

# Enterprise Risk and Opportunity Management for Nonprofit Organizations and Research Institutions

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**Abstract:** Enterprise risk and opportunity management (EROM) concerns the means by which organizations develop and implement their strategic goals through a portfolio of programs, projects, institutional assets, and activities. The overall objective of EROM is to reach an optimal balance between minimizing the potential for loss (risk) while maximizing the potential for gain (opportunity). The focus of this paper is on the development of guiding principles and an overall approach that serves the interests of technically oriented nonprofit organizations and research institutions. These interests tend to place emphasis on performing services and achieving technical gains more than on achieving specific financial goals, which is the province of commercial enterprises. In addition, the objectives of nonprofit organizations may extend to institutional development and maintenance, financial health, legal and reputational protection, education and partnerships, and mandated milestone achievements. This paper discusses the philosophical underpinnings of EROM in the context of nonprofit organizations, the integration of EROM with existing management processes, and the nature of the activities that are performed to implement EROM within this context.

**Keywords:** Enterprise risk management, opportunity management, strategic goals, desired outcomes, leading indicators.

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## 1. INTRODUCTION

Enterprise risk management (ERM) and enterprise risk and opportunity management (EROM) are synonymous terms used to address the natural desire of an organization to strike a reasonable balance between minimizing the potential for loss (risk) and maximizing the potential for gain (opportunity). These risks and opportunities are addressed within the context of implementing the organization's strategic goals.

General frameworks for EROM have been developed successfully over the past 10-15 years by organizations such as COSO [Committee of Sponsoring Organizations of the Treadway Commission, 2004], and have been encoded within Standards such as ISO-31000 [International Organization for Standardization, 2009]. While these frameworks have undoubtedly provided impetus for the acceptance and practice of EROM, they have tended to focus primarily on monetary gains and losses as would be paramount for organizations whose principal objectives are financial. Furthermore, the frameworks are intentionally presented at a high level wherein the means for implementing them are to be customized by the users. The work described herein is directed instead toward nonprofit organizations such as Government agencies and research organizations, whose principal objectives tend to focus more on performing services or achieving technical gains, most often within frequently changing financial, schedule, and political constraints. The approach presented in this paper along with accompanying ideas for implementation provide a current snapshot of a process that is continuing to evolve and change, and that is scheduled to be documented by NASA in the summer of 2014 [NASA/SP--2014-615, Enterprise Risk and Opportunity Management, Concepts for Implementation within NASA].

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## 2. PHILOSOPHICAL UNDERPINNINGS

This section discusses the dimensions of opportunity within EROM and the principles for balancing enterprise risk and opportunity, normalizing risk and opportunity management within the enterprise, and analyzing enterprise risks and opportunities over different time scales.

### 2.1 Dimensions of Opportunity

The term “opportunity” has two definitions in Webster’s online dictionary: (1) a favorable juncture of circumstances, and (2) a good chance for advancement or progress. Nonprofit technical organizations are concerned with both types of opportunity. In particular, the first definition applies to events that have a potential to reduce the risk of not meeting one or more desired outcomes; for example, an emerging opportunity for an originating organization to share risks with a partner organization might result in a reduction of risks for the originating organization. The second applies to events that provide an opening to change strategic goals or desired outcomes to align them better with stakeholder expectations; for example, the emergence of a new technology might open up possibilities for the originating organization to achieve strategic benefits that were not previously considered possible.

Significant gains in advancement or progress may involve proactively searching for opportunities, such as putting resources into basic or applied research, with the expectation that on the whole these efforts will bear fruit and speed the rate of progress toward long-term goals. In the words of Francis Bacon (“The Essays,” 1612): “A wise man will make more opportunities than he finds.”

### 2.2 Balancing Risk and Opportunity

In order to encourage innovations and because of the drive to address increasingly complex technical challenges with decreased funding, many organizations are having to embark in new directions in which the primary objective is no longer just to minimize risk but rather to balance risk against opportunity. This evolving philosophy was addressed, for example, by the Administrator for NASA in an open letter to all NASA employees dated April 19, 2013:

“We have to be willing to do daring things. Put another way, *risk intolerance is a guarantee of failure to accomplish anything of significance* [emphasis is the Administrator’s]. ... While we do this, we must constantly balance our risks and rewards and always, always put the lives and safety of our people first.”

