

The GPS Framework: A New Approach to Comprehensive Strategic Risk Management

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Abstract

Although the potential failure to reach a particular strategic objective may not significantly affect a company's enterprise value, the ultimate success rate of the *portfolio* of strategic objectives must be considered of critical importance. Strategic risk management (SRM) frameworks seek to improve the likelihood of attaining strategic objectives through many of the same methods seen in enterprise risk management (ERM). This paper presents a new approach to SRM that supplements proven ERM techniques with novel methods and leverages key concepts from the *Logical Framework Approach*. The result is a pragmatic yet *comprehensive* approach that improves strategic planning, strategic execution, and performance measurement. The framework enables timely and informed management action, a portfolio view of a company's strategic objectives, risk-based capital deployment, and formulations of risk appetite and risk-adjusted compensation.

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The views expressed in this article are my own and not necessarily those of my employer, Assurant Inc.

1. Introduction

For companies with a robust enterprise risk management (ERM) framework it is tempting to conclude that effective strategic risk management (SRM) is a natural consequence of the current methods, processes, and risk knowledge embedded in the ERM framework. Some practitioners assume that the risks that affect a company's pursuit of its strategic objectives are merely a subset of the universe of risks that are identified and managed in a well-functioning ERM framework. This assumption is almost universally false.

It is common for ERM functions to maintain a high-level view of risk that seeks to avoid significant downside events while attempting to exploit opportunities with an attractive risk-reward profile. ERM is, metaphorically speaking, running a military campaign to protect against and benefit from risk and focuses on large-scale considerations. By design, ERM is not always "aware" of the finer details of particular battles as they unfold. The risks that affect a particular business line's effort to achieve a strategic goal are often *regarded* as the domain of the front-line product experts, risk managers, and decision makers at the business segments.

Effective risk management of the *portfolio* of a company's strategic goals is certainly crucial for the preservation and growth of company value. However, in many cases, this class of key risks goes largely under the radar of the ERM risk identification function. Even if these risks are identified as part of existing ERM processes, several specialized and necessary tools may be absent.

This paper introduces the *Goals-Progress-Strategy* (GPS) approach to SRM with the following objectives:

- *Objective 1: Increase the likelihood of attaining strategic objectives*

- *Objective 2: Ensure transparency and buy-in from management, risk experts, and strategic planners*
- *Objective 3: Enable “adaptive management”: timely and informed adjustments to business tactics, risk mitigations, strategic considerations, and a more objective basis for any termination decisions*
- *Objective 4: Improve perception of SRM (and possibly ERM) among shareholders, rating agencies, and other external stakeholders*

GPS is then shown to be a *comprehensive* SRM system in that, for a company’s strategic objectives, it enables the following:

- A portfolio view of risk and reward
- A concept of strategic risk capital
- Risk appetite formulation
- Risk-reward–based capital deployment
- Risk-adjusted compensation

GPS is *scalable* in the sense that these critical concepts are purely “optional” and can be realized with straightforward “add-ons.” A 100-day GPS implementation plan is covered in Appendix C.

2. The Goals-Progress-Strategy (GPS) Framework

2.1. The Three Phases of GPS

Though not essential, a scenario-based approach to ERM is an effective foundation for design and execution of an SRM program. In such a framework, the risk function queries the subject matter

experts to form a consensus on several hypothetical scenarios that capture various ways each enterprise risk can manifest. These “risk interviews” are the primary vehicle for risk identification and quantification.

Each scenario includes probability estimates and impact approximations for income statement or balance sheet components (e.g., sales, expenses, loss ratio, or reserve changes) leading to quantification in terms of key risk metrics (e.g., effects on GAAP earnings, company value, return on equity, or capital) The selected metrics are precisely those of interest to internal and external stakeholders. The risk interview concept and the scenario approach represent some of the fundamentals suggested by ERM consultant Sim Segal.²

Much of the “risk knowledge” embedded in the GPS framework is obtained through the scenario approach. In addition, the notions of *risk velocity*,³ *potential for action*,⁴ and *required recovery ratio* play important roles in GPS. We describe each of these notions in turn.

When a risk manifests, how long will it be before the company experiences some type of impact? This question helps shed light on when and to what extent we can apply a mitigation or adapt to changing risk and business environments. Consider, for example, the risk of hurricanes on the East Coast of the United States. Most Atlantic Coast hurricanes originate as a tropical wave (an elongated area of relatively low air pressure moving from east to west) from as far east as the

² A practical and effective approach to ERM can be found in Sim Segal’s *Corporate Value of Enterprise Risk Management: The Next Step in Business Management*. Segal’s quantification includes multiple model years and is able to accommodate scenarios that unfold over long time horizons. An immediate consequence is the ability to model a company value metric.

³ The Corporate Executive Board provided my first exposure to *risk velocity*. It is possible that my definition differs from their formulation.

⁴ My conception of potential for action (PFA) was an attempt to align “raw” ERM data with risk expert priorities at the business units. Some potentially detrimental risks are not, and should not be, top management priorities. My experience is that these risks have low PFA.

Sudan, and the impact to an at-risk insurance company can sometimes occur within two weeks. This “speed of onset” is referred to as risk velocity. Hurricane risk, for example, is generally viewed as having high risk velocity whereas a risk relating to phased-in health care regulations is potentially a low velocity risk.

Potential for action (PFA) is a measure of the expected benefit to the company’s risk-reward profile from additional focus on or effort at risk mitigation (i.e., PFA assesses the anticipated “bang for the buck” of *incremental* mitigation activity). PFA might be a qualitative rating (e.g., high, medium, or low), or one can estimate a numerical quantity that captures expected benefit, as some combination of increased reward and/or reduced risk, in the numerator and quantifies incremental mitigation effort or investment in the denominator.

For an underperforming strategic objective, the required recovery ratio (RRR) gauges how much “catching up” is needed to achieve the initial baseline or best-estimate projection for the strategic objective. In the case of an objective solely based on earnings, this baseline might be \$100 million over the three years of the objective time horizon with annual projections of \$25 million in year 1, \$35 million in year 2, and \$40 million in year 3. Suppose \$15 million is earned in year 1. In this situation, we must outperform the remainder of the baseline forecast to still meet our aggregate objective of \$100 million. RRR is the ratio of required future performance versus the baseline projection (for the remaining years) that ensures we will still meet the aggregate goal: $15 + \text{RRR}(35 + 40) = 100$. In this case, $\text{RRR} = 113.33$ percent.

Before pursuit of the objective begins in earnest, several values of RRR are examined. We analyze several possibilities *today* for being “behind plan” *in the future*. We examine such deficits in various amounts and at several points in time, for example, after year 1 or in the middle or late stages of the objective’s time horizon.

For each value of RRR that is considered, we estimate prob(objective will still be achieved given the value of RRR), where “prob” denotes the probability of the event in parentheses. All other things being equal, a larger RRR should suggest a smaller probability estimate for meeting the objective. The probabilities should be checked for internal logic and consistency.

This analysis, performed upfront in the GPS process, helps to inform future termination decisions, if applicable, and helps remove some of the emotion from the process. Suppose after half the time horizon has elapsed we need an RRR of 170 percent to hit our objective. If we previously assigned a probability of 5 percent to such an RRR/time pair, this builds a strong case for termination and sets the expectation that any argument for continuing the objective be supported by substantial evidence. In all too many cases the default assumption is to soldier on despite a clearly doomed objective. This may be the only option at times, but one must not be lulled into a “sunk cost” argument. In most circumstances additional effort and expense are required to continue to pursue an objective, and that additional capital and resource commitment must be carefully considered.

GPS manages risks related to a strategic objective through a three-phase structure:

1. *Goals*—State the strategic objective in a clear and measurable way and define “critical-to-success” (CtS) goals that are essential for attainment of the objective. Research, propose, and analyze performance drivers, risks to goals, associated mitigations, and metrics/indicators to assess these factors. Elements of strategic planning and risk considerations of CtS goals are influenced by the *Logical Framework Approach (LFA)*.⁵

⁵ The Logical Framework Approach (LFA) was developed in 1969 by Leon Rosenberg for the United States Agency for International Development (USAID). It is a management tool often used in the design, monitoring, and evaluation of international development projects. More generally, LFA is a framework that helps organizations of nearly any type achieve strategic goals. Practical

2. *Progress*—Set progress measures, early warning indicators (EWIs), risk exposure, and risk mitigation assessment metrics. Measure and track metrics/EWIs, risk velocities, risk exposures, and mitigation effectiveness (through PFA) and inform the success outlook through RRR. Report findings to management.
3. *Strategy*—Based on the report findings, PFA, RRR, and success outlook, management alters or refines strategic elements such as business tactics, risk mitigations, “go/no-go” decisions (if applicable) or overall strategic course. This is the promised *adaptive management*. If overall strategy is to be altered, then the process returns to the Goals Phase; otherwise it returns to the Progress Phase. After this analysis is performed it is important to determine and document any lessons learned. These lessons can improve the chance of reaching the current objective or improve GPS in the long term, increasing the likelihood of future achievement of objectives.

During the time horizon of a strategic objective the company works through these phases in order and then typically repeats the Progress and Strategy Phases several times. This repetition might take place on a monthly or quarterly basis depending on the overall importance and “health” of the objective.

