgment and single state exemptions),

- Careful consideration will need to be given to the development of prudent estimate assumptions and the margins therein. Assumptions setting and determining margins were top concerns for almost all companies. To prepare for assumption setting, companies may want to review and possibly enhance their experience study capabilities. Regarding margins, sensitivity tests can help identify the assumptions to focus on, and a couple of publications are available on margin setting as well.

- Reporting and communicating results was another top concern. What used to be actuarial-only conversation is moving into the broader financial arena. Actuaries will need to get senior financial management comfortable with the volatility of results, the importance of certain assumptions, and the role of actuarial judgment in principle-based reserves and capital. Siloed actuarial departments may need to branch out to accomplish all the auditing, documentation and controls needed to effectively communicate results.

Appendix A – The Survey

E-mail Invitation

The Society of Actuaries Smaller Insurance Company, Product Development, Financial Reporting, and Reinsurance Sections, along with the Committee on Life Insurance Research, are co-sponsoring a survey to gauge preparedness and perspectives as the industry moves to a principle-based framework for determining reserves and capital. This is an important project for the Society of Actuaries and will give the profession and regulators important insight into the cost and effort required to implement a principle-based framework. Your participation is greatly appreciated and needed for this research initiative to be successful. We invite you to take a few minutes to share your thoughts about this important topic. Please provide only one response per company. We have targeted chief actuaries at U.S. life insurance companies for this survey, but please feel free to forward this to the most appropriate individual at your company. It is expected that it will take about 20 minutes to complete.

The SOA has contracted Towers Perrin to assist with developing survey questions, analyzing compiled responses and summarizing results in a report to be made publicly available on the SOA Web site. It may also be published in other venues. Persons responding to the survey will receive a copy of the final report prior to its public release. Responses to the survey will be submitted to the SOA office and kept confidential. The survey requests your contact information for the purpose of distributing the final report and perhaps following up with you for additional information or clarification. Any follow-up will be conducted by SOA research staff or Towers Perrin consultants and will also be kept confidential.

In completing the survey, you may find it helpful to print a copy of the questions and review it prior to entering your responses electronically. The deadline to complete this survey is Friday, January 8. Questions may be directed to Ronora Stryker at 847-706-3614 or rstryker@soa.org, or to Jason Kehrberg at 312-201-5724 or jason.kehrberg@towersperrin.com.

The link to the survey is http://www.surveyz.com/TakeSurvey?id=nnnnn.

We hope that you will participate in this important survey and thank you for your consideration.

Sincerely,

Ronora Stryker, SOA Research Actuary

Jason Kehrberg, Lead Researcher for the Project

Actual Survey

All respondents are encouraged to answer all survey questions if possible. Responses to the survey will be submitted to the Society of Actuaries office and will be kept confidential.

The survey requests your contact information for the purpose of distributing the final report and perhaps following up with you for additional information or clarification. Any follow-up will be conducted by SOA research staff or Towers Perrin consultants and will also be kept confidential.

Should you be interrupted while taking the survey, you can save your progress and return to the survey from the same computer at a later time.

Thank you for your consideration.

PROFILE

1. What is your company's primary line of business?
    a. Life insurance
    b. Life reinsurance
    c. Annuities
    d. Health
    e. Other __________
2. What is your company's organizational structure?
    a. Stock
    b. Mutual
    c. Mutual holding company
    d. Other __________
3. Is your company the subsidiary of a non-U.S. company?
    a. Yes and if so which country
    b. No
4. What is your current job function (please check all that apply)?
    a. Chief Actuary
    b. Appointed Actuary
    c. Valuation Actuary
    d. Modeling Actuary
    e. Corporate Actuary
    f. Other __________
5. What were your company's total statutory assets at 12/31/08, including separate account?
    a. Less than $100 million
    b. $100 million to $1 billion
    c. $1 to $5 billion
    d. $5 to $20 billion
    e. Over $20 billion

6. What is the approximate size of your company's statutory reserves for the following products as of 12/31/2008? Choose one answer per row.

	We do not write this product	< $250 million	$250 million to $1 billion	$1-5 billion	> $5 billion
a. UL – accumulation type					
b. UL – secondary guarantee					
c. Term					
d. Whole Life – par					
e. Whole Life – non-par					
f. Variable Life and VUL					
g. Indexed Life and EIUL					
h. Group Life					
i. Fixed Annuities					
j. Variable Annuities					
k. Health					
l. Other __________					

7. Does your company have business that is in scope of the new principle-based framework for determining reserves and capital (e.g., almost all life products)?

   a. Yes
   b. No (If "No," you may end the survey here)

STATUS

8. How would you describe the current status of your company's knowledge base regarding the new principle-based framework? Choose one answer per column.