The balance between risk and opportunity is a reflection of one’s tolerance for risk relative to one’s appetite for opportunity. In existing EROM guidebooks, the phrase “risk tolerance” or “risk appetite” is sometimes used to denote the maximum level of risk that a decision maker (DM) is willing to take relative to meeting a strategic goal or desired outcome within given constraints<sup>2</sup>. For each goal or outcome, the DM specifies his or her maximum tolerable level of risk that it will not be accomplished within given constraints on funding, schedule, etc. In this paper we introduce the term “opportunity expectation” to denote the minimum level of opportunity that the DM considers worth pursuing for any strategic goal or desired outcome. In simplest terms, the DM’s risk tolerance and opportunity expectation represent his or her balancing point for making decisions regarding responses to emerging risks and opportunities. However, it should be recognized that there is generally a correlation between opportunity expectation and risk tolerance, in that the DM might accept a higher tolerance for risk in conjunction with a higher expectation for opportunity.

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<sup>2</sup> By the term “strategic goals,” we mean the planned objectives that an organization strives to satisfy in keeping with its mission. The term “desired outcomes” refers to the specific accomplishments or milestones that must be achieved in order to satisfy the strategic goals.

For example, suppose a project at a research organization dedicated to fundamental physics has an objective to determine whether or not a postulated subatomic particle exists, and suppose the project has an associated funding constraint. In this case, there is a risk that the money will be spent without a resolution to the question of whether or not the particle exists. If it can be proved that the particle does exist, on the other hand, there is an opportunity for significantly advancing mankind's understanding of the laws of nature. Suppose the DM is willing to accept a likelihood of 20% that there will be no resolution if there is at least a 5% likelihood that the particle will be found to exist. In addition, the DM may state that he/she will accept a 40% likelihood of no resolution if there is a 10% minimum likelihood of proving existence. In terms of that particular risk and that particular opportunity, the opportunity expectation is 5% if the risk tolerance is 20%, and 10% if the risk tolerance is 40%.

In addition to balancing risks and opportunities in a generic sense, organizations must frequently manage risks and opportunities in a diversified manner. The organization may have higher standards (lower tolerance for risk) relative to preserving its core capabilities and human lives and safety, while at the same time having looser standards (tolerating higher risk) relative to accepting the possibility of losing hardware in the pursuit of pioneering or capability-expanding activities that create new opportunities to more effectively advance the organization's mission. This considered diversification of risk tolerance is essential for progress and success over the long term. It creates areas where the organization learns rapidly, in part through acceptable numbers of setbacks, as well as promoting areas where the gains made through high risk activities are consolidated and institutionalized into a more capable organization.

There is a well-known tendency for such balances to be made based on psychological factors that are not always in the interest of making the optimum decision. It was originally pointed out in the so-called Ellsberg paradox (Quarterly Journal of Economics, 1961) and subsequently in many treatises concerning risk aversion, that when people are confronted with two choices where the balance between opportunity for success and risk of loss is neutral or even moderately favorable to the opportunity, they will tend to choose the path with lower risk. Use of EROM in a structured approach helps to ensure that strategic decisions are made more objectively.

### **2.3 Normalization of Risk and Opportunity Management within the Enterprise**

The EROM process should lead to a common approach for conducting risk and opportunity management throughout the organization, wherein such tasks as identifying, analyzing, ranking, and responding to risks and opportunities are performed in a consistent manner across the various entities that comprise the enterprise. Such commonality of approach provides several advantages:

- It makes it much easier to understand how risks cut across the various entities within the enterprise.
- It simplifies and improves the accuracy of the roll up of risks and opportunities from entity levels to the enterprise level, thereby providing increased confidence in the strategic decisions that the organization must make.
- It improves upon the ability of the organization to respond in an agile and timely manner to risks and opportunities that require immediate attention.

At the same time, the EROM framework should promote creative approaches to solve diverse problems and does not insist on a prescriptive approach wherein one size fits all.

### **2.4 Risks and Opportunities over Difference Time Scales**

The EROM process treats the organization's goals and desired outcomes within various time scales. For example, the goals and desired outcomes might be expressed in terms of the following time intervals: (1) less than one year, (2) one to five years, (3) five to ten years, and (4) longer than ten years. The EROM approach strives for the successful attainment of the desired outcomes within each of these time frames.