In the Goals Phase we focus on our ultimate objective, the necessary steps to reach it, and the various obstacles that can hinder this effort. We work backward in time from the strategic objective to determine what CtS goals will allow us to achieve the objective. The focus is on the major “end game” goals that position the company to reach the objective; we might describe two to five such prerequisite goals. That same “back-step” idea should then be applied to the CtS goals to help

Concepts Incorporated extended the use of LFA to 35 countries. LFA is often used by bilateral and multilateral organizations and was employed by NORAD.

inform what tasks and projects must be accomplished to allow subsequent attainment of the CtS goals. Project planning for the strategic objective is accomplished via the following “time-reversed” *causal chain*:

Strategic Objective ← Critical to Success Goals ← Subgoals & Tasks.

Initial planning and execution begins with the desired future state on the left side, and we step backward through time to the present day as we move from *left to right* in the chain. The arrows represent “then” or “this leads to” assumptions baked into our project planning. If this planning is sound and we are not derailed by instances of risk manifestation, then we attain our CtS goals and progress through the chain, from *right to left*, until we reach our strategic objective.

The Progress Phase employs customized metrics to assess our achievements to date and describes risks to attainment of subgoals, tasks, CtS goals, and the overall objective at any point. This phase also includes metrics that express our view of the likelihood of success and inform any needed “course corrections.” Risk velocity helps to highlight those exposures for which there would likely be time to react should the particular risk begin to manifest.

The Strategy Phase is the reaction to information from the Progress Phase. In some cases no changes or perhaps minor tweaks are necessary. If a major revision is needed in business tactics, risk mitigations, or overall strategic course (including a potential project termination) this is where the call is made. This phase also provides an opportunity to assess the metrics/EWI themselves: do they measure the right quantity at the right time? Metrics and EWI are not necessarily locked down in GPS; they too are subject to revision.

Before examining the GPS framework in more detail we discuss the qualities of strategic objective planning that will ensure GPS performs at its full potential.

2.2. Effective Strategic Planning and the Logical Framework Approach

In the medical profession, MRI (magnetic resonance imaging) is a powerful tool for the diagnosis of a certain class of conditions. Effective *execution* of the MRI process (imaging and interpretation) requires that both the *tool* (i.e., MRI machine) *and* the *input* (i.e., the patient) meet some requirements: for example, the MRI has proper gradient calibration and the patient remains stationary and does not wear anything magnetic. This suggests that successful execution can depend not only on the process itself but on certain qualities of the input to the process, when such a notion exists.

In our case the “tool” in question is GPS, and its successful execution depends to an extent on a properly formulated *input* to the framework, that is, the strategic objective.

In project planning for a strategic objective, much of the thought process is guided by a business equivalent of “if-then” logic: *if* we accomplish certain tasks, *then* we achieve a particular goal. While we truly *know* that “if $x < 1$ *then* $x < 2$,” we are not generally as confident in an assertion such as “if we complete tasks A and B, *then* we reach subgoal G.” In this business planning context, the “then” is really dependent on multiple assumptions relating to challenges, conditions, or risks that will or will not manifest. It is a sort of “fuzzy” causality.

The strategic objective is described in terms of CtS goals. Implicit in our planning is that *if* the CtS goals are attained, *then* we will achieve the strategic objective. Similarly, when we describe subgoals and tasks that will enable the CtS goals, we again are making the assumption that if we reach those check points, *then* we progress to the more advanced state. An understanding of this if-then logic and the assumptions underlying the various occurrences of “then” will help drive robust risk identification, improve the understanding of risk-reward tradeoffs, and increase the overall chance of success.

The conditions necessary for the *then* to hold may be “external” to the project or objective. As an example, we might need low interest rates to persist, require that a certain proposed regulation does not become law, or might have assumed that a pandemic does not occur in the next five years. There may be assumptions more “internal” to the objective such as continued growth in the demand for tablet computers or the expectation that actual claims on a warranty product will not exceed the last two years’ experience by more than 15 percent.

When these assumptions underlie a key occurrence of if-then thinking in our strategic planning they are further analyzed in the risk scenario context to obtain risk identification, quantification, prioritization, and, where applicable, PFA assessment.⁶

This drill-down into assumptions underlying occurrences of “then” is a primary tool of LFA. Strategic planning can be further enhanced through other LFA concepts including the LogFrame and the Four Critical Strategic Questions.⁷

We are now ready for a detailed examination of the GPS approach.

2.3. Framework Details and Process Flow

Assume that GPS is to be used to manage risks relating to a newly conceived strategic objective “X.” The Goals Phase is accomplished through the following steps:

- 1) Verify that X aligns with company strategy, mission, capabilities, and resources. If it does not, then the idea should be reconsidered before applying GPS.

⁶ In the case of risks that are strictly related to project management, this scenario approach is not typically necessary. One might simply address the issue through more detailed planning or increased resource dedication.

⁷ Terry Schmidt applies LFA to the private sector in *Strategic Project Management Made Simple: Practical Tools for Leaders and Teams*. Wiley; 1 edition Feb. 9, 2009.

- 2) Ensure that X's description is Specific, Measurable, Attainable, Relevant, and Time-Bound or Time-Specific (SMART).
- 3) Conduct project planning by using the *causal chain*: determine CtS goals and the tasks and subgoals that help ensure their attainment.
- 4) Research, propose, and analyze the objective's performance drivers (e.g., marketing effectiveness, interest rates, or unemployment), risks to goals, and associated mitigations, and define possible metrics and EWI to assess these factors.
- 5) Identify instances of if-then thinking in (3) and (4); this includes statement of the form "if we achieve these subgoals, *then* this larger goal is reached" or "if *these conditions* hold and those *risks do not manifest*, then we will succeed ..."
- 6) Conduct risk interviews with the strategic team and other risk experts to quantify key risks as identified in (4) and (5).
- 7) Based on risk scenarios from (6), analyze a range of potential values for RRR at various points in time (e.g., at quarter end dates in X's time horizon) and their corresponding probabilities.

The prior steps are completed before the main execution effort on the objective begins. The Progress Phase is then carried out as follows:

- 8) Set progress measures, EWI, risk exposure, and risk mitigation assessment metrics. (At this point we are ready to begin pursuit of the objective in earnest.)
- 9) Track metrics/EWI, risk velocity, and exposures, and assess mitigation effectiveness through PFA.
- 10) Observe progress to date on key metrics and calculate the related RRRs. Based on the probability estimates from (7) assign the likelihood of attaining the objective.

The Strategy Phase helps to determine any necessary management action:

- 11) Analyze the report findings, PFAs, actual RRRs with associated probabilities, and overall outlook for success. The main purpose of the PFA concept is identification of those risk mitigations that are most in need of expansion or revision.
- 12) Apply adaptive management: modify strategic elements such as business tactics, risk mitigations, “go/no-go” decisions (if applicable), or overall strategic course. If overall strategy is to be altered, then return to (1), otherwise cycle through (9)–(12) until the objective is attained.

The sequencing of some of these steps can be customized to a particular company’s processes or culture. Exhibit 1 shows a possible process flow for GPS. An illustrative application of GPS to a new product launch is shown Appendix A.

2.4. Win-Win-Win: How GPS Benefits Multiple Stakeholders

GPS leverages risk expertise within the company to enable adaptive management. By providing timely information on progress toward a strategic objective, risk exposures, mitigation assessments, and early warning indicators, management is given the time to react and a sound basis for doing so. Those responsible for planning and executing the strategic objective are more organized, better informed, and made aware of potential challenges as early as possible. These benefits to management and the strategic team both serve to meet Objective I: *Increase the likelihood of attaining strategic objectives.*

GPS’s scenario approach to risk quantification is driven by the knowledge of the strategic team and other risk experts across the company. Because the risk identification and quantification comes from these experts and they assist in risk mitigation assessment, their view is aligned with

the key messages that come out of the process. The scenario approach is intuitive, and “no PhD is required” for its application. This approach to risk analysis within GPS addresses Objective 2:

