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WPI

POLYSYSTEMS PHASE II

AIDING IN CONVERSION TO A NEW VALUATION SYSTEM

This project was sponsored by The Phoenix Companies, Inc; a Nassau Re company.

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This report is submitted to the faculty of Worcester Polytechnic Institute as fulfillment of the Major Qualifying Project; a partial fulfillment of the Bachelor of Science Degree.

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ABSTRACT

The purpose of this Major Qualifying Project is to assist Phoenix Life Insurance Company in a transition to a new actuarial valuation software, PolySystems. We gathered data from Phoenix's variable annuity product portfolio, including all death benefits and riders, with a special focus on features and mechanics, and organized the information into templates in accordance with product specifications. In addition, we updated and peer reviewed the universal life and variable universal life insurance product template to ensure accuracy for the conversion to PolySystems. The constructed variable annuity templates and updated universal life and variable universal life templates were delivered to the conversion team at Phoenix who will use them to code the product blocks into PolySystems.

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EXECUTIVE SUMMARY

The following Major Qualifying Project (MQP) report covers the work completed by Abrin Berkemeyer, Joseph Moynihan, Khasan Dymov, and Zachary Belisle for Phoenix Life Insurance Company. It begins with a brief introduction to terminology used throughout the report that helps the reader understand the work completed. Then, the history of Phoenix is covered in order to introduce the reader to the insurance products utilized or examined through this MQP: variable annuities, fixed indexed annuities, universal life insurance, and variable universal life insurance. The first product type is covered in significant detail in order to ensure that the reader understands the significance of every aspect of the project; in particular, there is much attention devoted to detailing the various riders and death benefits offered.

The purpose of this MQP is to facilitate Phoenix in its transition to a new actuarial valuation system, PolySystems. In order to achieve this, the team was tasked with three key objectives.

The first objective was to construct a timeline for the variable annuities team. The purpose of this timeline was to provide a high level overview of the history of Phoenix's variable annuity products, including product and rider introductions, discontinuations, and re-prices. To construct this timeline, a plethora of sources were used, including product prospectuses, contracts, training guides, marketing brochures, products charts, and additional internal Phoenix documents.

The second objective was to construct three variable annuity templates in Microsoft Excel; one template devoted to variable annuity core products, one devoted to death benefits, and one devoted to riders. The purpose of these templates was to capture the core features of every product, death benefit, and rider that need to be coded into PolySystems in order to produce accurate valuations. These templates were completed through back and forth collaboration with members of Phoenix and the MQP team to ensure accuracy and completeness of the required information.

The final objective was to review an existing but incomplete template for the universal life and variable universal life product block. For this objective, contracts, prospectuses, and marketing guides were once more utilized to fill in missing information and validate previous

inputs. In order to keep track of changes made and information added, a system was developed to log progress within the template. Frequent collaboration with Phoenix was important to ensure that all of the information documented in the template was accurate and complete.

BACKGROUND

TERMINOLOGY

The following definitions are important insurance terms related to this project:

- **Account Value (AV):** The value of an annuity at any point in time; also referred to as the Accumulated Value or the Fund Value (FV).
- **Accumulation Period:** The duration of time in which money is invested before payouts are received.
- **Annual Roll-up:** For a predetermined number of years, every contract anniversary the benefit base of an annuity is increased by a set roll-up rate.
- **Annual Step-up:** Every contract anniversary, if the contract value is greater than the benefit base, the benefit base will automatically step-up to equal the contract value
- **Annuitant:** A person who receives the benefits of an annuity.
- **Annuitization:** The process of converting an annuity investment vehicle into a series of periodic income payments.
- **Annuity:** A contractual financial product sold by financial institutions that is designed to accept and grow funds from an individual and then, upon annuitization, provide a stream of payments to the individual at a later point in time.
- **Cash Surrender Value:** The dollar amount of an annuity that the policyholder would receive if they chose to forfeit their policy
- **Contract:** A binding legal document that houses the specific details of an annuity
- **Death Benefit:** The amount paid to the annuitant after the death of the insured.
- **Free Partial Withdrawal:** The amount of Account Value the policyholder is allowed to withdraw in a year without penalty of surrender charge (see definition below).
- **Generally Accepted Accounting Principles (GAAP):** A set of accounting guidelines for publicly traded companies to use when disclosing necessary, relevant financial information.

