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Structured Creativity: Six Sigma Quality and Product Development

by Eva Goldstein

Introduction

Product development is variously described as a science, an art, or a philosophy. Six Sigma suffers from the same ambiguity—it is a statistical measure, a business philosophy, a process, a methodology, and a way of living! But by combining the two, we are able to apply structure to creativity and enable product success.

Many people balk when they hear they words "creativity" and "structure" in the same sentence—it is commonly believed that structure stifles creativity. However, how many good ideas never see the light of day because there is no process in place for bringing them to the attention of company decision makers? And how many bad ideas are brought to market because there are no controls in place to prevent their development? My guess is a lot!

Six Sigma is a quality initiative implemented across all GE businesses. It is a data-driven, customer-focused, and customer-touching approach to doing business that looks at whether an organization is delivering what its customers require. We measure product or process performance against what our customers

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Thoughts on the Enhanced Earnings Death Benefit

by Douglas L. Robbins

The 1990s saw the rise of many types of variable investment products within the life insurance industry. It was only natural that hedging strategies and products would emerge in response to the inherent risk of loss of value in variable life and annuity products. This article explains a 21st-century twist on the concept for annuities, the Enhanced Earnings Death Benefit (EEDB) Rider.

The advent of this rider sparked quite a bit of interest in the industry. This is at least partly because, as a rider that increases in cost to the insurance company when separate account assets increase, it is countercyclical to many other riders sold (as well as the profitability of the base annuity product itself). For this reason, we believe that this rider can be less risky to offer, even in a relatively rich form, than it appears on its surface.

Past Guaranteed Death Benefit Riders

Several types of Guaranteed Minimum Death Benefits (GMDBs) have been sold within both base deferred annuity products and riders throughout the 1990s. The general form of these riders is to assess a charge as a percent of the annuity fund value and provide a floor death benefit regardless of fund performance. The various ratchet and roll-up benefits that were sold were intended to help the annuitant with estate planning amidst volatile equity markets.

However, they did not address certain tax considerations that affect deferred annuities upon death of the annuitant. Life insurance offers several tax advantages over deferred annuities on death. With a life policy, the death benefit is much higher than the cash value, and policy gains (on death) are not subject to federal income tax. For example, say a policy has cumulative premiums of $50,000, a cash value of $80,000 at the time of death, and a face amount of $150,000. If the insured dies, the entire $150,000 goes to the beneficiary free of federal income tax.

Annuities have neither of these advantages. Gains on a non-qualified deferred annuity are subject to federal income tax, whether as a result of gains in the fund value or as a result of a GMDB. (On a qualified product, the entire amount paid on death is taxable.) So, expanding the above example, say an annuity had the same cumulative premiums, cash value, and death benefit (due to say a bull market up to a ratchet point, followed by a bear market). In this case, the annuitant's estate could lose up to $40,000 to federal income taxes (based upon the 40% tax bracket, combined with the $100,000 gain).

There are also estate tax considerations on death, and these can vary a lot under current law by date of death. However,

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value growth (before rider charges) doubled to 16%, our annual cost would increase back to over 1.10% of fund!

Actuarial Analysis Can Frame the Risks

This looks like a daunting risk to take at first glance. How can one offer a benefit for which you would charge 0.35% on an expected basis, but which might easily cost so much more than that?

We would suggest that the answer lies in taking a holistic view of the annuity product combined with the EEDB rider. The reason for the increase in the rider's cost on the 16% net return scenario is that we expected the fund value (per policyholder remaining, at $50,000 initial premium) at the end of 25 years to be around $300,000 (at 8% net growth), and at 16% net growth, it was almost $2 million.

But let's take a look at what else might be going on. Let's say that, to sell this annuity, we will have 8% of the premium up-front as acquisition costs. In addition, let's also assume that to maintain it will cost us $100 per year. Assume that the M&E and other fund-based revenues amount to 1.75% per annum.

Under this set of assumptions, the additional product and rider asset charges we would take in at 16% fund growth (accumulated to year 25 at our 7% rate) would more than offset the increased cost of the EEDB. (Pricing on an IRR basis, one would be even further ahead, because the implied discount rate on the eventual death benefit enhancement is then much higher than 7%.) Even if we decide we must cap the EEDB at some (higher than current) level in order to help manage the risks, it seems clear that it could be much higher than where much of the industry currently has it set.