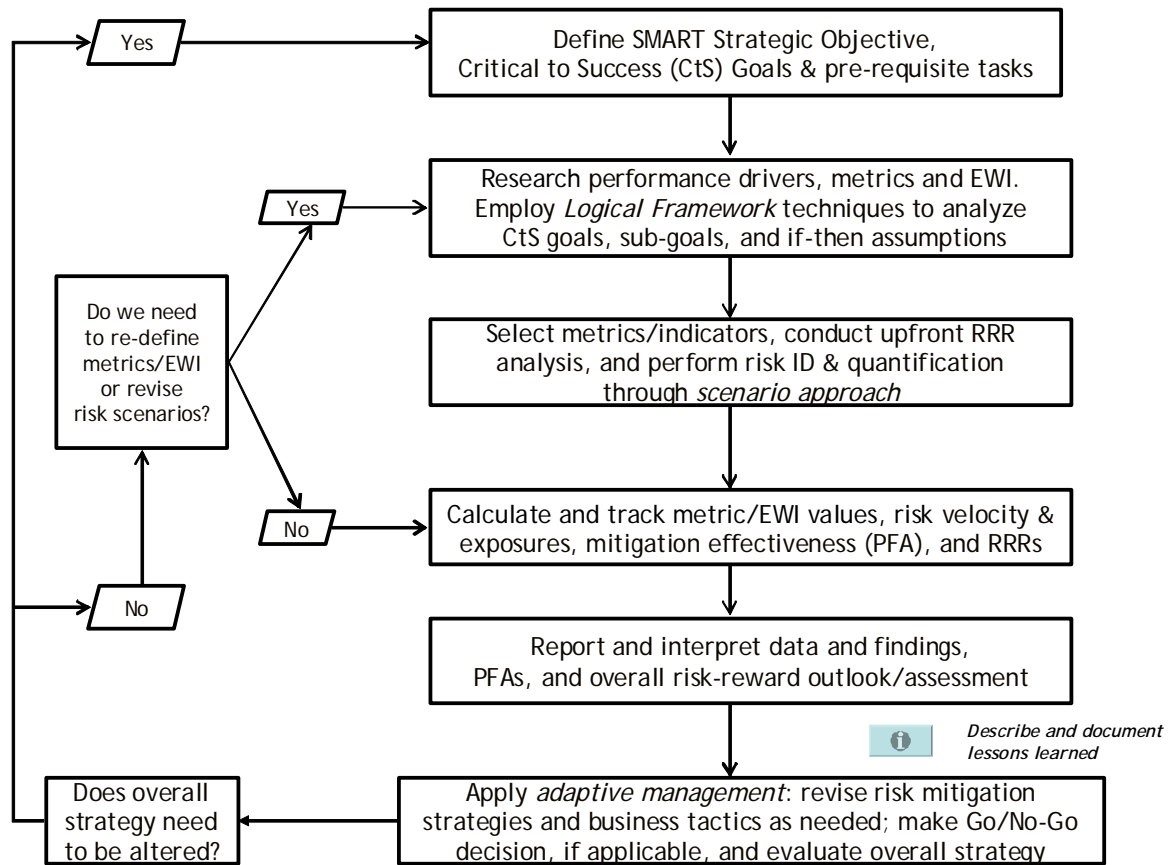
Ensure transparency and buy-in from risk experts and strategic planners.

Through the application of various metrics, early warning indicators, RRR, PFA, and its overall transparency, GPS satisfies Objective 3: *Enable “adaptive management”: timely and informed adjustments to business tactics, risk mitigations, strategic considerations, and a more objective basis for any termination decisions.* This capability provides a critical benefit to company management, and the resulting improvement in risk identification and risk culture demonstrates that SRM is effectively executed, and ERM (if a formal program exists) is expanding and maturing.

These benefits address Objective 4: *Improve perception of SRM (and possibly ERM) among shareholders, rating agencies, and other external stakeholders.*

In the case of an insurance company that leverages ERM capabilities to implement GPS, it is possible that a risk-reward focus becomes (more) embedded in the company culture, and this helps address the Own Risk and Solvency Assessment (ORSA) expectation of a clear link between ERM and strategic planning. Furthermore, this is accomplished in the way that best suits the company’s strategic needs.

Exhibit I: Illustrative GPS Process Flow



3. Risk Management of the Portfolio of Strategic Objectives

3.1. Simulation of Strategic Objective Performance

Given a strategic objective, GPS employs a scenario approach to identify and quantify *each* key risk source influencing the company’s ultimate success or failure in pursuit of the objective. The output

Exhibit II				
Scenario Summary for Foreign Exchange Rate Risk (Dollar vs. Euro)				
Scenario Description	Probability	Impacts to Business Drivers	Year 1 Earnings Impact	Company Value Impact
1. Exchange rate stays within 10% of March 1 levels for next 12 months	35%	Assume baseline forecast interval estimate applies	Assume baseline forecast interval estimate applies	Assume baseline forecast interval estimate applies
2. Dollar appreciates vs. Euro by 10-20%	25%	\$US Sales Down 20% (vs. baseline, post currency translation)	-\$20M	-\$54M
3. Dollar appreciates vs. Euro by >20%	20%	\$US Sales Down 35%	-\$35M	-\$95M
4. Dollar depreciates vs. Euro by 10-20%	15%	\$US Sales Up 15%	\$15M	\$41M
5. Dollar depreciates vs. Euro >20%	5%	\$US Sales Down 30%	\$30M	\$81M
Statistical Expectation			-8M	-22M
Downside Conditional Expectation			-27M	-72M
Challenges	<i>[list perceived difficulties in risk prevention or impact reduction]</i>			
Mitigations	<i>[identify existing risk controls that reduce likelihood and/or expected business effects]</i>			
Potential for Action	<i>[assess the expected benefit to the company’s risk-reward profile from additional focus or effort on risk mitigation]</i>			

of 0.25, the probability of scenario 2). In Excel one can use the “rand” function to generate these random numbers.

If such a simulation is performed *for each risk source* (reflecting its own set of scenarios, probabilities, and impacts) that is analyzed for a strategic objective, one can aggregate the impacts to business drivers to simulate overall performance for the strategic objective and impacts to earnings and company value. Several examples of simulation for strategic objectives can be found Appendix B.

Through many such simulations, one can produce the distribution of performance for this

objective. It is important to communicate that the distribution is directly linked to the selection of the scenarios, their estimated impacts, and the assumed probabilities.

This aggregation can assume that the various scenario impacts are additive or might employ a more sophisticated methodology. It is an important caveat that the additive approach and the separate simulation of each risk source assume that no significant correlations exist between the various risk sources. The methodology detailed in the remainder of this section suggests a way to capture such relationships when they are significant.

3.2. Conditional Probabilities

Assume that the analysis of an objective identifies three key risks: product demand, disability claims level, and expenses. For each of those three risk sources, scenario analysis was performed in the manner of Exhibit II.

We may have assigned the most adverse disability claims scenario (“scenario 1”) a probability of 10 percent, but this probability estimate makes no particular assumption about the economy. It is possible that if the risk experts knew (with certainty) that a severe recession would occur in the next year, they would have provided a larger probability estimate than “10 percent.” This concept of increased disability claims in the face of an economic downturn is well documented.

Scenario 1’s assigned probability of 10 percent is generic or unconditional in the sense that no assumptions are made about any macro-factors that might influence our estimate of the likelihood of that particular scenario for claims. It may make sense to say, for example, that *if we assume a severe recession occurs*, then this scenario is closer to a 20 percent probability. In a similar fashion, we would consider which other scenario probabilities are influenced by the

assumption of a severe recession. Of course, these conditional probabilities must still sum to 100 percent. They represent the range of possible outcomes in the face of a severe recession.

We continue the example with additional illustrative values. When we assume a severe recession does *not* occur, we estimate $\text{prob}(\text{scenario 1}) = 10$ percent, $\text{prob}(\text{scenario 2}) = 30$ percent, and $\text{prob}(\text{scenario 3}) = 60$ percent. When we assume a severe recession occurs we estimate $\text{prob}(\text{scenario 1}) = 20$ percent, $\text{prob}(\text{scenario 2}) = 25$ percent, and $\text{prob}(\text{scenario 3}) = 55$ percent. We now have two sets of (conditional) probabilities for the scenarios describing claims risk: one set corresponds to the economy being in severe recession, whereas the other assumes no severe recession is in effect.

This conditional concept can be reflected in the analysis for product demand and expenses as well. It is then straightforward to first simulate the economic regime and other macro-factors that together characterize the “state of the world” and then, reflecting that state, simulate the performance of this strategic objective.

A first set of random numbers will determine the scenario in effect for each macro-factor. Based on those simulated macro-factor scenarios, a specific set of probabilities will be activated for each risk source that is modeled for the objective. Then additional random numbers, one for each risk source in the objective, are generated to simulate which scenario occurs under each of those sources. Exhibit (ii) in Appendix B illustrates this type of “two-stage simulation.”

3.3. The Macro-Factor Overlay

For our modeling purposes, the macro-factors or states of the world are described using the scenario approach. Some may be of a binary nature (e.g., a particular proposed regulation becomes law in 2013 or it does not), and others might have a range of possible outcomes described in terms of three

to five hypothetical outcomes that capture (a representative profile of) the potential variability of the risk source.

As a simple example, assume that we have a strategic objective whose success primarily depends on two risk sources: customer disposable income and the ability to change product pricing on a frequent basis. We create risk scenarios, in the manner of Exhibit II, around each of these risk sources. We use the symbol \mathbf{S}_D to represent the scenario analysis performed for disposable income risk and \mathbf{S}_P for that of pricing flexibility risk.

Assume that \mathbf{S}_D has three sets of conditional probabilities for its scenarios, corresponding to each of these economic states: recovery, minor slowdown, or depression. Pricing flexibility may depend on both the fate of a proposed regulation as well as the state of the economy. Perhaps \mathbf{S}_P has four sets of probabilities for its scenarios, corresponding to these future macro-states: (1) a particular proposed regulation becomes law in 2013 *and* there is an economic recovery, (2) the proposed regulation becomes law in 2013 *and* there is *not* an economic recovery, (3) the proposed regulation does *not* become law in 2013 *and* there is an economic recovery, and (4) the proposed regulation does *not* become law in 2013 *and* there is *not* an economic recovery. The simulated macro-state (1, 2, 3, or 4) determines which probability assumptions are to be used when pricing flexibility is simulated.

