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An Overview of the GPS Framework for Comprehensive Strategic Risk Management

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INTRODUCTION

This article introduces the Goals-Progress-Strategy (GPS) approach to Strategic Risk Management (SRM) with the following objectives: 1) increase the likelihood of attaining strategic objectives, 2) ensure transparency and buy-in from management, risk experts, and strategic planners, and 3) enable "adaptive management": timely and informed adjustments to business tactics, risk mitigations, strategic considerations, and a more objective basis for any termination decisions.

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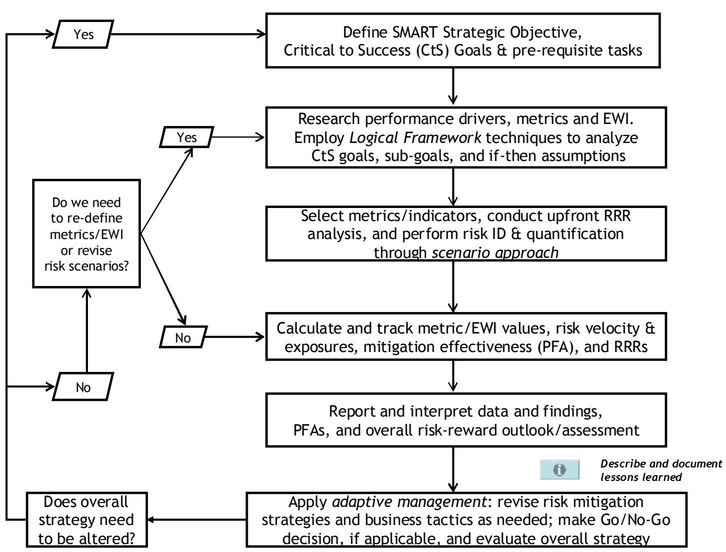
Exhibit 1: Illustrative GPS Process Flow



GPS is a comprehensive SRM system in that, for a company's strategic objectives, it enables:

- 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 as straightforward "add-ons.".

KEY CONCEPTS AND THE EXECUTION MANAGEMENT CYCLE

GPS employs a *scenario-based approach* to strategic risk identification and quantification. For a risk source of relevance to a strategic objective, subject matter experts provide a set of scenarios representing several ways the risk might manifest. Each scenario includes probability estimates and impact approximations for income statement or balance sheet components, leading to quantification in terms of key risk metrics (e.g., effects on GAAP earnings, company value, capital, etc.) GPS makes use of frequent use of several additional concepts which are now described in turn.

When a risk manifests, how long will it be before the company experiences some type of impact? This "speed of onset" is referred to as *risk velocity*. Hurricane risk, for example, is generally viewed as having high risk velocity while a risk relating to phased in health care regulations is potentially a low velocity risk.

Potential for Action (PFA) is a measure (possibly qualitative) of the expected benefit to the company's risk-reward profile from *additional* focus or effort on risk mitigation.

For an underperforming strategic objective, the *Required Recovery Ratio* (RRR) gauges how much "catching up" is needed to achieve the initial baseline

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or best-estimate projection for the strategic objective. Assume success of an objective is defined solely by an earnings metric. The baseline might be $100M over the three years of the objective's time horizon with annual projections of $25M in year 1, $35M in year 2 and $40M in year 3. Suppose $15M is earned in year 1 so that we must outperform the remainder of the baseline forecast to still meet the aggregate objective of $100M. 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: $15 + RRR (35 + 40) = 100$. In this case, 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 the objective's time horizon. This upfront analysis helps to inform future termination decisions, if applicable, and helps remove some emotion from the process. In all too many cases the default assumption is to soldier on despite a clearly doomed objective. One must not be lulled into a "sunk cost" argument. In most circumstances there is additional effort and expense that is required to continue to pursue an objective and that additional capital and resource commitment must be carefully considered.