- **Mortality and Expense Charge:** A general annuity fee assessed to a policyholder's account values by the issuing company in order to compensate them for taking on the risk of the policy.
- **Plan Code:** The code used to identify a specific product and specifications for it. Not every product has the same specifications, but every same plan code within the product does.
- **Prospectus:** A document required by the Securities and Exchange Commission that details all aspects of an investment product, including the fees, investment options, and other pertinent information.
- **Reserve:** The money set aside for the future payment of incurred claims. They represent a liability on the insurance company's balance sheet.
- **Rider:** An add-on provision to a basic insurance policy that provides additional benefits to the policyholder at an additional cost. Examples are Guaranteed Minimum Withdrawal Benefit and Guaranteed Minimum Death Benefit.
- **Statutory Accounting Principles (SAP or STAT):** An insurance industry specific set of guidelines for preparing financial statements in order to regulate companies.
- **Surrender Charge:** The value that would be subtracted from the account value of a policy to arrive at the cash surrender value.

COMPANY HISTORY AND DEVELOPMENT

Phoenix Life Insurance Company was founded in Hartford, Connecticut in the year 1851 as the American Temperance Life Insurance Company. Originally founded upon the idea of insuring only those who abstain from alcohol, Phoenix quickly went through several changes in its early stages. In 1861, the company formally changed its name to the Phoenix Mutual Life Insurance Company and abandoned its initial strategy of catering only to teetotalers. Throughout the next century, Phoenix continued to evolve and survived through several economic crises that closed the doors of many other life insurance companies. In 1955, after recognizing that females typically live longer than males, Phoenix began to offer reduced life insurance premiums to females. In 1967, Phoenix began to offer discounted premiums on

all policies to customers who did not smoke. In 2001, Phoenix converted from a mutual company to a stock company and began trading under the ticker PNX. Over the next fifteen years, Phoenix grew its business and focused more on dedicated life insurance and annuity sales support to partner companies. However, in 2016, Phoenix was acquired by Nassau Re and once again went private.

In the past, Phoenix implemented Milliman's MG-Triton® and MG-ALFA® valuation software systems, which work fluidly together for financial modeling and calculating the company's reserves. The valuation system has unique versions of the software with the ability to support annuity, life, and health insurance companies. MG-Triton® allows insurance firms to produce reserves to tax, STAT, and GAAP standards. In order to maintain accordance with regulations, the system was designed to ease the external audit process. In addition, the system is regularly updated and is able to internally validate results against previous versions and export the results to various software platforms. MG-Alfa® offers controlled flexibility to the company implementing it by allowing formulas to be customized and upholding the integrity of calculations to meet standards. A few of the many key features of MG-Alfa® include its ability to support various product features and meet regulatory requirements.

Recently, Phoenix has decided to change their valuation and modeling systems to a new software called PolySystems. Similarly to Milliman's MG-Triton® and MG-Alfa®, PolySystems supports the valuations and modeling for annuity, life, and health insurance companies. In contrast to Milliman's two products, PolySystems uses one software system for both valuations and modeling. For valuations, PolySystems allows companies to calculate their reserves to Tax, STAT, and GAAP standards. The software has a wide range of predefined reports that one can generate and allows for the option of generating customized reports as well. PolySystems also has the ability to support various riders that may be included with a contract. For Phoenix, PolySystems is the supporting software that will help the company hurdle regulatory challenges and calculate complex mathematical models related to risk in the future.

PRODUCT AND RIDER OVERVIEWS

Phoenix Life Insurance Company has been developing life insurance products that have been meeting contemporary needs of patrons for more than 150 years. In particular, two of the lines of life insurance policies that Phoenix needs to integrate into PolySystems are universal life insurance and variable universal life insurance. Under a universal life contract, the insured pays premiums which cover the cost of insurance and builds a savings account called the cash value. The insured also has the option of using interest on the savings account to help pay the premiums so the policy can stay in force if he or she cannot use external funds to cover the cost of insurance. For Phoenix policyholders the premiums are flexible and interest gained on the cash value is tax deferred. Variable universal life policies function in much the same way as universal life, but differ in that they have premiums paid into sub-accounts. The sub-accounts can be invested into stocks and bonds, and administrative costs are taken directly from them by the insurer. In the case of Phoenix's variable universal life products, premiums are still flexible and interest is accumulated, but policyholders have the option to invest their money in aforementioned sub-accounts. In these sub-accounts there is the potential risk of incurring losses.