As expected, our macro-factor scenarios include estimated probabilities for each of the modeled states. Macro-factor-based simulation for the performance of this strategic objective can then be carried out through the following process:

1. Generate two independent random numbers from a uniform distribution over (0,1): r_1 and r_2 .

2. Based on r_1 simulate the state of the economy, and based on r_2 simulate whether or not the proposed regulation becomes law. This is done in the manner of Section 3.1.
3. Based on the economy state and regulation result from (2), determine the activated sets of probabilities to be used when simulating customer disposable income and pricing flexibility.
4. Generate two independent random numbers from a uniform distribution over (0,1): r_3 and r_4 .
5. Based on r_3 and \mathbf{S}_D simulate the scenario for disposable income. Based on r_4 and \mathbf{S}_P simulate the scenario for pricing flexibility. In each case the activated probabilities are known from (3).
6. Aggregate the effects of the simulated scenarios from (5) to capture the simulated performance of the strategic objective.

See Appendix B for illustration of the above procedure.

In the above example, the simulated economic state influences the choice of conditional probabilities for *both* scenarios relating to disposable income and those for pricing flexibility. The simulated fate of the proposed regulation influences the appropriate set of probability values for those scenarios modeling pricing flexibility, but not disposable income. Through these types of linkages we are able to model certain correlations between strategic objectives without resorting to approaches involving correlation matrices and the associated complexities. Additionally, this macro-factor approach can capture relationships beyond the linear type that is detected by the traditional (Pearson) correlation measure.

We have assumed that the described scenarios for the *macro-factors* are *not* correlated. This can often be achieved if one is careful in the selection of these high-level risk sources. When it is desired to model correlation across macro-factors or their scenarios one can employ a simulation

approach based on the Cholesky decomposition of the assumed correlation matrix.

3.4. The Portfolio View

If enough macro-factors are identified and properly analyzed then, we can simulate the performance of all of a company's strategic objectives in this manner. In other words, we are able to model the behavior of the *portfolio* of strategic objectives in response to the simulated macro-conditions.

We must look at the full list of key risks (those with modeled scenarios) faced by any of our strategic objectives and determine the macro-factors that would influence our perceived likelihood of *any* of the modeled scenarios. The "usual suspects" for macro-factors that affect a multiline insurance company's pursuit of its objectives might include the economy, federal and state regulatory action, pandemics, and hurricanes.

In each simulation we (stochastically) model the state of each of the macro-factors and reflect those states in the simulation of the strategic objectives. By running several thousand simulations we can characterize our portfolio of strategic objectives by its exposure to macro-factors.

We can describe the *distribution* of potential performance of any objective in our portfolio. Percentiles and confidence intervals for a specific objective's metrics or the objective's contribution to company metric variation are straightforward to obtain from the simulation output. If, for example, we focus only on those simulations where a severe downside economic scenario was in effect, we can then rank all objectives by their relative sensitivity to economic stress. This can be performed for any macro-factor or combination of the factors.

This is a powerful approach that, for example, allows us to

- Determine those objectives with significant exposure to a particular macro-factor

- Identify objectives that diversify the portfolio or increase the portfolio's exposure to any single factor or combination of factors
- Obtain the conditional distribution (assuming the manifestation of a particular scenario of interest) for any individual objective or the portfolio of objectives
- Determine the overall riskiest objective, based on a particular metric, using a conditional tail expectation measure at a particular confidence level or other downside metric.⁸

4. A Risk-Reward View of Strategic Objectives

4.1. Risk Capital for Strategic Objectives

The risk analysis conducted for a strategic objective during the GPS process provides impacts to key business drivers, metrics, and financial statements for each of its modeled risk sources. We can use the simulation procedure of Section 3 to define a risk capital measure for a particular strategic objective.⁹

Assume that we will determine the risk capital for strategic objective X. As before, we simulate the macro-factors and then, based on those modeled states, simulate the scenarios corresponding to each modeled risk source for X. By aggregating these effects we simulate X's performance.

⁸ The conditional tail expectation (CTE) is the conditional expectation of a random variable assuming it is in a specific "tail." For example, if m is the fifth percentile of a continuous random variable X , then the *fifth percentile CTE* of X is the conditional expectation $E(X | X < m)$. When applied to a "right" tail, a ">" sign would appear in the expectation. When empirically estimating a CTE based on simulated observations, it is simply a matter of computing the average of all the simulated values that fall in the tail of interest. For example, in a run of 10,000 simulations, the average of the smallest 500 observations estimates the fifth percentile CTE.

⁹ For an approach different from that of Section 4.1, but with some similar themes, see Don Mango, Insurance Capital as a Shared Asset, *Casualty Actuarial Society Forum*, Fall 2006.

For each simulated performance of X, the modeled levels of the key metrics can be compared to their corresponding levels in the baseline or best-estimate forecast. This baseline may have been the forecast provided when X was originally given the green light (e.g., if X is a stand-alone or temporary initiative) or may have been part of the company’s recurring financial planning process (e.g., a GAAP earnings target in the case of an ongoing, core business).

Suppose our only metric of interest is annual earnings over a three-year time horizon, and the baseline forecast (in millions of dollars) is 100, 150, and 200 for years 1 to 3, respectively. We apply the macro-factor-based simulation a single time to get these simulated annual earnings for objective X: 80, 140, and 230.

We consider the notional set of earnings flows needed to supplement the simulated set of earnings to exactly match the baseline forecast. We had shortfalls of 20 and 10 for years 1 and 2, respectively, and year 3 was an *excess* of 30 versus baseline. Assuming end-of-year timing, the present value (PV) of this notional set of supplemental flows is

$$\text{PV}(\text{notional supplement}) = 20/(1 + i) + 10/(1 + i)^2 + (-30)/(1 + i)^3.$$

In the above expression, i is a discount rate, possibly related to an estimate of the company’s weighted average cost of capital or an opportunity cost. Alternatively, one may choose not to give “credit” (through the minus sign) for a simulated metric value that exceeds plan.¹⁰

This present value can be thought of as a notional infusion amount that gets actual performance back on track. We run several thousand simulations, and for the “ k th simulation” (e.g., the 10th or 738th) we have simulated earnings, for years 1 to 3, respectively, of $E1_k$, $E2_k$, and $E3_k$. Assuming the baseline earnings are $B1$, $B2$, and $B3$ the k th infusion is

¹⁰ In that case, each summand in the PV formula would be of the form: $\max(0, \text{baseline value} - \text{simulated value}) / (1+i)^n$. This type of customization should be based on the intended application of the capital measure.

$$k\text{th infusion} = \text{PV}(\text{notional supplement}) = (B1 - E1_k)/(1 + i) + (B2 - E2_k)/(1 + i)^2 + (B3 - E3_k)/(1 + i)^3.$$

In the run of several thousand such simulations we determine the 95th percentile of these infusion amounts. If we are able to do *another run* with the same number of simulations and the observed 95th percentile is (approximately) the same as that of the first run, then we define that common value to be the risk capital for objective X.

If the above stability in percentiles is not seen, then we simply increase the number of simulations in a run until we consistently generate the same percentile value across runs, thereby calculating risk capital.

One can customize the confidence level (e.g., 99 percent or 99.97 percent) or the metric and still apply the same procedure to develop risk capital.

Using the approach of Section 3.4 we can simulate all key macro-factors and the performance of the portfolio of strategic objectives. By recording the value of the infusion for each objective in each simulation we obtain the risk capital for each objective. In other words, in a large run we determine risk capital for each objective *simultaneously*.

Suppose in each simulation we sum up the annual shortfalls and excesses (for each year) across all objectives and then compute the present value of those sums to describe a portfolio infusion need. We can then compute the 95th (or other high) percentile for those portfolio infusions to arrive at the *risk capital for the portfolio* of strategic objectives. Note that this portfolio risk capital reflects netting: when one objective is ahead of plan in a particular year, that notional excess can (partially) fund an infusion need for other objectives that are lagging in some way in that year.

By repeating that simulation with one objective held constant at its baseline projection levels in every simulation (“zero risk”) we can then observe if the portfolio risk capital is more or less than when this objective’s performance had been simulated along with that of all the other objectives.

This can be used for identification of risk-reducing objectives or risk-increasing objectives. Additionally, one can use these concepts to allocate overall portfolio risk to each objective.

4.2. Risk-Adjusted Return of Strategic Objectives

In the prior section, we collected various numerical items from each simulation of a large run. If at the same time we also gather each objective's respective impact to a baseline (e.g., the plan/budget) company value metric (e.g., present value of free cash flows), then we can form a risk-adjusted return measure for a particular objective:

risk-adjusted return of objective X = average impact in company value due to X / risk capital of X.

This is an example of a so-called RORAC measure because it measures “return on risk-adjusted capital.” This is a true risk-adjusted return: given two objectives with the same reward measure, as captured in the numerator, the objective with the *lower* risk capital will have the *higher* risk-adjusted return. One can replace the expectation (average) in the numerator with its 50th percentile or change the reward metric entirely, perhaps using net cash flow, earnings, or a weighted average of several metrics.

In a manner similar to that in Section 4.1, one can use this simulation to derive the risk-adjusted return of the *portfolio of objectives*. The simulation can then be repeated with one objective being set to have zero risk (always producing its baseline forecast), and we can then observe the change in risk-adjusted return of the portfolio. Again, this type of information shows which objectives provide diversification benefits and allows for an attribution of the portfolio risk-adjusted return to its constituent objectives.