### 3. INTEGRATION WITH EXISTING MANAGEMENT PROCESSES

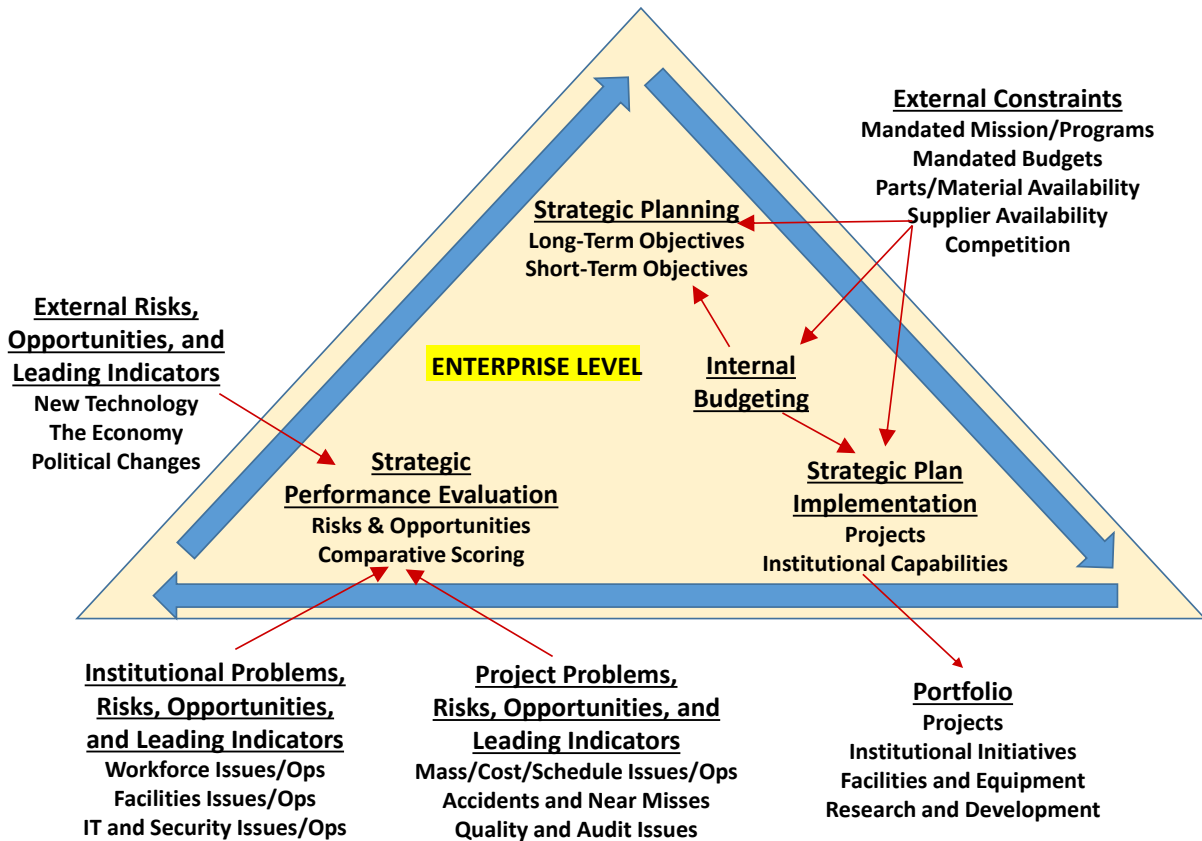
Although the need for EROM in nonprofit technical organizations may be driven by a need to provide innovative technical solutions, it is also necessary and desirable to implement EROM within the current management framework of the organization. While the detailed structure of each organization differs, most nonprofit technical organizations are organized under the top level into the three main functions shown in Figure 1: enterprise strategic management, institutional management, and project management. The authority for strategic management sets the overall strategic goals and desired outcomes for the enterprise; develops a high-level plan for implementation, including the definition of major programs and projects and specification of institutional support requirements; evaluates performance in terms of the degree to which its strategic goals and desired outcomes are being realized; and makes major course correction or course resetting decisions when conditions warrant it. The authority for institutional management provides the same goal setting and execution oversight with respect to the institutional capabilities of the enterprise, including the sufficiency of the workforce, availability of facilities, and integrity of procurement and quality control practices. The authority for project management does the same for the projects that the enterprise funds to achieve its strategic goals and desired outcomes. Communication among these three functions occurs through a process of reporting and informing as shown in the figure.



**Figure 1. Generic Illustration of Organizational Functions and the Interfaces between Enterprise, Project, and Institutional Levels.**

At the enterprise level, the processes of strategic planning, strategic plan implementation, and strategic performance evaluation are guided by information obtained from both external and internal sources, as shown in Figure 2. The needed information includes knowledge and understanding of the constraints that are imposed by Government and other sources, as well as recognition of the problems that occur during the execution of the strategic plan, the opportunities that present themselves, the risks from potential adverse events that have not yet occurred, and the leading indicators that portend possible problems, opportunities, and risks.