Life insurance companies typically provide more for customers than just life insurance policies, and Phoenix is no exception. A substantial portion of Phoenix's business comes from its annuity product block, which originated in the 1980s. Annuities can be viewed as hedges against life insurance policies because of their antipodal properties. Under an annuity contract, the issuing party makes more money the sooner the policyholder dies after issue, while under a life insurance contract, the issuing party makes more money the later policyholder dies after issue. Due to the nature of these opposing profitability patterns, a company issuing both life insurance and annuities is protected from mortality trends. Phoenix provides customers with two main types of annuities: fixed indexed annuities and variable annuities. Both types of annuities attract policyholders due to their tax deferred growth and income protection.

Fixed indexed annuities are typically regarded as the more complex type of annuity, because they are composed of many different parts, and have various complex regulations governing them. The basic premise of a fixed indexed annuities is that the annuitant invests a sum of money with the life insurance company in return for protection against down markets,

the potential for positive returns, and the growth of his or her investment. This growth is typically linked to the performance of some market index (hence the name “fixed indexed annuity”) but is based on five different factors:

1. **Cap:** An upper limit on the annuitant’s return over a certain period of time; typically monthly or annually.
2. **Participation rate:** The percentage of the index return that the company credits towards the annuity. For example, if the market index rises by 10% and the policy participation rate is 50%, the annuity would be credited a 5% increase.
3. **Asset fee:** A percentage fee that is subtracted from the index gains prior to crediting.
4. **Bonus:** A percentage of first year premiums that is added to account value.
5. **Riders:** Additional purchasable features for the annuity policy.

Variable annuities are less complex than fixed indexed annuities, but offer the annuitant more flexibility and options. The basic premise of a variable annuity is similar to that of a fixed indexed annuity: the annuitant purchases a variable annuity policy from an insurance company, either through one initial investment or a stream of payments, in exchange for potential future positive returns. Variable annuities have two primary stages. First is the accumulation phase in which premiums are paid to the insurance company and investments are made. Second is the payout phase in which the policy is paid out to the customer, including the initial policy value and any gains made through investments. The payout phase can occur in either one lump sum payment called cash surrender value, or as a stream of payments through a process called annuitization. Phoenix offers 13 different annuitization options, listed below:

1. **Option A:** Fixed life annuity with a specified 5, 10, or 20 year period certain.
2. **Option B:** Fixed non-refundable life annuity.
3. **Option D:** Fixed joint and survivorship life annuity.
4. **Option E:** Fixed installment refund life annuity
5. **Option F:** Fixed joint and survivorship life annuity with a specified 10 year period certain.
6. **Option G:** Fixed payments for a specified period.

7. **Option H:** Fixed payments of a specified amount.
8. **Option I:** Variable life annuity with a specified 10 year period certain.
9. **Option J:** Variable joint survivorship life annuity with a specified 10 year period certain.
10. **Option K:** Variable annuity for a specified period.
11. **Option L:** Variable life expectancy annuity.
12. **Option M:** Variable unit refund life annuity.
13. **Option N:** Variable non-refundable life annuity.

Variable annuities have two distinctive features compared to fixed indexed annuities. The first feature is the ability to receive variable periodic payments through annuitization, which provides potential for greater benefit but also a risk for less benefit. The second feature is the variability of account value growth. Variable annuities do not have the option of being in a fixed interest fund. They have a guaranteed minimum growth rate like fixed indexed annuities, but their growth is always variable. The flexibility and options for a variable annuity come in the form of additional riders that a customer can purchase. These riders provide the policyholder additional benefits but come at an additional cost. There are four main types of riders: guaranteed minimum accumulation benefit, guaranteed minimum income benefit, guaranteed minimum withdrawal benefit, and guaranteed minimum death benefit.

A guaranteed minimum accumulation benefit rider, or GMAB, assures the annuitant of receiving at least a minimum fund value after the accumulation period. The specified amount received by the annuitant after the accumulation promised by the rider can either be the amount invested or a set gain. The purpose of this rider is to protect the value of the annuity from market fluctuations that could adversely affect the annuity. If purchased, the GMAB rider is implemented when the market value of the annuity after the accumulation period is less than the guaranteed minimum. In such a case, the difference is made up for by the issuer. If the market value of the annuity after the accumulation period is greater than the guaranteed amount, then there is no need to implement the rider.