	C3P3	VM-20
a. We have extensive expertise on this topic		
b. We have some very knowledgeable individuals		
c. We have some individuals who understand the basics		
d. We do not have anyone at the company with this knowledge		
e. Not sure		
f. Other __________		

9. What is the current status of your company's preparation for the new principle-based framework? Choose one answer per column.

	C3P3	VM-20
a. Waiting until adoption by NAIC to start any work		
b. Just starting to analyze		
c. Planning is well underway		
d. Have started to implement, perhaps have draft results		
e. Largely been implemented based on existing interpretations		
f. Other __________		
g. We plan to outsource this work		

10. Do the actuaries at your company have access to grid computing?

   a. Currently have access
   b. Should have access by the end of 2010
   c. Should have access by the end of 2011
   d. No planned access
   e. Other __________
   f. Not sure

PLANS

11. How do you plan to satisfy the C3P3 requirements for the following products? Choose one answer per row.

	Alter-native Amount	Stochastic Exclusion Test	Full Stochastic Modeling	N/A	Not sure
a. UL – accumulation type					
b. UL – secondary guarantee					
c. Term					
d. Whole Life – par					
e. Whole Life – non-par					
f. Variable Life and VUL					
g. Indexed Life and EIUL					
h. Group Life					
i. Other ___________					

12. When does your company plan to incorporate C3P3 and VM-20 into life product pricing and asset liability management at your company? Choose one answer per column.

	Life product pricing		Asset liability management	
	C3P3	VM-20	C3P3	VM-20
a. We have already done this				
b. When adopted				
c. When effective				
d. Within a few years after the effective date				
e. No plans / not sure				
f. Other ___________				

13. For C3P3 and VM-20, what is your company's plan with respect to models? Choose one answer per column.

	C3P3	VM-20
a. We need to build additional product models		
b. We will use existing models, with enhancements		
c. We will use existing models, no enhancements needed		
d. Not sure		
e. Not applicable		

COSTS & RESOURCES

14. Please rank the following in terms of U.S. dollars spent to implement C3P2 and VA CARVM at your company.

	Rank (“1” = most $)
a. Actuarial training	
b. Additional actuarial staff/resources	
c. Additional IT staff/resources	
d. Sufficient computing capacity (hardware)	
e. Computer software	
f. Consultants	
g. Other (opportunity cost, etc.) ___________	
h. Not applicable	

15. Please rank the following in terms of your current expectations as to additional U.S. dollar expenditures (future as well as past) required to implement C3P3 and VM-20 at your company.

	Rank (“1” = most $)
a. Actuarial training	
b. Additional actuarial staff/resources	
c. Additional IT staff/resources	
d. Sufficient computing capacity (hardware)	
e. Computer software	
f. Consultants	
g. Other (opportunity cost, etc.) ___________	

16. Please estimate the approximate U.S. dollar budget (future as well as past) needed at your company to complete the following items. Choose one answer per row.

	< 50K	50 - 250K	250K - 1M	> 1M	N/A
a. Implement C3P2 (one-time cost)					
b. Implement VA CARVM (one-time cost, assuming C3P2 already implemented)					
c. Annual cost of C3P2 calculations					
d. Annual cost of VA CARVM calculations					
e. Implement C3P3 (one-time cost)					
f. Implement VM-20 (one-time cost, assuming C3P3 already implemented)					
g. Annual cost of future C3P3 calculations					
h. Annual cost of future VM-20 calculations					

17. In which of the following areas is additional actuarial training needed to implement the new principle-based framework for life capital and reserves? Select all that apply.

	C3P3	VM-20
a. Valuation		
b. Accounting / Financial Reporting		
c. Modeling		
d. Other ___________		
e. No additional training needed in any area		
f. Not sure		

CONCERNS

18. What needs to be done at a company level to ensure successful implementation of the new principle-based framework? Select all that apply.