# ENTERPRISE-LEVEL RISK AND OPPORTUNITY MANAGEMENT



**Figure 2. Generic Illustration of the Transfer of Information Into, Out of, and Within the Enterprise Level.**

A well-conceived EROM approach should support each of these functions in the following areas:

- Planning within the strategic management function in setting strategic direction, goals, architecture, and policies; establishing metrics against which to measure strategic performance; projecting future performance; establishing mission and budget priorities; establishing enterprise-level performance requirements; and approving major new initiatives
- Planning within the institutional management and project management function and management of risks and opportunities for new institutional initiatives
- Data gathering for high-level planning and review meetings; acquisition strategy, procurement, and planning meetings; and performance review meetings conducted under each of these functions
- Identification of risk and opportunities to be pursued based on findings from these high-level planning and review meetings together with results from other sources, such as reports from external agencies and independent review councils

## 4. EXAMPLES OF EROM ANALYSIS ACTIVITIES

This section discusses some of the analysis activities involved in developing enterprise-level risk and opportunity taxonomies, identifying corresponding leading indicators, composing enterprise risk and

opportunity statements, correlating strategic success likelihoods with leading indicator values, rating present indicators and success likelihoods, and incorporating potential opportunity into strategic planning.

#### **4.1 Developing Enterprise-Level Risk and Opportunity Taxonomies**

A taxonomy is a tree structure of classifications that begins with a single, all-encompassing classification at the root of the tree, and partitions this classification into a number of sub-classifications at the nodes below the root. This process is repeated iteratively at each of the nodes, proceeding from the general to the specific, until a desired level of category specificity is reached.

Taxonomies can be used to group enterprise risks and opportunities into categories that reflect, first, the types of strategic goals and desired outcomes that they affect, and second, the types of events that could create risk and opportunity for each strategic goal or desired outcome. Risk and opportunity taxonomies provide the following benefits:

- They assist in the identification of risks and opportunities that otherwise might be missed (e.g., by facilitating the brainstorming process)
- They help identify leading indicators that can be used to rank the likelihood (at least qualitatively) that a postulated event that either threatens or benefits a strategic outcome will occur
- They facilitate the process of identifying planning alternatives to effectively mitigate the risks or exploit the opportunities
- They assist in properly allocating resources among the entities or organizational units of the enterprise (e.g., to mitigate a risk or exploit an opportunity)