In fact, some producers of late appear to be taking this view, at least to an extent. A few companies have raised the maximum benefit on their EEDB riders from 40% to 100% of premiums paid (while also increasing the asset charge for the rider). Perhaps this indicates growing recognition that a richer EEDB provides a stronger countercyclical effect within a variable annuity than a less rich version.

A key assumption making much of the preceding reasoning possible is the date of death. (If death were expected in 5 years in our example, then no reasonable rider charge would cover that cost.) Clearly, it is crucial to control the mortality that will occur in order to maximize the benefit to the company of offering this rider. There are several ways to do this, aside from underwriting, but we will not cover them here. The important point is that, having done so, we could possibly offer a very attractive benefit indeed.

Conclusion

Because the EEDB rider is countercyclical to not only the base annuity product, but also to most other guarantees currently offered on variable annuities, two things seem clear:

- This rider offers some degree of risk management, as we have demonstrated in our admittedly simple example. This alone should make this rider very popular for insurance companies in the variable annuity market.
- It should be possible to offer this rider in such a way that it better meets its estate preservation goal. Caps on the benefit could be higher or maybe even non-existent.

We will see in the future how these ideas all play out.

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have told us that they need. Design for Six Sigma (DFSS) is a methodology, or framework, for developing processes and/or products that meet customer needs. Design for Six Sigma for innovation (DFSS/i) is a sub-set of DFSS, focused on bringing new, innovative products to market. DFSS/i can be a powerful tool for successful product development.

The Need for Something Different

In today's environment, insurers are faced with having to develop product solutions to address increasingly complex risk management problems. Customers are more sophisticated and more demanding, and their needs are changing as quickly as market conditions. These factors, along with expanding global competition and a focus on growth contribute to a need for increased operational efficiency and increased innovation. Both of these require more effective use of ever fewer resources.

In this environment, successful insurance manufacturers are those who focus on unique product benefits and develop well-defined product plans, by using more non-traditional tools in market research, such as a team-based approach. By involving cross-functional teams earlier in the product development process, the following can be achieved:

- Direct access to customer knowledge;
- Ownership and buy-in across functions;
- Earlier detection of changing customer needs;
- Broader perspective in understanding the market; and
- Faster time-to-market of the new product.

The use of cross-functional teams is fundamental to the successful execution of any Six Sigma project.

DFSS for Innovation

GE uses DFSS/i to lower the risks and the costs associated with new product innovation. DFSS/i is a data-driven approach to assessing business opportunities and

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Statutory Valuation Basis	Male, 45, NS		Male, 65, NS	
	PV Profit (Per Unit)	Profit Margin	PV Profit (Per Unit)	Profit Margin
1980 CSO	$9.60	4.5%	$21.08	9.9%
2001 CSO S&U	$8.69	4.8%	$24.78	13.7%
2001 CSO Ultimate	$8.69	4.8%	$24.70	13.7%

- Reductions in the dollars of profit from the interest margin resulting from the new cap on the reverse select and ultimate COI rates offset slightly by increases in the dollars of profit from the mortality margin due to increases in the net amount at risk. Larger offsets occur at older issue ages for this sample case because of the larger percentage increase in the net amount at risk;
- A decrease in the dollars of premium tax resulting from the lower gross premium; and
- Lower percent of premium surrender charge income resulting from the lower gross premium.

It is worth noting that the profit margin may increase (as a result of lower gross premiums) while the actual dollars of profit may decrease.

Independent changes in the policy load structure were determined such that the 1980 CSO present value of profits was maintained.