		C3P3	VM-20
a.	Commit significant resources to implement/improve modeling processes		
b.	Commit significant resources to implement/improve modeling controls (e.g., access, version control, validations, peer review, Model Audit Rule)		
c.	Improve assumption setting and experience monitoring processes (including assumption governance)		
d.	Establish processes for determining what margins are appropriate for each risk		
e.	Improve computing capacity / software capabilities		
f.	Improve reporting to explain results to management		
g.	Develop products that reduce tail risk / volatility		
h.	Improve risk management capabilities		
i.	Improve hedging capabilities		
j.	Establish better dialogue with regulators		
k.	Other ___________		
l.	Not sure		

19. Where did your company have challenges when implementing C3P2 and VACARVM (if applicable)? Where do you expect your company to have challenges when implementing C3P3 and VM-20? Select all that apply

		C3-P2	VA CARVM	C3-P3	VM-20
a.	Interpreting the new requirements				
b.	Gathering data and conducting experience studies				
c.	Setting assumptions and margins				
d.	Liability cell compression and liability modeling				
e.	Asset file creation and asset modeling				
f.	Sufficient computing capacity (hardware)				
g.	Computer software				
h.	Sufficient actuarial resources and expertise				
i.	Sufficient IT staffing resources				

		C3-P2	VA CARVM	C3-P3	VM-20
j.	Meeting the initial effective date				
k.	Year-end timing				
l.	Controlling overall implementation costs				
m.	Controls (peer review, version control, etc.)				
n.	Analysis of results				
o.	Documentation requirements				
p.	Securing necessary budget				
q.	Other __________				

20. How would you rate your company's overall experience implementing C3P2 and VACARVM (if applicable)? What do you expect your company's overall experience will be like implementing C3P3 and VM-20? Choose one answer per column.

		C3-P2	VA CARVM	C3-P3	VM-20
a.	Very challenging				
b.	Moderately challenging				
c.	Reasonable				
d.	Moderately easy				
e.	Very easy				
f.	Not applicable				
g.	Not sure				

IMPACT ON RESULTS

21. Regardless of where your company is in the implementation process, please estimate how your company's C3 results under the new framework will compare to C3 results under the current framework. Choose one answer per row.

	Higher	About the same	Lower	Not sure	N/A
a. UL – accumulation type					
b. UL – secondary guarantee					
c. Term					
d. Whole Life – par					
e. Whole Life – non-par					
f. Variable Life and VUL					
g. Indexed Life and EIUL					
h. Group Life					
i. Other __________					

22. Do you expect the new principle-based reserve framework will result in significantly reduced reserve redundancies at your company? Choose one answer per column.

	Definitely yes	Probably so	Probably not	Definitely no	Not sure	N/A
a. UL – accumulation type						
b. UL – secondary guarantee						
c. Term						
d. Whole Life – par						
e. Whole Life – non-par						
f. Variable Life and VUL						
g. Indexed Life and EIUL						
h. Group Life						
i. Other ___________						

FOLLOW-UP

23. May we contact you for a follow-up interview?
    a. Yes
    b. No
24. Contact information

Appendix B – Detailed Survey Results

Profile

Q1: What is your company's primary line of business? (choose one)

1	Life insurance	30
2	Life reinsurance	1
3	Annuities	8
4	Health	7
5	Other	2
	Total	48

Q2: What is your company's organizational structure? (choose one)

1	Stock	29
2	Mutual	6
3	Mutual holding company	4
4	Other	9
	Total	48

Q3: Is your company the subsidiary of a non-U.S. company?

1	Yes	4
2	No	44
	Total	48

Q4: What is your current job function? (check all that apply)

1	Chief Actuary	26
2	Appointed Actuary	31
3	Valuation Actuary	21
4	Modeling Actuary	10
5	Corporate Actuary	15
6	Consulting Actuary	2
7	Other	5

Q5: What were your company's total statutory assets at 12/31/08, including separate account?

1	< $100M	5
2	$100M - $1B	20
3	$1B - $5B	9
4	$5B -$20B	6
5	>$20B	8
	Total	48

Q6: What is the approximate size of your company's statutory reserves for the following products as of 12/31/2008? (choose one answer per row)

		1	2	3	4	5
		None	<$250M	$250M-$1B	$1B-$5B	>$5B
1	UL-Accum	13	23	4	6	2
2	UL-SG	31	10	3	3	1
3	Term	6	33	7	1	1
4	WL - par	14	21	6	6	1
5	WL - non-par	13	31	3	0	1
6	VL and VUL	33	9	3	3	0
7	IL and EIUL	39	7	1	1	0
8	Group Life	19	25	3	0	1
9	FA	7	19	8	9	5
10	VA	32	6	3	2	5
11	Health	15	27	4	2	0
12	Other	38	7	1	2	0

Q7: Does your company have business that is in scope of the new principle-based framework for determining reserves and capital (e.g., almost all life products)?