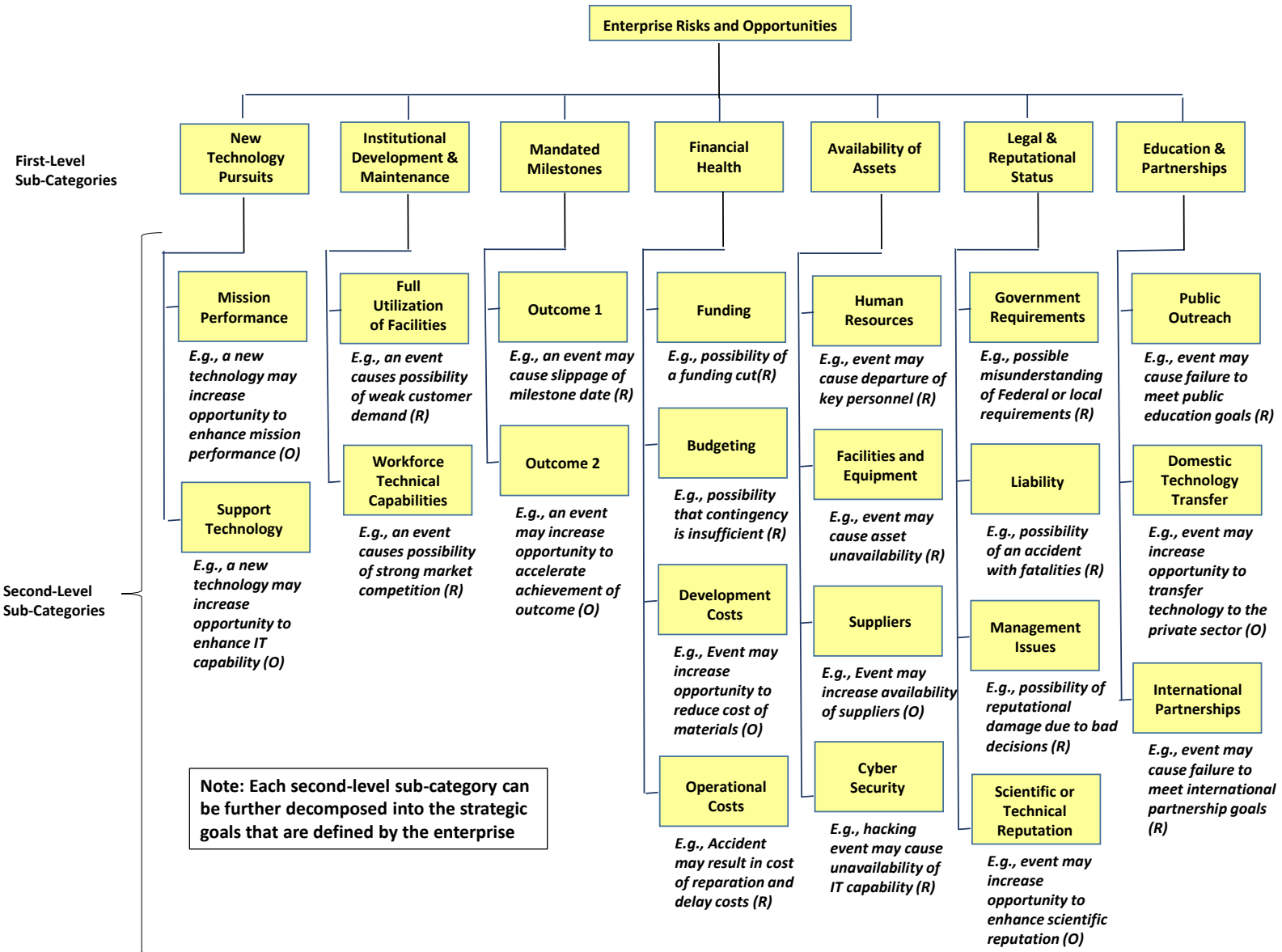
Figure 3 illustrates an example three-level enterprise risk and opportunity taxonomy that is applicable to nonprofit technical organizations. For each categorical unit in the bottom level of the taxonomy, it also provides an example individual risk (R) or opportunity (O). As noted on the figure, each bottom-level sub-category can be further decomposed into one or more strategic goals or desired outcomes that apply to that categorical unit. For example, new technology pursuits pertaining to mission performance is comprised of different individual technology pursuits, each of which represents a strategic goal or desired outcome of the enterprise. Thus, the taxonomy in Figure 3 may be construed as having an unseen bottom level corresponding to the strategic goals and desired outcomes.

#### **4.2 Identifying Corresponding Leading Indicators**

The degree to which each of the organization's strategic goals and desired outcomes is being satisfied can be inferred, at least qualitatively, by tracking a set of quantitative and/or qualitative surrogate measures referred to here and elsewhere as leading indicators. Table 1 suggests a set of potential leading indicators for each of the lowest-level categorical units in Figure 3 and identifies whether each indicator emanates from an internal source or an external source. For strategic goals and desired outcomes relating to new technology development for mission performance, for example, the leading indicators may include results from assessments of the technical state-of-the-art both within the organization and in other organizations, the number and type of patents obtained within the organization, and the rate of progress in advancing the associated technology readiness levels (TRLs). The manner in which the status of the leading indicators can be used to qualitatively infer the likelihood of success for each strategic goal or desired outcome will be discussed further in Section 4.4.

#### **4.3 Composing Enterprise Risk and Opportunity Statements**

Enterprise-level risk and opportunity statements are concise descriptions of credible scenarios that could potentially affect the organization's ability to meet its strategic goals and desired outcomes, either positively or negatively. In its simplest form, a risk or opportunity statement contains three basic parts: a Condition, a Departure, and a Strategic Result.