In summary

- The 2001 CSO Tables may reduce projected account values of reverse select and ultimate plan designs through lower caps on the maximum COI rates.
- Plans funded at (lower) tax law limits may develop lower account values unless loads, COIs, or credited interest rates are reconfigured;
- Higher reserves on annual pay plans may not by themselves require a change in the plan design. While 2001 CSO reserves may be higher on a percentage basis than 1980 CSO reserves during the early durations, the increase in dollars of reserves is somewhat limited due to the fact that reserves for moderately funded annual pay plans are typically lower in the early policy years anyway.
- Surrender income may be reduced slightly if existing surrender charges are above the new maximum limits.
- To offset potential lost income on COI charges of UL plans with highly reverse select and ultimate COI patterns, companies may consider implementing a per unit charge that varies by gender, issue age, risk class and policy duration.
- Companies may elect to postpone implementing the CSO 2001 Tables on a tax basis until the latest phase-in date for tax purposes.
- Many UL plans are constructed to satisfy the definition of life insurance via the Guideline Premium Test. However, the increase in the net amount at risk as a result of the 2001 CSO Tables for plans that satisfy the definition of life insurance via the Cash Value Accumulation Test (CVAT) may to be less at some attained ages than the increase in the net amount at risk for Guideline Premium Test plans. As a result, companies may begin to consider the CVAT design more often.

Additional Loads Required To Achieve 1980 CSO Present Value of Profits (M, 45, NS)	
Policy Load Component	2001 CSO Ultimate
Percent of Premium, *or*	1%
Per Policy (per month), *or*	$2
Annual Per Unit	$0.20

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defining the customer's critical requirements. It is used to select new markets, define new products, track post-launch market behavior, and leverage market intelligence efforts. In other words, it is the front end of a multi-disciplinary, structured product development process.

It is no secret that some new products fail to meet sales expectations, and others never make it to market. In some cases, a pet idea is advanced, even in the face of negative market research. In other cases of failure, market size is overestimated, a product is incorrectly positioned, or unexpected competition emerges. If a product never makes it to market, it may be because there was insufficient information to warrant the product development investment, or because of unexpected showstoppers. Finally, many companies are so busy with "me-too" responses and product fixes that they miss new or established market opportunities. It all boils down to a lack of information—information that would have been gathered if the DFSS/i framework was used.

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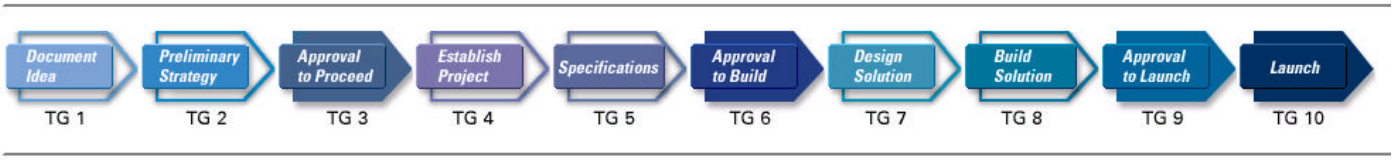
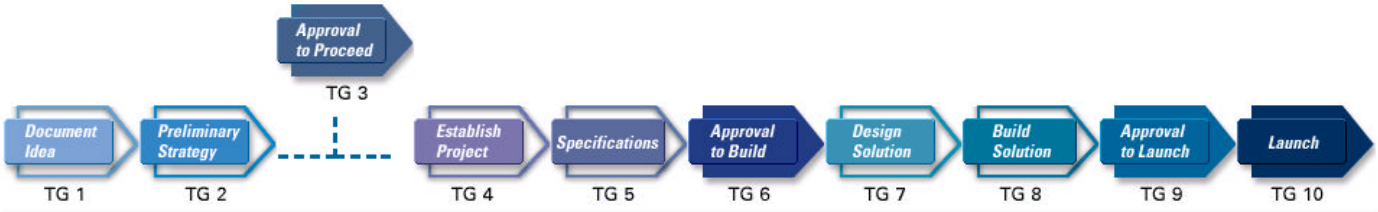
The 10 Tollgates Process

One of GE's businesses has developed the "10 Tollgates" approach to new product innovation, based on the steps in the DFSS/i and general DFSS processes. This approach incorporates a roadmap for new product innovation and development, a centralized intranet-based toolbox for execution—including task lists, resources, required sign-offs, Six Sigma tools and more—to support the roadmap, as well as incentives for associates who use it.