A guaranteed minimum income benefit, or GMIB, is designed to provide the policyholder with a base amount of lifetime income when they retire regardless of how well his

or her annuity investments performed. There is typically a waiting period before this rider can be exercised on a policy, usually seven or ten years. After the waiting period has elapsed, the GMIB can be exercised but only if the policyholder annuitizes his or her fund. In this case, the benefit amount of this rider is a preset percentage of the *original* investment made by the policyholder prior to the annuitization, and as such, protects the investor from a decline in the value of their investments.

A guaranteed minimum withdrawal benefit, or GMWB, allows a policyholder to withdraw a predetermined percentage of his or her original investment annually until the full amount of the original investment is withdrawn. This rider differs from the GMIB in that it only guarantees withdrawal of the original investment amount, and not any returns. If the underlying investments net positive returns, then there will be leftover funds available after the full withdrawal is made. However, if the underlying investments perform poorly and the account value is not sufficient to cover the original investment, the investor can continue to withdraw funds until they have withdrawn the full amount of their investment. In this instance, the policy issuer would cover the additional withdrawals, which cuts into company profits. As such, a GMWB rider can be thought of as insurance for the investor against poor investment performance.

A guaranteed minimum death benefit, or GMDB, allows a policyholder to insure against the loss of his or her investment in the event of death by assigning an additional beneficiary to the policy. Should the primary policyholder die during the accumulation period of the annuity, the beneficiary will then collect the benefits from the policy, which are predetermined during the purchase of a GMDB rider. In general, the beneficiary of a GMDB rider is guaranteed the greater of either the contract value at the time of the policyholder's death or the premium payments made minus any withdrawals. Many companies also provide enhancements to GMDB riders, such as ratchets, floors, and enhanced earnings benefits.

As one can see, all of these types of products and riders are rather intricate. Due to their many features, relatively long lifespans, and exposure to many different risk factors such as stock market performance and interest rates, every single policy requires vast amounts of calculation and modeling to compute potential future values and payouts, reserve amounts, exposure levels, etc. As such, powerful software is needed to perform these calculations

efficiently and accurately and ensure that the insurance company is intimately aware of every aspect of its annuity product portfolio. Typically, these software solutions are not developed in-house and instead, are purchased from a third party provider that specializes in software packages and can provide support for the insurance company. As an insurance company's business evolves, so do its needs and as such, new software solutions are frequently required.

PROJECT DESCRIPTION

The purpose of this project was to support Phoenix's system conversion to PolySystems. The project work was specifically aimed at the gathering and organization of variable annuity product data, universal life product data, variable universal life product data, and associated rider data. The gathered data should represent the features and mechanics of the products and riders. As such, all available information from prospectuses, contracts, amendments, and other similar documents were analyzed to discern which elements of data were relevant to the conversion.

The relevant data was templated in order to easily code the products and riders into PolySystems. To maintain consistency across Phoenix's product lines, previously existing fixed indexed annuity templates were used as a model in the creation of the variable annuity templates. For the conversion of variable annuities, a product history document, product template, rider template, and death benefit template were made.

After the completion of the variable annuity templates, the project focused on aiding in the conversion of universal life and variable universal life product lines. The gathering and organization of documentation for these product lines was completed by Phoenix, which left the task of filling in the blanks via product specifications and training guides. For the conversion, a universal life/variable universal life product template, with all necessary data for the PolySystems conversion, was completed.

METHODOLOGY

PRODUCT HISTORY DOCUMENT

The purpose of the Product History Document is to chronicle the evolution of variable annuity products and associated riders at Phoenix since their inception. As such, this timeline captures all product and rider introductions, discontinuations, and re-prices. Overall, it provides a high-level, holistic timeline of Phoenix’s variable annuity product portfolio from inception to present day. There were two main goals with this deliverable: to ensure that all necessary information was captured accurately and presented well, and to design the template in such a way that it can be easily updated with future changes to Phoenix’s variable annuity product block.