It is worth mentioning that the risk-adjusted return measure can be used retrospectively, that is, on an “actual” basis. In this case, the denominator is the same, and the reward measure in the numerator is gathered from recent performance data or financial statements.

4.3. Portfolio Analytics, Risk Appetite, and Capital Deployment

In traditional risk analysis for investment portfolios it is common to describe the portfolio’s asset allocation across asset classes that are differentiated, in part, by their distinct risk-reward profiles. Such asset classes often include cash equivalents, investment-grade bonds, high-yield bonds, and equities. The usual theme is that a higher expected (or average) return (yield) often goes hand in hand with a greater risk as defined by the standard deviation or downside volatility of the return measure.

The simulation of the strategic objective portfolio accommodates similar analysis. We might define *risk classes* of strategic objectives by (1) determining the average simulated internal rate of return (IRR) versus the 5th percentile conditional tail expectation for IRR for each objective, and (2) categorizing these objectives as “high reward/high risk,” “medium reward/medium risk,” etc.

To carry out the above categorization one can first define ranges of average IRR corresponding to high, medium, and low reward and similarly define ranges for high, medium, and low risk. Such analysis can also be carried out for conditional runs where one or more of the macro-factors are forced to occur and the rest vary stochastically according to their probabilities.

If the simulation includes RRR calculations, it may be of interest to look at the percentage of simulations where a particular objective would be indicated as unlikely to succeed, as based on the RRR concept. With a large number of metrics tracked in our GPS work and the many risk-reward measures available today, a myriad of ways are available to “slice and dice” the strategic portfolio.

Because the above concepts allow us to examine portfolio exposures and allocations through a methodical approach, it is possible to objectively set strategic risk appetite statements and capital deployment decision rules. Examples include the following:

- We will not pursue an objective that increases our exposure to the EU's economy (measured by metric M) to more than $\$Y$ or that leads to an allocation of more than $X\%$ in "risk class C" or lower
- Given objectives competing for the same funding, priority will be given to the objective with a higher risk-adjusted return
- We give the lowest priority to objectives relating to regulated products where the calculated risk capital for the objective is less than the corresponding regulatory requirements
- Our portfolio of objectives will aim for at least Y percent on a three-year rolling average of our risk-adjusted return measure
- No new strategic objective that increases portfolio risk capital will be funded in the next year unless it improves the expected portfolio risk-adjusted return by at least 20 bps.

5. Risk-Adjusted Compensation

5.1. The Multiplicative Bonus Factor

An important theme of GPS is that when decisions must be made in the face of uncertainty, a scenario approach is the preferred method. The upfront analysis relating to a strategic objective's potential *high-level performance* should include various outcomes for sales, claims, expenses, and profits. As usual, we require probabilities for each scenario. These high-level forecast scenarios, typically provided as part of getting management's "go ahead," allow for a compensation measure that reflects both the company's performance in pursuing the objective as well as the quality of the

upfront risk analysis. Historically, such a compensation scheme has often been challenging because of an inherent conflict of interest.

When initial projections for a new venture or objective are provided to management, a somewhat optimistic view may be portrayed so as to “sell” the project internally. Management wants to have a clear understanding of the inherent risks to achieving the objective, but the strategic team may be hesitant to accurately portray any large downside potential for fear of jeopardizing buy-in or funding. In many cases those providing the critical projections and assessment truly want to communicate the downside but feel constrained by the possibility that their proposed product, venture, or change strategy will be rejected.

The scenario-based risk analysis inherent in GPS and the macro-factor overlay (Section 3.2) provide a straightforward solution. We define a compensation measure that reflects both the quality of our upfront risk analysis as well as our execution efforts in pursuit of the strategic objective.

Consider a strategic objective that uses sales as the single metric for gauging success. For simplicity, assume that the objective is sales of at least \$100 million in the next year and the strategic team’s high-level analysis describes exactly three scenarios:

Scenario 1: Sales exceed \$150 million; scenario expectation = \$170; probability = 25 percent

Scenario 2: Sales are \$100–150 million; scenario expectation = \$125; probability = 45 percent

Scenario 3: Sales are less than \$100 million; scenario expectation = \$80; probability = 30 percent

Note that we have added the estimate of expected sales level in each scenario. This is a conditional expectation and can be thought of as our best estimate for the sales level assuming it is known that actual sales fall into the indicated range for the scenario of interest.

To define our risk-adjusted compensation, we calculate a multiplicative factor that will be applied to some notional or “target” bonus amount. It will be a weighted average of two components. Meeting the objective is a primary goal so the first component is the ratio of actual sales to \$100 million. This captures absolute performance, while the second component, defined below, reflects the quality of the strategy team’s upfront scenario analysis.

Assuming an actual sales level of X , we calculate the following quantity to reflect the quality of the risk analysis:

$$P1 \times X/(\text{scenario 1 expectation}) + P2 \times X/(\text{scenario 2 expectation}) + P3 \times X/(\text{scenario 3 expectation})$$

where $P1 = \text{prob}(\text{scenario 1}) = 25$ percent, $P2 = 45$ percent, and $P3 = 30$ percent. Given the actual sales level X , the multiplicative factor F is the weighted average, $w1 \times \text{component 1} + w2 \times \text{component 2}$:

$$F = w1 \times X/\text{objective target} + w2 \times (P1 \times X/\text{scenario 1 expectation} + P2 \times X/\text{scenario 2 expectation} + P3 \times X/\text{scenario 3 expectation})$$

The weights $w1$ and $w2$ sum to one and are selected by a compensation committee and/or management, prior to pursuit of the objective. The weights represent the consensus view of the relative importance of absolute performance versus the quality of the upfront high-level scenario

analysis. The formula has an obvious extension to any number of scenarios. The “objective target” in this expression is our goal of \$100 million.

Assuming $w_1 = 60$ percent and $w_2 = 40$ percent and actual sales of \$70 million we have

$$F = 60\% \times (70/100) + 40\% \times (25\% \times 70/170 + 45\% \times 70/125 + 30\% \times 70/80) = 0.667.$$

This factor is slightly lower than if it had been defined as the ratio of actual to target sales, when it would have been 0.700. This is due to the fact that the scenario analysis suggests that the target sales level of \$100 million is somewhat “conservative.” The scenarios indicate a 70 percent chance of sales being at least \$100 million and therefore express an optimistic view about the company’s outlook for achieving this target level.

It is important to note that if the probabilities were reduced for scenarios 1 and 2 and the probability of scenario 3 was increased (to ensure they sum to one), this would represent a more pessimistic outlook, and missing the target would have been penalized *to a lesser extent* (i.e., the factor would have been larger). This concept will be known by those performing the upfront analysis. By including this component in the bonus factor we help keep in check the temptation to portray an (overly) optimistic outlook to win support for a project.¹¹

There will be situations where performance is assessed by multiple metrics. In that case one can calculate a factor as above for each metric and then apply weights to all of them to arrive at the overall bonus factor.

¹¹ This component of the factor, related to the upfront scenario analysis, is different from that which would be obtained if one compared actual metric results to the expected value of the scenarios. The method of this paper is sensitive to the expected metric level in each scenario, whereas the expected value of the scenarios may lose some of this information.

Some objectives may define targets based on metrics that evolve during the objective's time horizon. For example, an IT expense reduction initiative may initially focus on the number of people switched to more economical "multifunction devices," but after two years the metric might be redefined as reduction in IT expenses. In this case the factor reflects a different metric depending on the quarter or year to which it is applied.

5.2. Low Manipulation Potential

Traditionally the initial analysis for a strategy tends to be "rosy" in that it underestimates the probabilities of downside scenarios. Such optimism can also be seen in the overestimation of the forecast metric levels in each scenario. The multiplicative bonus factor addresses both of these issues.

Because of the second component in the factor F (weighted by w_2) one can help protect his or her bonus by portraying a larger, more realistic chance for failing to achieve the targeted success level. Furthermore, by choosing realistic metric levels within downside scenarios, there is further improvement in the "bonus at risk." These motivations help to balance the natural tendencies that a strategic team member may have in order to "sell" the strategic concept and action plan.

The first component of F (and a relatively large weight w_1) helps to stress that absolute performance versus the objective is of primary importance. The second component creates an incentive for realistic strategic forecasts. A natural question is the following: to what extent might the scenario analysis be manipulated in an attempt to increase one's bonus through the second component?

As an example, assume an executive on the strategic team will receive a bonus of \$100,000 $\times F$, where F is the multiplicative bonus factor defined as above. In the case of a set of three scenarios and an actual achieved metric level of X , we have

$$F = w_1 \times X/\text{objective target} + w_2 \times (P_1 \times X/\text{scenario 1 expectation} + P_2 \times X/\text{scenario 2 expectation} + P_3 \times X/\text{scenario 3 expectation}).$$

We will make an assumption about how much one can “play” with the scenario metric and probability estimates before management pushes back. For simplicity, assume one can change a probability by up to 10 percent and a metric level can be altered by \$20 million before management questions the validity of the assumptions. In that case, one might alter the scenarios from Section 5.1 to be

Scenario 1: Sales exceed \$150 million; scenario expectation = \$170; probability = *15 percent*

Scenario 2: Sales are \$100–150 million; scenario expectation = \$125; probability = 45 percent

Scenario 3: Sales are less than \$100 million; scenario expectation = *\$60*; probability = *40 percent*

The manipulated values, portraying a more pessimistic view, are italicized.