1	Yes	43
2	No	0
3	Not yet	0
4	Not sure	5
	Total	48

Status

Q8: How would you describe the current status of your company's knowledge base regarding the new principle-based framework? Choose one answer per column.

		C3P3	VM-20
1	Extensive expertise	0	0
2	Knowledgeable	10	7
3	Understand the basics	33	33
4	No knowledge	8	6
5	Not sure	4	3
6	Other	0	0
	Total	55	49

Q9: What is the current status of your company's preparation for the new principle-based framework? Choose one answer per column.

		C3P3	VM-20
1	Start when adopted	20	28
2	Starting to analyze	23	15
3	Planning underway	7	6
4	Started Implementation	2	1
5	Largely implemented	0	0
6	Other	0	0

7	Will outsource	0	0
	Total	52	50

Q10: Do the actuaries at your company have access to grid computing?

1	Currently have access	10
2	Access by 2010	2
3	Access by 2011	1
4	No planned access	28
5	Other	4
6	Not sure	3
	Total	48

Plans

Q11: How do you plan to satisfy the C3P3 requirements for the following products? Choose one answer per row.

		1	2	3	4	5
		Alternative Amount	Stochastic Exclusion Test	Full Stochastic Modeling	N/A	Not Sure
1	UL-Accum	1	10	9	12	12
2	UL-SG	1	1	7	23	10
3	Term	2	10	5	4	23
4	WL – par	1	9	3	10	19
5	WL - non-par	2	9	3	10	20
6	VL and VUL	0	3	3	27	10
7	IL and EIUL	0	1	3	29	9
8	Group Life	5	7	0	15	15
9	Other	0	0	0	15	5

Q12: When does your company plan to incorporate C3P3 and VM-20 into life product pricing and asset liability management at your company? Choose one answer per column.

		1	2	3	4
		C3P3 - Prod. Dev	VM-20 - Prod. Dev.	C3P3 - ALM	VM20 - ALM
1	Have already done	0	0	0	0
2	When adopted	9	10	9	8
3	When effective	7	7	11	11
4	A few years after effective	3	1	3	3
5	No plans / not sure	23	25	22	23
6	Other	3	3	0	0
	Total	45	46	45	45

Q13: For C3P3 and VM-20, what is your company's plan with respect to models? (choose one answer per column)

		C3P3	VM-20
1	Build additional models	6	7
2	Existing models+ enhancements	24	20
3	Existing models	3	3
4	Not sure	12	14
5	N/A	0	1
	Total	45	45

Costs and Resources

Q14: Please rank the following items in terms of U.S. dollars spent to implement C3P2 and VACARVM at your company. (rank with "1" = most $)

		1 Ranked highest	2 Ranked 2nd highest	3 Ranked 3rd highest	4 Ranked 4th highest	5 Ranked 5th highest	6 Ranked 6th highest	7 Ranked 7th highest
1	Training	6	6	1	1	4	2	0
2	Actuarial staff	10	2	0	0	2	0	0
3	IT staff	0	1	1	1	1	4	0
4	Computing hardware	1	2	7	3	0	0	0
5	Computer software	1	4	2	1	1	1	0
6	Consultants	3	2	2	3	1	0	0
7	Other (opportunity cost, etc.)	1	1	1	0	0	0	0
8	N/A	26	0	0	0	0	0	0
	Total	48	18	14	9	9	7	0

Q15: Please rank the following items in terms of your current expectations as to additional U.S. dollar expenditures (future as well as past) required to implement C3P3 and VM-20 at your company. (rank with "1" = most $)

		1 Ranked highest	2 Ranked 2nd highest	3 Ranked 3rd highest	4 Ranked 4th highest	5 Ranked 5th highest	6 Ranked 6th highest	7 Ranked 7th highest
1	Training	5	10	9	8	3	3	0
2	Actuarial staff	9	7	2	5	6	3	0
3	IT staff	1	1	3	3	7	8	2
4	Computing hardware	10	6	7	6	3	2	0
5	Computer software	9	5	4	4	3	3	0
6	Consultants	6	7	8	4	3	3	0
7	Other (opportunity cost, etc.)	1	0	1	1	0	0	3

Q16: Please estimate the approximate U.S. dollar budget (future as well as past) needed at your company to complete the following items. (choose one answer per row)

		1	2	3	4	5
		< $50K	$50 - $250K	$250K - $1M	> $1M	N/A
1	One-time C3P2	12	10	3	0	19
2	One-time VACARVM	7	5	5	0	27
3	Annual C3P2	18	5	1	0	19
4	Annual VACARVM	12	4	1	0	27
5	One-time C3P3	17	17	7	0	2
6	One-time VM-20	16	17	4	1	5
7	Annual C3P3	29	11	1	0	2
8	Annual VM-20	26	10	2	0	5