GPS derives its name from its three main phases: Goals-Progress-Strategy:

- **Goals:** Clearly articulate the strategic objective and define "critical-to-success" (CtS) goals which are essential for attainment of the objective. Research and propose relevant performance drivers, risks to goals, associated mitigations, and metrics to assess these factors.
- **Progress:** Set progress measures, early warning indicators (EWI), and risk exposure and risk mitigation assessment metrics. Measure and track metrics/EWI, risk velocities, risk exposures, PFAs, and inform the success outlook through RRR. Report findings to management.
- **Strategy:** Based on the report findings, PFA, RRR, and success outlook, management 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. This Execution Management Cycle is illustrated in Exhibit 1 on p.18.

SIMULATION OF STRATEGIC OBJECTIVE PERFORMANCE

A standard technique for simulation using a discrete set of scenarios employs a random number drawn from a uniform (0,1) distribution. The general idea is that for a given risk source modeled with scenarios S1, S2,…Sk with probabilities $p_1, p_2, \ldots, p_k$ (with $p_1 + p_2 + \ldots + p_k = 1$) we may simulate which scenario occurs by generating a random number from (0,1). If this random number is r we simply use the rule: if $r < p1$ then S1 occurs, if $p1 < r \leq p_1+p_2$ then S2 occurs, if $p_1+p_2 < r \leq p_1+p_2+p_3$ then S_3 occurs, etc.

In this section we will first use this concept to simulate a set of macro factors, or the "state of world". This state of the world will tell us which set of conditional probabilities is to be used for each and every risk source modeled for the strategic objective of interest. We may then simulate the objective's performance in a way that links it to macro factors.

As a simple example, assume 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 for 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

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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, 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.

Our macro factor scenarios include estimated probabilities for each of the modeled states. Macro factor based simulation for the performance of this strategic objective may then be carried out through the following process:

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

2. Based on r1 simulate the state of the economy, and based on r2 simulate whether or not the proposed regulation becomes law.

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): r3 and r4.

5. Based on r3 and $\mathbf{S_D}$ simulate the scenario for disposable income. Based on r4 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 simulate strategic objective performance.

THE PORTFOLIO VIEW

If enough macro factors are identified and properly analyzed then we may simulate the performance of all 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 which would influence our perceived likelihood of *any* of the modeled scenarios. The "usual suspects" for the insurance industry include the economy, federal and state regulatory action, pandemics, and hurricanes.

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.

RISK CAPITAL AND RISK-ADJUSTED RETURN FOR STRATEGIC OBJECTIVES

For each simulated performance of a strategic objective "X," the modeled levels of the key metrics can be compared to their corresponding levels in the baseline or best-estimate forecast. Suppose our only metric of interest is annual earnings over a three year time horizon and the baseline forecast (in $M) is: 100, 150, and 200 for years 1-3 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 have 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 these differences is:

$$PV = 20/(1+i) + 10/(1+i)2 + (-30)/(1+i)^3$$

This present value can be thought of as a notional "infusion" that gets actual performance back on track. 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. For the "kth simulation" we denote the simulated earnings, for years 1-3 respectively, by $E1_k$, $E2_k$, and $E3_k$. Assuming the baseline earnings are B1, B2, and B3 the kth infusion is:

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

In the run of several thousand such simulations we determine the 95th percentile (for example) of these infusion amounts. If we are able to do another run with the same number of simulations and the observed 95th

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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. We ensure the number of simulation is large enough to lead to stability of results. We may also compute the infusions on a portfolio level by aggregating all objectives baselines and then running simulations. We can then define *the risk capital for the portfolio* of strategic objectives.

By repeating that simulation with one objective held constant at its baseline projection levels in every simulation ("zero risk") we may 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 may be used for identification of risk-reducing objectives or risk-increasing objectives. Additionally, one may use these concepts to allocate overall portfolio risk to each 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 since it measures "return on risk-adjusted capital".

One may also use simulation to derive the RORAC for 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 may 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.

PARTING THOUGHTS

GPS offers a robust and intuitive approach to SRM. By using the scenario approach and risk content based on subject matter expert knowledge, buy-in is ensured by design. Further aspects and more detail of the framework can be found in the full paper available at *http://www.ermsymposium.org/2013/pdf/erm-2013-paper-levine.pdf*.

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