The original scenarios and the bonus factor of 0.667 determined in Section 5.1 (using the assumed sales of \$70 million) would mean a bonus of $0.667(100,000)$ or \$66,700. With the manipulated scenario assumptions we have $F = 0.732$, leading to a bonus of \$73,200. This

represents an increase of only \$6500 (pretax) assuming a specific downside scenario will play out (actual sales of \$70 million), but the changes in these estimates would make the strategy look significantly less attractive during its initial pitch. Clearly there is not much appeal to such an attempt at bonus manipulation.

6. Conclusion

A company's approach to strategic risk management must align with its mission, risk culture, and capabilities. The GPS framework is an intuitive and robust approach based on the best available information as provided by the company's risk experts. GPS can be implemented as an extension of existing ERM processes or as a standalone SRM framework. In either case, the various modeling extensions of the approach (Sections 3–5) do not represent a burdensome additional time investment.

It is not uncommon to encounter resistance to methods that require numerical estimates of probabilities and impacts for risk scenarios. It is important to remember that decisions will be made in any event, so they might as well be based on the best available information, even if some of it consists of educated guesses. Sim Segal provides a thorough answer to the question “Aren't these just guesses?”¹² As John Maynard Keynes put it, “It is better to be roughly right than precisely wrong.”

Other approaches to SRM can yield some of the benefits of the GPS framework, but few combine its transparency, stakeholder buy-in, and its ability to enable adaptive management, a portfolio view of strategic objectives, risk-adjusted performance measurement, and risk-intelligent capital allocation.

¹² Cf. note 1, p. 91.

Appendix A: Example of GPS Applied to the Launch of a Retail Warranty Product

We now apply the framework to a product launch at an insurance company: a retail warranty product to be marketed to consumers in Italy. The warranties will be sold by employees at a moderately sized retail chain in Italy. The company has sold a similar product in France for the past five years.

Based on initial research and analysis, the strategic team provides several forecasts including expected P&L statements and highlights opportunities for future partnerships with top-tier retailers. A scenario approach was employed to express the uncertainty inherent in such projections. It was this analysis that helped get the “green light” from management.

The strategic objective is stated as follows: *(1) Launch the product by June 1 and (2) produce at least \$300 million in premium cash flows over the first 36 months and net GAAP earnings exceeding \$10 million in each of years 2 and 3.*

The project plan suggests that three main goals must be achieved for the strategic objective to be attained. These *critical to success* goals (CtS) are (G1) train the retail sales people by March 1, (G2) increase year-over-year sales by at least 15 percent in each of years 2 and 3, and (G3) decrease year-over-year claims administration costs by at least 15 percent in each of years 2 and 3.

Back-steps suggest the following:

- To meet G1 we must set up three on-site visits at retail locations where two of our employees each lead a full-day session
- To reach G2 our internet marketing plan must increase the number of hits on the site by 30 percent in the next 12 months, and our retail partners must have a success rate of at least 20 percent when offering the warranty

- To achieve G3 a new protocol for handling claims must be implemented, and call center employees must show performance improvement in each of the next three years

Relevant *progress metrics* might include total number of staff trained, number of hits on the marketing website, per employee sales, and average time spent and dollar payout per claim for each call center employee. Of course, premium revenue, claims, expenses, and profits are carefully tracked.

Risk experts, including the strategic team, analyze various assumptions regarding claim frequency, claim severity, marketing effectiveness, training programs, and macro-factors including Italy's disposable income trends and foreign exchange volatility. In addition, where the project plan makes assertions such as "if we complete tasks A and B, *then* we'll achieve goal X," we identify the necessary conditions for the "then" to be valid in reality. A focus on assumptions underlying if-then thinking is a key component of the Logical Framework.¹³

Several critical assumptions are identified including the following:

1. The forecast profit levels assume that claims experience will be within 10 percent of that seen in the experience with the company's similar product in France
2. Sales levels must quickly ramp up after the low levels projected in year 1
3. Call center training is assumed to lead to reduced claims payout and improved efficiency

These suggest risks to achieving the strategic objective that include claims behavior differences across countries, stagnant sales growth, and unsuccessful efforts to improve call center profitability or resource usage.

In addition, there are risks that an economic downturn (in Italy or globally) would drive down demand for the product or currency fluctuations could either make the warranty's price

¹³ See note 4 above.

prohibitive or drive down U.S. dollar profits. It is determined, after considerable analysis, that the ISAE consumer confidence index is a leading indicator for demand for a retail warranty product among Italian consumers.

The above illustrates steps including stating the objective, selecting progress metrics and early warning indicators, and performing risk identification. We then use the risk interview approach to describe hypothetical scenarios that capture a range of outcomes for the key risks. In the case of risks that are strictly of a project planning nature, this scenario approach is not needed. One might simply identify a project challenge and address it by suggesting an additional subgoal, process change, or increase in resources.

Before the product launch, several RRR values are considered, and for each a probability estimate of success given that RRR value (at its indicated point in time) is provided. We capture RRRs at various time steps over the objective horizon and of varying severity, including the following:

- RRR = 120 percent at $t = 1$ year, RRR = 150 percent at $t = 1$ year
- RRR = 130 percent at $t = 2$ years, RRR=140 percent at $t = 2.5$ years
- Conditional probability estimates $\text{prob}(\text{success on goal} \mid \text{RRR and } t)$ for each RRR/ t combination

Based on this work we embed the selected EWI, metrics, and indicators into a realistic and detailed project plan. The project plan includes reporting deadlines and progress-based decision triggers.

Now we are ready to apply the framework to manage the objective. On a monthly or quarterly basis we do the following:

1. Track metrics/EWI, and identify and quantify any changing risk exposures, rate risk velocities, and assess mitigation effectiveness through PFA.
2. Observe and report progress metrics and provide a status update including an estimate of the likelihood of attaining critical subgoals and CtS goals, as well as the strategic objective.
3. Based on (1) and (2), alter or refine strategic elements such as business tactics, risk mitigations (with medium/high PFA), “go/no-go” decisions with RRRs (if applicable), or overall strategic course. Document and retain any lessons learned. If overall strategy is to be altered, then return to the initial setting of the strategic objective. Otherwise repeat these three steps.

Illustrative changes in tactics might include increased training at underperforming retail stores, the creation and implementation of a new procedure for small claims administration, a bigger push on a specific marketing campaign, or purchase of a currency hedge such as futures. Changes in risk mitigation strategies, such as this currency hedge, are suggested and supported by PFA analysis.

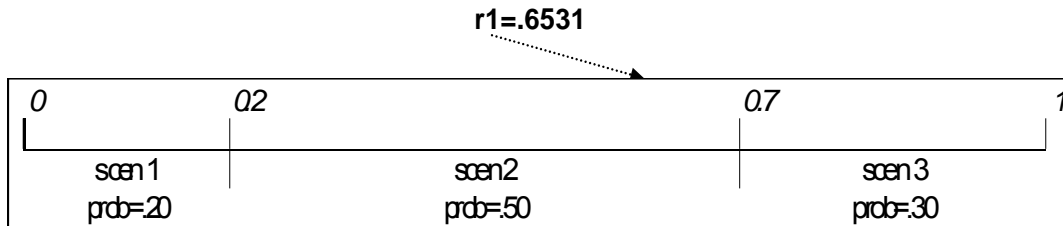
Appendix B: Examples of Simulation for Strategic Objectives

Exhibit (i): Simulation of a Strategic Objective with Two Risk Sources

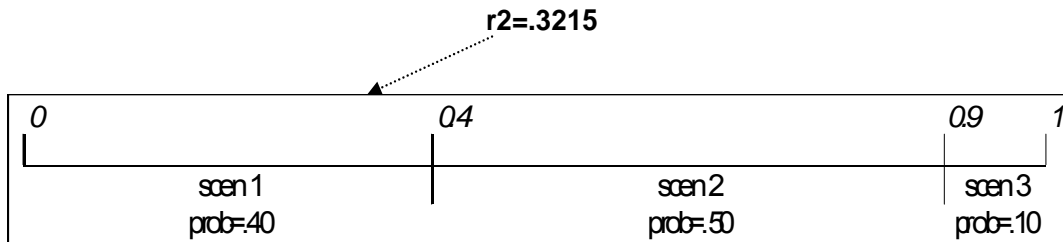
Generate two independent random numbers from a uniform distribution over (0, 1): **r1** and **r2**

- **r1** determines the simulated scenario for risk source 1
- **r2** determines the simulated scenario for risk source 2