Due to the sheer amount of information that needed to be captured in this timeline, many different resources were utilized. The primary source of information for this timeline was the collection of contracts and marketing materials for each product and rider. These documents provided the majority of information needed for the top-level overview in this timeline, primarily product and rider introductions, re-prices, and discontinuations. However, not all of the information was always available in these documents. When required information was missing or conflicting information was found, two internal Phoenix Excel files were supplemental for filling in gaps in the information. These two Excel files were “*VA Living Benefit Rider Summary ASD Project.xls*” and “*VA QI 2016 FV by Plan Code.xlsx*.” The first file provided information on all riders, including dates of launches, re-prices, and discontinuations. In addition, it provided a list of *all* variable annuities that a rider was available for, which was useful for verifying which contracts belonged together. The second file was also exceptionally valuable because it provided a list of every single active variable annuity policy, without personal customer information. However, information like product name, issue dates, available riders, policy value, and plan codes were in the file. This information was used to verify product and rider introduction and discontinuation dates by filtering the policies based on product name and riders, and then analyzing when new issues began to decline dramatically. Large time gaps between issues identified the time period that the product or rider was no longer offered for sale. The reason for looking at gaps instead of the

date of the very last issue is that Phoenix occasionally re-issues legacy policies, so a policy may be listed as containing a product or rider long after that product or rider was discontinued. These re-issues occur relatively long after discontinuation, making it relatively simple to identify if a policy is new or simply a re-issue. This process was done for all products and riders as a means of cross-referencing with the contracts and marketing materials to ensure accuracy in the template. Lastly, if there was any information unavailable in any of the documentation, the appropriate people at Phoenix were contacted to find the information.

Overall, the timeline was very well received by Phoenix, with the ease of use and easy to find, accurate information garnering the most praise. We hope that the timeline continues to be a useful asset for Phoenix in the future.

PRODUCT TEMPLATE

The purpose of the Product Template is to list all past and present variable annuity products offered by Phoenix and detail the relevant specifications for each one. The template was built in Microsoft Excel and contains a summary worksheet followed by separate worksheets for each product. The summary page lists the products and gives information on each one including every possible plan code, launch dates, discontinuation dates, fund value, and reprice history. The tabs to follow list more specific information such as surrender charges, administration charges, minimum rates, issue ages, commissions, and annuity payment schedules. Eighteen products are identified on the summary tab, but only sixteen have their own tab. The identified products are *Big Edge*, *Big Edge Plus*, *Big Edge Choice*, *Templeton Investments Plus*, *Group Strategic Edge*, *Home Life*, *Capital Select*, *Capital Select Plus*, *Phoenix Edge*, *Retirement Planner's Edge*, *Premium Edge*, *Investor's Edge*, *Spectrum Edge*, *Spectrum Edge Plus*, *Phoenix Asset Manager*, *Freedom Edge*, *Dimensions*, and *Portfolio Advisor*. *Home Life* and *Portfolio Advisor* did not get their own tabs because they contained too small a portion of Phoenix's business. As a result, in the PolySystems conversion, these products will get mapped to other variable annuity products that possess similar specifications.

The summary worksheet was constructed by finding plan codes, launch dates, discontinuation dates, fund value, and reprice history. The plan codes, launch dates,

discontinuation dates, and reprice history had already been found in order to complete the Product History Document, so the information was just copied over. The fund values had not been previously found, so they were calculated from the “*VA Q1 2016 FV by Plan Code.xlsx*” Excel sheet provided to us by Phoenix. Policy counts and fund values were then totaled in the bottom row to capture the size of the product block as a whole.

Each product specific worksheet has one column to list the categories, one column to list each specification, and any number of further columns to track re-prices. Where available, the first source of information was the product charts provided by Phoenix. Next, we used Phoenix Marketing Materials and Training Guides to fill in some blanks left by the product charts or as starting points when a product chart did not exist. All three of these sources provided adequate summaries of product specifications, which is why they were used before the actual specifications documents provided to us by Phoenix. The specifications documents were used when pieces of information still could not be found in the Product Charts, Marketing Materials, or Training Guides. And finally, product Contracts and Prospectuses would be used for any additional missing product information. Given these five source groups, there was still some missing information on commissions. This missing information was filled in using data from “*Variable Annuity Agreements between 1-2000 and 9-2012.zip*”, which included general commissions, commissions for Merrill Lynch, and commissions for State Farm.