**Figure 3. Example Taxonomy for Enterprise Risks and Opportunities**

**Table 1. Example Leading Indicators for Each Taxonomy Unit**

Taxonomy Unit(s)	Example Leading Indicators
New technology pursuits: mission performance and support technology	<i>Internal:</i> Initiation of and results from internal state-of-the-art assessments; number and types of patents obtained; rate of progress in technology readiness level (TRL). <i>External:</i> Technology trends in areas pertinent to the organization’s missions and support capabilities.
Utilization of facilities	<i>Internal:</i> Scheduling backlog. <i>External:</i> Market demand for facility capabilities; capabilities of competitive facilities.
Workforce technical capabilities	<i>Internal:</i> Educational and experience backgrounds; technical training courses taken and passed; number and type of technical papers published.
Mandated milestones	<i>Internal:</i> Schedule compared to other programs/projects in the organization; number of missed intermediate milestones and slippage amount; number of unresolved action items and uncorrected problems. <i>External:</i> Mandated changes in prioritization of the organization’s outcomes.
Funding sufficiency	<i>External:</i> Economic indicators; Congressional makeup; changes in national priorities.
Budgeting sufficiency	<i>Internal:</i> Contingency compared to other programs/projects; rate of spending compared to other programs/projects; unresolved assignment of roles and responsibilities
Development and operational costs	<i>Internal:</i> Monthly cost reports; scores on self-assessments and audits; earned-value reports; precursor, anomaly, and mishap reports. <i>External:</i> Price trends; threats of foreign conflicts or political changes (affecting rare material costs, e.g.); supplier financial problems; Government shutdown.
Availability of human resources	<i>Internal:</i> Age of workforce; workplace morale (from surveys, e.g.). <i>External:</i> Changes in competitive labor market; demographic changes.
Availability of facilities & equipment	<i>Internal:</i> Number of unplanned maintenance actions; age of equipment. <i>External:</i> Terrorism trends; changes in OSHA regulations.
Supplier availability	<i>External:</i> Market factors (demand versus supply); supplier financial or legal problems.
Cyber security	<i>Internal:</i> Number of unaddressed vulnerabilities. <i>External:</i> Hacking trends; new viruses.
Government requirements	<i>Internal:</i> Quality of ethics program; quality of record keeping (e.g., for OSHA requirements). <i>External:</i> New regulations.
Legal liability	<i>Internal:</i> Increased use of hazardous or toxic materials; accident precursors. <i>External:</i> Trends in Court decisions regarding liability.
Management issues	<i>Internal:</i> Findings of independent reviews; resolution of internal dissenting opinions.
Scientific or technical reputation	<i>Internal:</i> Number of technical papers published; number of patents granted. <i>External:</i> Number of citations in technical papers; number of nominations or awards received.
Public outreach	<i>Internal:</i> Missed milestones; low enrollment in educational programs.
Technology transfer	<i>Internal:</i> Missed milestones; number of technology transfer agreements. <i>External:</i> Lack of interest or progress from potential commercial partners; trends regarding the sharing of sensitive information and materials.
International partnerships	<i>Internal:</i> Missed milestones; <i>External:</i> Lack of interest or progress from potential international partners; new regulations regarding sensitive information; competition from a foreign country.



- The *Condition* is a single phrase that describes current key fact-based situation in terms of the status of the appropriate leading indicators
- The *Departure* is an event or set of events that could potentially occur which, if they do occur, produce a departure from the baseline assumptions behind the implementation plan for the organization’s strategic goals and desired outcomes.
- The *Strategic Result* is a single phrase that describes the foreseeable positive or negative impact(s) on the ability of the organization to meet one or more of its strategic goals or desired outcomes or to further its mission by enabling a new strategic goal or desired outcome.

It is important to the EROM process that risk and opportunity statements be composed without regard to potential modifications of the implementation plan, such as risk mitigation or opportunity exploitation options that may suggest themselves. The statements do not presume anything that is not in the current baseline implementation plan, other than the Condition, which has its basis in fact.

Table 2 illustrates some example risk and opportunity statements that may apply to some of the categorical units that were identified in the taxonomy of Figure 3. The Conditions in these statements refer to leading indicators that were identified in Table 1.

A more detailed description of risk statements and narrative that accompany them may be found in the NASA Risk Management Handbook [NASA/SP-2011-3422, 2011].

**Table 2. Example Risk and Opportunity Statements for Selected Taxonomy Units**

Taxonomy Unit(s)	Example Risk or Opportunity Statement
New technology pursuits: mission performance	<i>Opportunity:</i> Given that [CONDITION] the rate of progress in technology readiness for technology X is 20% faster than anticipated, there is a possibility that [DEPARTURE] the technology will be ready in time for Program Y resulting in [STRATEGIC RESULT] an ability to exceed the performance requirements associated with Strategic Goal Z.
Funding sufficiency	<i>Risk:</i> Given that [CONDITION] economic indicators suggest the possibility of a recession, there is a possibility that [DEPARTURE] overall funding for the organization will be cut substantially resulting in [STRATEGIC RESULT] the need to scale back on Strategic Goal X.
Government requirements and reputational issues	<i>Risk:</i> Given that [CONDITION] an audit of ethics training has indicated shortcomings in the contents and attendance of the training, there is a possibility that [DEPARTURE] there will be a serious ethical infraction resulting in [STRATEGIC RESULT] Government sanctions and reputational damage to the organization.
Public outreach	<i>Risk:</i> Given that [CONDITION] the schedule for establishing participatory engagement activities with the public has slipped 6 months, there is a possibility that [DEPARTURE] the quality of such engagement will be less than desired resulting in [STRATEGIC RESULT] the public education initiative being out of compliance with the strategic plan.