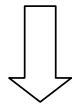
Interpret each of the above numbers as a scenario by using the respective decision rule / “mapping” for that risk source (based on scenario probabilities)*:



risk source 1: scenario 2 is simulated



risk source 2: scenario 1 is simulated



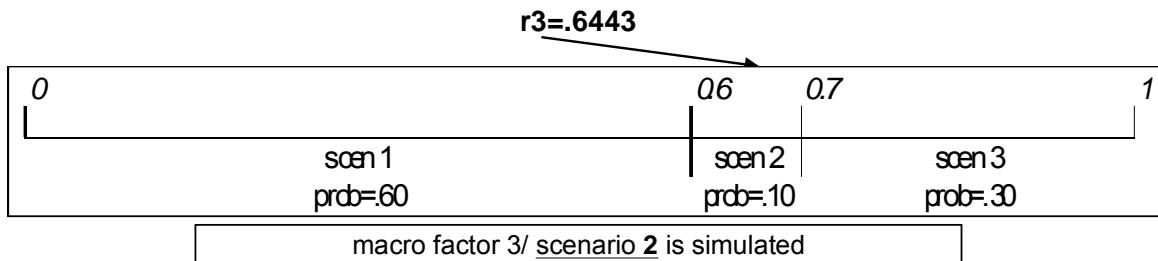
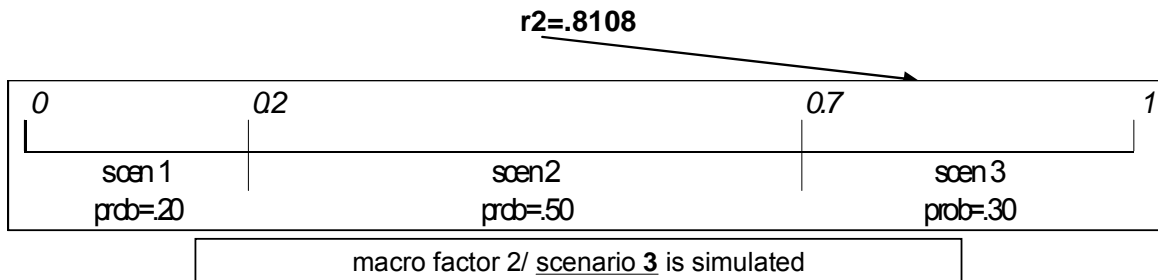
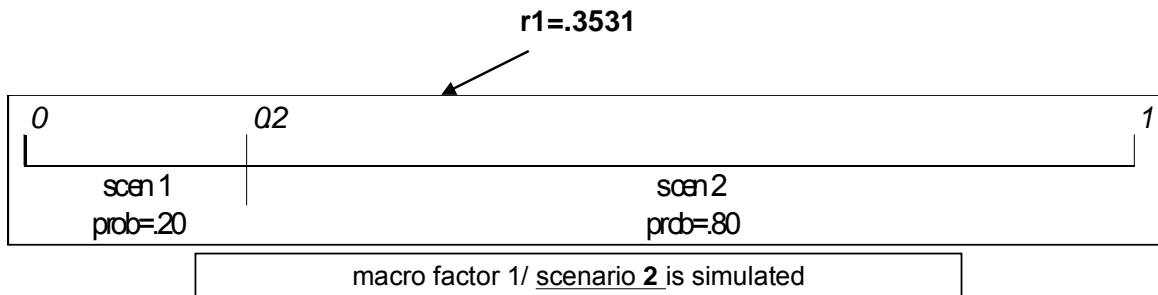
determine performance for strategic objective X:
aggregate impacts from above simulated scenarios

*e.g., for the first risk source, shown on the left, prob (scen 1)=.20, prob (scen 2) =.50, prob (scen 3) =.30 and the decision rule (mapping) is based on the (random) value of r1 as follows: If $r1 < .20$ then scenario 1 is activated, if $.20 \leq r1 < .70$ then scenario 2, if $r1 \geq .70$ then scenario 3. The width of the kth sub-interval is equal to prob (scen k).

Exhibit (ii): Macro Factor Based Simulation of a Strategic Objective (assuming 3 macro factors)

Generate three independent random numbers from a uniform distribution over (0,1): **r1, r2** and **r3**

r1, r2, r3 determine the simulated scenario for
macro factor 1 , macro factor 2 and macro factor 3 respectively



The above macro scenarios activate **conditional probabilities for each risk source** of the objective...

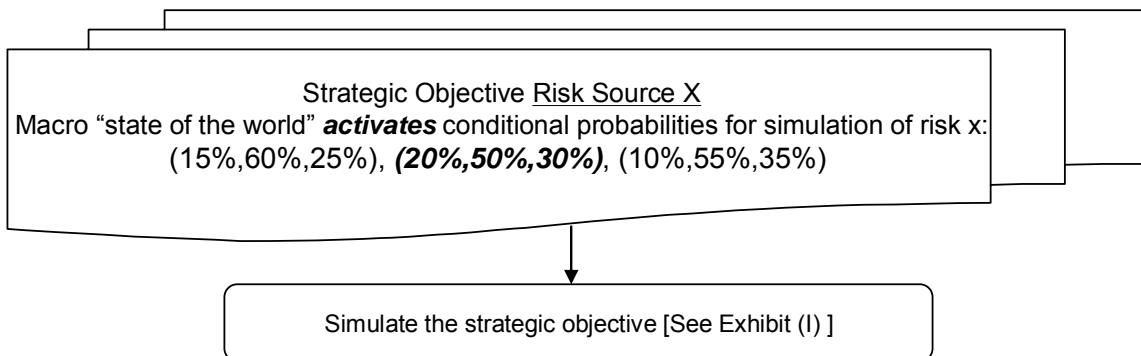
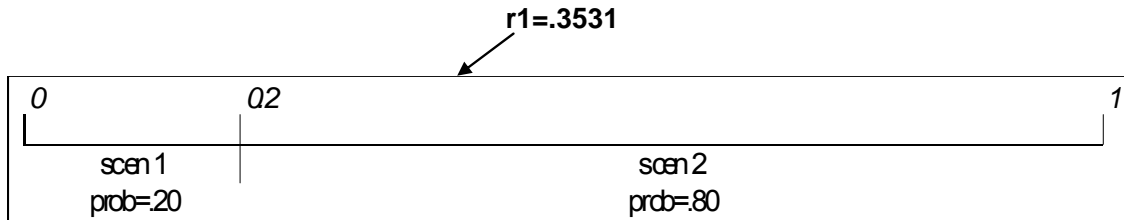


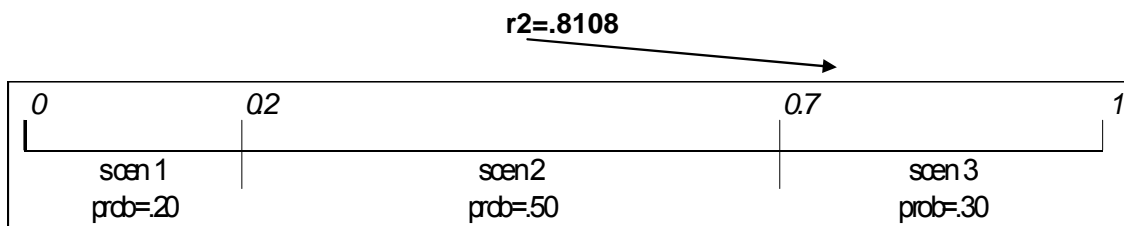
Exhibit (iii): Macro Factor Based Simulation of the Portfolio of Strategic Objectives (assuming 3 macro factors and 4 strategic objectives)

Generate three independent random numbers from a uniform distribution over (0, 1): r_1 , r_2 and r_3

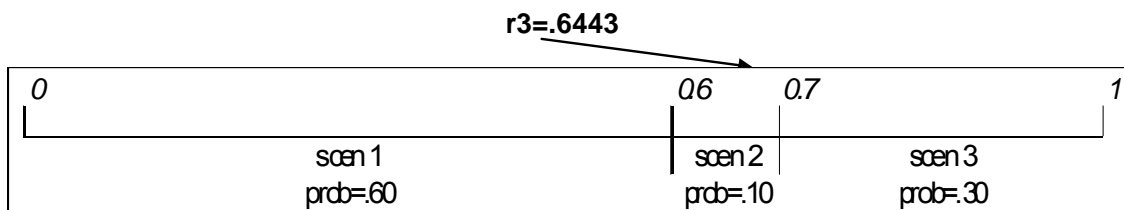
r_1 determines the simulated scenario for macro factor 1
 r_2 determines the simulated scenario for macro factor 2
 r_3 determines the simulated scenario for macro factor 3



macro factor 1/ scenario 2 is simulated

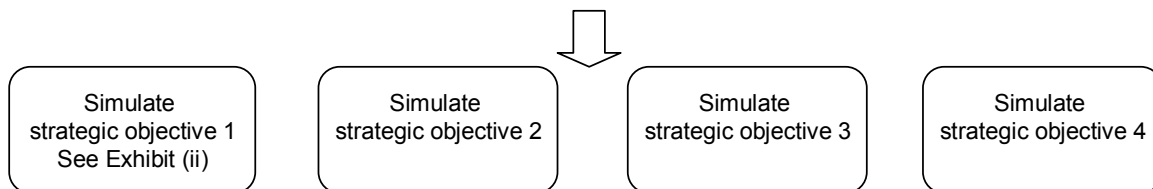


macro factor 2/ scenario 3 is simulated



macro factor 3/ scenario 2 is simulated

Based on simulated *state of the world*, "(2,3,2)", determine which conditional probabilities are in effect ("activated") for each of the following simulations in the portfolio of strategic objectives



Note: some strategic objective simulations may not be affected by the outcome of certain macro factors

Appendix C: GPS Implementation in 100 Days

With a firm commitment of resources and high-level buy-in, the outline presented in this appendix provides a clear path toward quick implementation of GPS. It will be easier to obtain if an ERM function already exists within the company, but this is not essential.