DEATH BENEFIT TEMPLATE

The only template created without a fixed indexed annuity counterpart as a guide was the Death Benefit Template. Phoenix’s variable annuity products have significantly more complicated death benefit information than their fixed indexed annuity products. Most variable annuity products not only had different death benefit options, which could be identified by plan code, but also had product specifications that would change with the death benefit. An example is *The Phoenix Edge* — *VA* product. The first death benefit option, a simple return of premiums paid, has a mortality and expense charge of 0.775% and an issue age restriction of 0 to 85. The second death benefit option, an annual step-up, has a mortality and expense charge of 1.125%, an issue age restriction of 0 to 85, and a stipulation that the death benefit amount turns into

account value after age 79. The third death benefit option, an annual roll-up, has a mortality and expense charge of 1.225%, a roll-up rate of 1.05, an issue age restriction of 0 to 85, and a stipulation that the death benefit amount turns into account value after age 79. Because death benefit specifications change with product specifications, each death benefit option is specific to each variable annuity product, despite the fact that return of premiums, annual step-ups, or annual roll-ups are calculated the same way across all policies.

The death benefit template was created by taking the summary sheet from the product template and adjusting it to separate each product and the associated plan code, launch and discontinuation dates, fund value, and reprice history by death benefit option; the exception being for *Home Life*, *Group Strategic Edge*, *Phoenix Asset Manager*, *Portfolio Advisor Jefferson Nation*, and *Freedom Edge*. These variable annuities were deemed to have immaterial fund values and thus will be mapped to other products. Each product, with the exception of the aforementioned five, have their own individual tabs where information is broken down by death benefit option. The information for each death benefit included issue ages, mortality and expense charges, adjusted free partial withdrawal, death benefit type, death benefit length, death benefit age limit before turning to account value, roll-up rate, and discontinuation (adjusted free partial withdrawal is how taking free partial withdrawals affects the death benefit). The death benefit template was created with a goal of making an easy transition into PolySystems.

RIDER TEMPLATE

The purpose of the Rider Template is to document and describe relevant variable annuity rider information for calculating reserves. Built in Excel, the template begins with a summary page containing data on the variable annuities Phoenix has in issue with the following riders: *GMIB I*, *GMIB II*, *GMIB III*, *GMAB*, *GMWB 5*, *GMWB 7*, *GMWB Lifetime*, *GMWB Lifetime 2*, *06GMWB*, *08GMWB*, *08GMWBCE*, and *08PRP*. The summary page lists all the riders by their original names and lists their associated rider codes. Rider codes allow Phoenix to identify which rider is or is not included with a policy. Phoenix has offered multiple variations of riders over the years which the rider code distinguishes the version of the rider the

policyholder has. For example, two policies may have a GMWB rider but one policy had the rider code “L5” meaning the policy has the *GMWB Lifetime* rider and the other policy had the rider code “05” meaning it has the *GMWB 5* rider. Distinguished by rider code, the summary page then lists the number of variable annuity policies in issue that have the rider as well as the associated fund value of those policies. The policy counts and fund values were then cross examined with other variable annuity documentation to verify the accuracy of the values. The summary page then lists the launch dates and discontinuation dates of all the riders. Oftentimes, the discontinuation date had to be inferred by using the date a new version of the rider was launched. For example, the *GMIB II* rider was launched in September of 2003 and documentation did not prove to provide a discontinuation date, but the *GMIB III* rider was launched in June of 2005. Therefore, it was inferred that the *GMIB II* rider was discontinued June of 2005. Lastly, the summary page calendared rider reprice history with reprice dates at the beginning of each column and “X”s to identify which riders had a reprice on that date.

After the summary page, each rider had its own worksheet to detail all relevant data. The rider worksheets were grouped together by type: *GMIB*, *GMAB*, and *GMWB*, with each type of rider having its own unique fields. Each worksheet for any given rider provided the variable annuity products that the rider was available for, the marketing name, the rider indicator, and then all relevant information for reserve calculations, such as waiting periods, fees, and benefit characteristics. In addition, each individual rider worksheet noted any re-prices that occurred for the rider, which is used for reserve calculations done for different time periods.