The following diagram is a screenshot from the first page of the 10 Tollgates Intranet site:



Tollgate 3: Approval to Procede Preliminary Project Pitch including Cost/Benefit Analysis (PAR), Project Plan and Resource Requirements

When a user selects a step in the roadmap, they are provided with the required tasks by functional area, relevant Sx sigma and other tools, and a list of resources to consult for assistance in completing the step. The following diagram illustrates this relatively simple infrastructure:

The 10 Tollgates approach balances the voice of the customer, business needs and product design constraints. Customer needs, distribution needs and the insurer's business needs are all assessed. In the world of Six Sigma, these needs are called "Critical to

Phase	Objective	Actions	Desired Outcome
Define	Identify the market opportunity and general product scope based on existing organizational knowledge and secondary research.	• Develop hypothesis • Gather organizational knowledge • Go/No-Go decision	Bring focus and efficiency to the rest of the process.
Measure	Focused data gathering in the context of the product framework. Translate the voice of the customer into measurable CTQs.	• Develop product framework • Fill in data gaps • Establish business, customer and channel CTQs	Emphasis on CTQs leads to data driven decisions and focuses limited resources.
Analyze	Analyze data to generate a concept design and define the most attractive product opportunity.	• Analyze data to define product • Financial modeling • Establish scorecard	Avoid analysis paralysis!
Design	Evaluate impact of alternative solutions. Develop detailed design for most attractive product approach.	• Assess technology impact • Establish product scorecard • Develop pricing strategy	Remember that design is iterative, but also finite!
Verify	Validate that the product opportunity is real. Verify the concept design and transition to implementation.	• Reach Go/No-Go decision • Final abatement of risk as needed • Hand off to execution team	Documentation of process and outcomes to date is critical. Have the courage to make a No-Go decision.

Quality" requirements or CTQs. CTQs must be measurable and actionable. Product requirements are defined and product specifications created within the parameters set by the CTQs and the insurer's capabilities. Six Sigma uses customer "Scorecards" to measure performance—keeping in mind that customers can be internal as well as external.

DMAIC – The Five Phases of DFSS

The DFSS framework can be broken into five phases:

Using DFSS/i to Develop a "Virtual" Insurance Product

Insource Ltd. recently used the DFSS/i framework to develop the first virtual insurance product in Canada. In this case, a distributor wanted to drive product design and wanted a new solution for an established market. This required a fundamental shift in the product development paradigm—usually it is the manufacturer that funds the design and development of a new product. Since the carrier was not going to be central to the product offering, this case required process design as well as product design, and risk control would be critical.

In the Define phase, it emerged that what the distributor wanted was a paradox: a unique, commodity product. In order to achieve this, we had to use processes to differentiate the product, rather than unique benefits or pricing.

Next, we gathered the CTQs of the various stakeholders. The distributor wanted a unique, proprietary product that would help them increase their sales to the small business market. The insurer wanted risk-free income, and the market was asking for competitive pricing in a simple, high-end product. A 10-year term product was selected as the best solution.

There was some discussion about the distributor's ability to deliver policyholder service and other functions, but a capability analysis clearly showed that the distributor should stick to their core competency—namely distribution. In this case, we had to find a third party organization to handle the underwriting, claims processing, policy service, and administration.

The final outcome was a "virtual" insurance model, where every function was optimized by allowing each participant in the model to focus on their core competencies and with the insurer acting as a fronting company for a 100% reinsured product.

The final analysis prior to the implementation hand-off, which employed a Six Sigma tool called the "Failure Mode Error Analysis," revealed a contract-related risk-management hurdle that had never been brought to the team's attention. Having caught this issue prior to launch, it was fairly easily solved, at little cost in terms of time to market and resources.

Conclusion

Six Sigma, and in particular DFSS and now the 10 Tollgates process, bring structure and discipline to the creativity required for successful product innovation and development at GE. In an environment of constant change and competitive pressure, the use of a consistent, data-driven methodology for product development decisions and execution are key to insurance company responsiveness and flexibility.

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Annual Meeting Speakers to Thank:

Deanne Osgood

Mary J. Bahna-Nolan

John M. Fenton

Anne Andersen

Roger Harbin

Douglas C. Doll

Steven P. Habegger

Novian Junus

Ken McCullum

Jennifer Orzell

Sheldon Summers

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David Cook

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Tim Ruark

Richard Bergstrom

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