Action in the business world is, for better or worse, typically driven by meetings. The following implementation guide is therefore based on a series of meetings that will drive the realization of the GPS framework. To accommodate competing schedules some meetings may need to be repeated or offered at multiple times and locations to reach their intended audiences.

The following is a chronological summary of key goals:

Day 1–20

- Dates and times are agreed to for all meetings through day 100. (Suggested meeting details with agendas and key outputs are covered after this chronological summary.)
- Provide introduction and overview of the framework to all key SRM contributors. This targeted group can include representatives from functions such as management, product design, actuarial, finance, ERM, marketing, sales/distribution, IT, legal/compliance, internal audit, underwriting, and HR and other key contributors to strategic objective setting, planning, and execution. (Covered in Meeting I and Meeting II)
- Create SRM steering committee (SC) with a breadth of departmental representation. Include those who have a firm grasp of risk management theory and practice, including risk identification, quantification, and the scenario approach. This committee may, in some cases, be composed of members from an ERM function and frequent strategic team participants. (Meeting III)

Day 21–40

- SC conducts training in basic probability, risk identification, and risk quantification based on the scenario approach. Case studies are frequently utilized and are based on actual business lines and past strategic objectives of the company or industry. The training is across all business units and targets key decision makers among those functions listed under the first bullet for the Day 1–20 section. (Meetings IV and V)
- SC trains the same group (“framework practitioners” [FPs]) in selection and use of risk metrics, progress tracking metrics, and early warning indicators (EWIs). Additional topics covered include risk velocity, required recovery ratio (RRR), risk mitigation assessment, and potential for action (PFA). (Meetings VI and VII)

Days 41–60

- SC and FPs work together to draft a written policy and procedure document. (Meeting VIII)
- FPs conduct training and review for their respective business units. Content includes the newly created policy/procedure document and a recap of prior GPS education. (Meeting IX)

Days 61–80

- SC/FPs agree on a uniform reporting format, and several subgroups produce sample reports for a given strategic objective to verify common understanding and consistency of approach. (Meeting X)
- The above subgroups carry out a “dry run” or table-top exercise designed by the SC and management. (Meeting XI)
- All parties in the above two steps have a debrief to review results and summarize lessons learned on topics including the scenario approach, metric/EWI definition and tracking, risk velocity ratings, and calculation of RRR and PFA. (Meeting XII)

- The same group meets to discuss the key messages that the table-top exercise produced as far as adaptive management. The quality of the information and the ability to act on such data should be discussed. Any future improvements should be documented. (Meeting XIII)

Days 81–100

- This catch-up meeting was scheduled on Day 1 to address any potential project management challenges or canceled meeting. (Meeting XIV)
- A new strategic objective is selected to be part of the first execution of GPS, and a team is formed to carry out the GPS process on this objective. GPS will be done *in parallel* to the traditional methods the company has used for SRM. The team includes those responsible for creation of, planning for, and execution of the objective as well as several FPs in relevant functional areas and business units. (Meeting XV) Note: It is likely that the objective time horizon will extend well beyond the 100th day; feedback for GPS will be based on its upfront analysis and observations and is the topic of Meeting XVI, below.
- The above group and management discuss how GPS improved the risk management process and what could be done differently to improve some or all of the following: risk identification, risk quantification, metric or EWI selection/tracking, mitigation assessment, RRR analysis, and adaptive management. (Meeting XVI) At this point, GPS is installed and ready to manage the next strategic objective.

The next page provides a summary of meeting agendas, invitees, and durations. If after reading through the meeting details and time commitments it is determined that such an implementation is not possible with current resource constraints, it is recommended that the company consider a longer implementation timeframe or an alternative to GPS that could serve as a foundation for an eventual GPS framework. Some suggested references will be provided in that regard.

Illustrative Meetings Driving GPS Implementation

	Phase	Agenda	Attendees	Duration (hours)
Meeting I	Days 1-20	training for motivation/purpose of SRM, GPS overview, logical framework concepts, ideal planning for strategic objectives	key contributors to strategic conception/execution; broad departmental representation is necessary	3.5
Meeting II	Days 1-20	training: quick review of (I), deeper dive into GPS, several case studies employed to illustrate GPS application	same as (1), to be referred to as framework practitioners (FP)	3.5
Meeting III	Days 1-20	creation of GPS implementation steering committee (SC)	top management and short list of candidates from (1) that are considered for steering committee (SC)	2
Meeting IV	Days 21-40	SC conducts training in basic probability, risk identification, and risk quantification based on the scenario approach	SC, FP	3
Meeting V	Days 21-40	Case studies utilized to reinforce concepts from (IV). Studies are based on actual business lines and past strategic objectives of the company or industry	SC, FP	3.5
Meeting VI	Days 21-40	SC trains FP in selection and use of risk metrics, progress tracking metrics, and early warning indicators (EWI)	SC, FP	3
Meeting VII	Days 21-40	SC trains FP in use of risk velocity, required recovery ratio (RRR), risk mitigation assessment, and potential for action (PFA)	SC, FP	3.5
Meeting VIII	Days 41-60	SC and FP draft a written policy and procedure document for GPS at the company (significant meeting follow-up work is required)	SC, FP	2.5
Meeting IX	Days 41-60	FP breaks into subgroups by business unit and each trains the strategic contributors at their own unit; training is based on the document from VIII	FP and business unit strategic planning/execution contributors	3.5
Meeting X	Days 61-80	A uniform reporting format is described for recurring analysis coming from GPS process. Several subgroups provide sample reports to verify a consensus understanding.	SC, FP	2.5
Meeting XI	Days 61-80	Several subgroups participate in a "dry-run" or table-top application of GPS applied to a specific strategic objective (e.g. a previous or hypothetical example)	SC, FP and business unit strategic planning/execution contributors	6
Meeting XII	Days 61-80	Conduct a debrief on dry-run: review results and summarize lessons learned on topics including the scenario approach, metric/EWI definition and tracking, risk velocity ratings, and calculation of RRR and PFA	SC, FP and business unit strategic planning/execution contributors	3
Meeting XIII	Days 61-80	A second debrief to analyze the timing and quality of the information coming out of the dry-run that was meant to enable adaptive management. Improvements are suggested and recorded in the GPS policy document	SC, FP and business unit strategic planning/execution contributors	3
Meeting XIV	Days 81-100	This is a catch-up meeting with topics to be determined	(attendees to be determined)	3
Meeting XV	Days 81-100	A new strategic objective is selected to be part of the first live execution of GPS. The selected team will carry out GPS in parallel to traditional processes on this objective	A subgroup of the attendees from XIII, based on the particular objective and relevant risk experts (include SC)	2
Meeting XVI	Days 81-100	Discuss how GPS improved the risk management process and what could be done differently (consider risk ID, quantification, metric or EWI selection/tracking, mitigation assessment, RRR analysis, and adaptive management)	Management, SC, FP, and group from XV	3

Note: preparation and execution time commitments are not shown above but must be carefully considered in resource planning and scheduling

Some companies may seek an alternate SRM framework that could eventually be expanded to attain true GPS implementation. A direct and intuitive methodology is presented in Gregory Monahan's *Enterprise Risk Management: A Methodology for Achieving Strategic Objectives* (Wiley and SAS Business Series (Book 16); Wiley, 1 edition (Sept. 29, 2008)). Mr. Monahan provides a very readable description of a quantitative approach to SRM that makes use of progress metrics and early warning indicators. His healthy "obsession" with progress-tracking metrics, whether or not inspired by the Logical Framework, is an important step toward improving strategic planning and execution. GPS processes align with his recommendations for risk quantification methods grounded in solid probability theory and the setting of strategic objectives using the SMART criteria. In contrast, GPS emphasizes a forward-looking assessment of potential challenges to the objective, a scenario-based approach to risk identification and quantification (as opposed to the use of continuous distributions and Value-at-Risk), and customized metrics such as RRR and PFA to guide strategic modifications.

In his book *The Failure of Risk Management: Why It's Broken and How to Fix It* (Wiley; 1 edition (April 27, 2009)), Douglas Hubbard stresses the importance of estimating *numerical* risk probabilities rather than employing a scheme such as "high," "low," etc. He recommends Monte Carlo simulation of risk scenarios, similar to some of the GPS extensions, and highlights several common pitfalls for ERM practitioners. He goes on to offer many practical solutions.

In the McKinsey & Company white paper "Risk Modeling in a New Paradigm: Developing New Insight and Foresight on Structural Risk" (Angius et al., originally published January 2010. Updated May 2011), the authors stress that strategic risks are managed through *insight*, *positioning*, *foresight*, and *mitigation*. *Insight* refers to understanding a company's risk by linking key risk

drivers to their effects on the P&L and balance sheet. *Positioning* primarily refers to the scenario approach from GPS. *Foresight* is about anticipation of risk and employs, as does GPS, early warning indicators. Their use of the term *mitigation* describes knowing when to act and taking action; it includes notions similar to adaptive management as described in GPS.

The above resources and the risk management approach of Sim Segal all propose sound techniques that are consistent with many of the key concepts of GPS. Launching a basic SRM program on their recommendations and employing a scenario approach (that uses numerical probabilities and financial statement impact descriptions) will put a company far along the path toward GPS implementation.