#### 4.4 Correlating Strategic Success Likelihoods with Leading Indicators (An Example Approach)

As mentioned earlier, the likelihood of successfully satisfying a strategic goal or achieving a desired outcome is estimated from the status of the leading indicators. Leading indicators may be considered to be quantitative or qualitative measures that define the present condition from which risks and opportunities may emanate. They are also surrogate measures with respect to the success likelihood of each strategic goal or desired outcome. Because they are surrogates, they do not necessarily comprise the complete set of factors that affect the success likelihood. At best, therefore, the success likelihood for each strategic goal or desired outcome can only be estimated within a range of uncertainty.

Superimposed on this estimate of success likelihood is the decision maker's risk tolerance. Generally speaking, the DM specifies his/her risk tolerance as a minimum likelihood of failure that he/she is willing to accept for the desired outcome in question at the present point in time. Conversely, the DM's minimum success expectation is by definition the complement of his/her risk tolerance. Thus, if the DM has a risk tolerance of 0.20 for the likelihood of not meeting the strategic goal or desired outcome, he/she has a minimum success expectation of 0.80.

Suppose, for example, that based on the current status of the leading indicators, the success likelihood for a desired outcome is estimated to be between 0.50 and 0.70. Since the DM's expectation is 0.80, we would say that the risk is intolerable. If, however the estimated success likelihood were between 0.90 and 0.95, we would consider the risk to be tolerable. If it were between 0.70 and 0.90, straddling the minimum success expectation, we would consider the risk to be marginal.

Once the DM has specified a risk tolerance or minimum success likelihood expectation for each strategic goal or desired outcome, it is incumbent on the analyst to determine how these expectations map to threshold values of the leading indicators. The following discussion presents an example approach. To start with, the analyst assumes that each leading indicator except the one being examined is at a representative best-estimate value. Then, he/she specifies two thresholds for the leading indicator being examined. This is done for each strategic goal or desired outcome to which the leading indicator applies. The two thresholds correspond to the lower bound and upper bound of the uncertainty range in the correlation of the strategic goal/desired outcome to the leading indicator.

For example, referring to Table 3, the DM has specified that he/she requires an 80% minimum tolerable likelihood of success for Strategic Goal A. The analyst determines that if other leading indicators are at their representative values, the DM's expectation could conceivably be satisfied if the technology readiness level, or TRL, for a particular technology development is at a value of 7, and that it should definitively be satisfied if the TRL is at 8. He/she therefore specifies two thresholds for the technology readiness level, which is designated as leading indicator 1 in Table 3: an "optimistic" threshold of 7 and a "pessimistic" threshold of 8. For interpretation, the risk of not satisfying the DM's success expectation is tolerable if the actual TRL is 8 or higher, is intolerable if it is at 7 or lower, and is marginal if between 7 and 8.

**Table 3. Example Development of Leading Indicator Threshold Values Consistent Corresponding to the Decision Maker's Minimum Tolerable Likelihoods of Success**

Strategic Goal or Desired Outcome	Minimum Tolerable Likelihood of Success	Leading Indicator Levels	Values for Leading Indicator 1 (Technology Readiness)	Values for Leading Indicator 2 (Public Support)	Values for Leading Indicator 3 (Material Cost)	Etc.
A	80%	Optimistic Threshold	7	N/A	\$20M	
		Pessimistic Threshold	8	N/A	\$25M	
B	75%	Optimistic Threshold	N/A	High	N/A	
		Pessimistic Threshold	N/A	Moderate	N/A	
C	90%	Optimistic Threshold	8	N/A	N/A	
		Pessimistic Threshold	9	N/A	N/A	
Etc.						

It should be noted that although this example has started from the presumption that all the leading indicators are composed of individual metrics, it is quite possible that some may represent composite metrics. For example, if high confidence in the success of a strategic goal or desired outcome required that *both* metric X and metric Y satisfy threshold values, the leading indicator could be defined as a composite of metric X and metric Y.

#### 4.5 Rating Present Leading Indicators and Future Success Likelihoods (An Example Approach)

Once the correlations between strategic success likelihoods and leading indicator values have been established, it is relatively straightforward to rate both of them in terms of the DM's minimum success likelihood expectations. As shown in Table 4, the present status of each leading indicator is first rated as green, yellow, or red for each goal/outcome based on how its value relates to the optimistic and pessimistic threshold values. The future success likelihood for the goal/outcome as a whole is then rated as green (acceptable), yellow (marginal), or red (unacceptable) based on the ratings for the leading indicators that apply to it. Generally, the future success likelihood rating for the goal/outcome will be the same as the rating for the worst-case leading indicator. There will sometimes, however, be ameliorating factors that would cause the rating for the future success likelihood to be better than the rating for the worst-case leading indicator. An example leading to this result is cited in Note 1 in Table 4.