Q17: In which of the following areas is additional actuarial training needed to implement the new principle-based framework for life capital and reserves? (select all that apply)

		C3P3	VM-20
1	Valuation	29	35
2	Financial Reporting	25	26
3	Modeling	31	32
4	Other	2	2
5	Not necessary	1	2
6	Not sure	6	3

Concerns

Q18: What needs to be done at a company level to ensure successful implementation of the new principle-based framework? (select all that apply)

		1	2
		C3P3	VM-20
1	Modeling processes	25	25
2	Modeling controls	25	26
3	Assumption setting	31	32
4	Determining margins	28	29
5	Computing capabilities	24	24
6	Improve reporting	24	24
7	Products with low tail risk	5	6
8	Improve risk management	14	15
9	Improve hedging	6	6
10	Better dialogue with regulators	11	11
11	Other	0	0
12	Not sure	7	5

Q19: Where did your company have challenges when implementing C3P2 and VACARVM (if applicable)? Where do you expect your company to have challenges when implementing C3P3 and VM-20? (select all that apply)

		1	2	3	4
		C3P2	VACARVM	C3P3	VM-20
1	Interpreting requirements	10	9	28	30
2	Gathering data	5	5	16	19
3	Setting assumptions	5	4	18	20
4	Liability modeling	3	2	13	13
5	Asset modeling	1	0	13	13
6	Computing hardware	5	3	21	21
7	Computing software	4	2	15	17
8	Actuarial expertise	6	6	24	27
9	IT resources	0	0	7	8
10	Meeting the effective date	1	1	17	15
11	Year-end timing	7	7	23	25
12	Controlling costs	0	0	13	14
13	Controls	5	7	22	25
14	Analysis	7	6	21	26
15	Documentation	5	7	23	25
16	Budget	2	1	12	14
17	Other	1	0	0	1
18	N/A	18	19	4	5
	Total	85	79	290	318

Q20: How would you rate your company's overall experience implementing C3P2 and VACARVM (if applicable)? What do you expect your company's overall experience will be like implementing C3P3 and VM-20? (choose one answer per column)

		1	2	3	4
		C3P2	VACARVM	C3P3	VM-20
1	Very challenging	1	1	15	20
2	Moderately challenging	9	10	14	11
3	Reasonable	5	2	5	3
4	Moderately easy	0	0	2	1
5	Very easy	2	2	1	0
6	N/A	17	22	5	6
7	Not sure	4	1	4	2
	Total	21	16	41	37

Impact on Results

Q21: Regardless of where your company is in the implementation process, please estimate how your company's C3 results under the new framework will compare to C3 results under the current framework. (choose one answer per row)

		1	2	3	4	5
		Higher	About the same	Lower	Not sure	N/A
1	UL – Accum	2	13	5	11	11
2	UL – SG	2	5	2	8	24
3	Term	1	13	8	15	4
4	WL – par	0	11	3	17	10
5	WL - non-par	1	12	4	16	9
6	VL and VUL	1	6	1	6	26
7	IL and EIUL	1	4	0	4	32
8	Group Life	0	11	1	10	16
9	Other	0	0	0	1	11

Q22: Do you expect the new principle-based reserve framework will result in significantly reduced reserve redundancies at your company? (choose one answer per row)

		1	2	3	4	5	6
		Definitely Yes	Probably So	Probably Not	Definitely No	Not Sure	N/A
1	UL - Accum	0	2	16	4	10	11
2	UL – SG	1	2	5	2	8	23
3	Term	3	8	12	3	12	4
4	WL – par	0	1	15	4	11	11
5	WL – non-par	0	2	14	5	12	9
6	VL and VUL	0	1	8	1	4	26
7	IL and EIUL	0	0	3	2	3	33
8	Group Life	0	0	14	3	7	17
9	FA	0	2	15	5	13	5
10	VA	1	4	2	4	3	25
11	Other	0	0	0	0	2	13

Follow-Up

Q23: May we contact you with follow-up questions?

1	Yes	28
2	No	14

Q24: Contact Information

Appendix C – Acknowledgements

We would like to thank the study participants for their time and insights into this issue. Without your help, this project would not have been possible. In addition, we would like to thank our associate Julie Liu for working with the responses and producing the charts. Lastly, we would also like to thank the following individuals of the Society of Actuaries' Project Oversight Group for their support and direction throughout this study.

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