UNIVERSAL LIFE AND VARIABLE UNIVERSAL LIFE TEMPLATE

This project’s inclusion of the universal life and variable universal life template represented a significant change in methodology compared to previous work with variable annuities. The universal life and variable universal life template was somewhat complete, but was missing data and had incorrect data in places – thus requiring a thorough review and strategic cross-referencing. The major changes surrounding this Excel workbook were the description of surrender charges for products, the addition of products to the template, the

addition of lapse test information, and changes to the options at maturity row to include riders that extend coverage. This was accomplished through product specifications and training guides for Phoenix's universal life and variable universal life products. Additionally, a color coding system was adopted to track changes and identify incomplete information. The color coding system implemented was as follows: in the product row light blue was used to indicate products that were already in the template, dark gray used to indicate products we didn't have documentation for that were already in the template, and dark blue was used to indicate new products added to the template. In verifying the product information for products already included in the template, light green was used to indicate information verified, light yellow was used to indicate changes made such as additional information and/or corrections, and light gray was used to indicate information that could not be verified with the available documentation. In addition, a new row was added at the end of the template where sources of information found were listed. The color coding system was instrumental in ensuring completeness and ease of cooperation between this MQP team and Phoenix.

CONCLUSION

Throughout the course of the project we familiarized ourselves with Phoenix Life Insurance Company's variable annuity, universal life, and variable universal life products. The information gathered was organized into five deliverables: a variable annuity product history timeline, a variable annuity product template, a variable annuity rider template, a death benefit template, and a universal life/variable universal life template. While working on these deliverables off-site we realized the importance of thorough and frequent communication with our contacts at Phoenix. This helped to ensure that our work was accurate and in line with Phoenix's expectations, and ensured our sponsors that progress was being made in a timely manner.

Moving forward with this project, sponsoring company, and future major qualifying projects, we suggest a continuation in the form of working on a valuation or valuation system with Phoenix. Working on a valuation or valuation system would be beneficial in providing students hands on mathematical experience, analytical experience, and real insight into insurance practices. In summary, this major qualifying project and future project opportunities are instrumental in granting greater insight into the actuarial field.

REFERENCES

- @AnnuitiesHQ. "Annuity Riders Explained | Annuities HQ." Annuities HQ. N.p., 28 Sept. 2016. Web. 19 Nov. 2016.
- "Difference between GAAP and Statutory Accounting." Difference Between. N.p., 27 June 2014. Web. 19 Nov. 2016.
- "Generally Accepted Accounting Principles (GAAP)." Generally Accepted Accounting Principles (GAAP) Definition & Example | Investing Answers. N.p., n.d. Web. 19 Nov. 2016. "Indexed Annuities: Look before You Leap - Fidelity Investments." Fidelity Investments. N.p., 13 July 2016. Web. 19 Nov. 2016.
- "Investor Publications." SEC.gov | Variable Annuities: What You Should Know. N.p., n.d. Web. 19 Nov. 2016.
- Milliman. "MG-ALFA." *Milliman*. N.p., n.d. Web. 19 Nov. 2016.
- Milliman. "MG-Triton." *Milliman*. N.p., n.d. Web. 19 Nov. 2016.
- "Phoenix Wealth Management: History." Phoenix Wealth Management: History. N.p., n.d. Web. 19 Nov. 2016.
- "Phoenix Wealth Management: Life Insurance Basics." Phoenix Wealth Management: Life Insurance Basics. N.p., n.d. Web. 13 Dec. 2016.
- Robert Powell, Special to USA TODAY. "Retirement: Pros and Cons of Fixed-index Annuities." USA Today. Gannett, 19 Aug. 2015. Web. 19 Nov. 2016.
- Root. "Annuitization." Investopedia. N.p., 08 Aug. 2005. Web. 19 Nov. 2016.
- Root. "Claims Reserve." Investopedia. N.p., 13 July 2010. Web. 19 Nov. 2016.
- Root. "Rider." Investopedia. N.p., 29 July 2015. Web. 19 Nov. 2016.
- Root. "Universal Life Insurance." Investopedia. N.p., 05 Dec. 2015. Web. 13 Dec. 2016.
- Root. "Variable Universal Life Insurance - VUL." Investopedia. N.p., 05 Nov. 2008. Web. 13 Dec. 2016.
- "Software - PolySystems." PolySystems. N.p., n.d. Web. 19 Nov. 2016.
- "Variable Annuities - Comprehensive Variable Annuity Investor Guide." Annuityfyi.com. N.p., n.d. Web. 19 Nov. 2016.

"What Are Guaranteed Minimum Death Benefits? | IRI." What Are Guaranteed Minimum Death Benefits? | IRI. N.p., n.d. Web. 19 Nov. 2016.

"What Are The Different Types of Guaranteed Minimum Living Benefits? | IRI." What Are The Different Types of Guaranteed Minimum Living Benefits? | IRI. N.p., n.d. Web. 19 Nov. 2016.