**Table 4. Example Development of Ratings for the Present Leading Indicators and the Future Success Likelihoods of the Strategic Goals and Desired Outcomes**

Strategic Goal or Desired Outcome	Minimum Tolerable Likelihood of Success	Leading Indicator Levels	Values for Leading Indicator 1 (Technology Readiness)	Values for Leading Indicator 2 (Public Support)	Values for Leading Indicator 3 (Material Cost)	Etc.	Overall Rating of Future Success Likelihood
A	80%	Optimistic Threshold	7	N/A	\$20M		Marginal (Note 1)
		Pessimistic Threshold	8	N/A	\$25M		
		Present Value	8.5	N/A	\$30M		
B	75%	Optimistic Threshold	N/A	High	N/A		Acceptable
		Pessimistic Threshold	N/A	Moderate	N/A		
		Present Value	N/A	Very High	N/A		
C	90%	Optimistic Threshold	8	N/A	N/A		Marginal
		Pessimistic Threshold	9	N/A	N/A		
		Present Value	8.5	N/A	N/A		
Etc.							

\* Note 1: The overall future success likelihood is rated higher than the rating for Leading Indicator 3 because material cost for goal/outcome A is considered to be less important than other leading indicators, and because it may be compensated by savings in other areas.

## 4.6 Incorporating Potential Opportunity into Strategic Planning

Potential opportunity occurs when a new condition arises and promotes the possibility of an opportunity coming to play at a later time. For example, suppose that a new technology has been under research for a long time and suddenly the possibility of an unexpected breakthrough is announced. The reality of the breakthrough cannot be verified until it is corroborated by another set of experiments. If the breakthrough is indeed real, the possibility will open for achieving a new strategic goal that was not previously considered possible. Before instituting any changes to the current plan, however, it is necessary to see whether the additional testing results in a positive result.

Let us examine how Table 4 would be influenced by the emergence of this new potential opportunity. Space limitations prevent a detailed exposition of this example, but the principal steps would be as follows. First, a new strategic goal D would be added after goal/outcome C to indicate that a new initiative may be possible, and a new leading indicator #4 would be added after indicator #3 to provide a measure of the status of corroboration of the breakthrough. As was the case for the other leading indicators, the present value of the new leading indicator would be rated green, yellow, or red for goal D and for any other goal/outcome to which it applies. These leading indicator ratings would again be based on threshold values that the analyst derives from the DM's minimum success likelihood expectations. Using the approach described in the preceding section, the future success likelihood of goal D would then be rated green, yellow, or red based on the ratings of all the leading indicators that affect it, and the ratings for other goals/outcomes that are affected by the new leading indicator would be modified as appropriate to reflect the influence of the new indicator.

This process provides a means for judging whether the new potential opportunity eventually will be worth pursuing. A contingency plan would perhaps be developed at this point so that if the potential opportunity were to actualize, it could be exploited in a timely fashion.

## 5. CONCLUSIONS

Enterprise risk and opportunity management (EROM) addresses the natural desire of an organization to strike a balance between minimizing the potential for loss (risk) while maximizing the potential for gain (opportunity). These risks and opportunities are addressed within the context of implementing the organization's strategic goals and focus on the achievement of broad outcomes. Whereas previous frameworks for EROM have tended to emphasize monetary gains and losses, this paper has discussed an approach and presented application examples that pertain to nonprofit organizations whose principal objectives are to perform technical services or achieve technical gains, often within frequently changing financial, schedule, and political constraints. The EROM approach assists the planning activities of the strategic/executive function of the enterprise in developing strategic direction, goals, architecture, and policies, establishing metrics against which to measure strategic performance, projecting future performance, setting mission and budget priorities, deriving enterprise-level performance requirements, and selecting potential new initiatives.

Taxonomies are used to group enterprise risks and opportunities into categories that assist in the identification of leading indicators, facilitate the identification of planning alternatives, and assist in properly allocating resources among the entities or organizational units of the enterprise. The degree to which each of the organization's strategic goals and desired outcomes is likely to be satisfied is inferred by tracking the leading indicators relative to a set of threshold values. A process is suggested wherein the success likelihood for each strategic goal or desired outcome can be judged to be acceptable or not based on the decision maker's expectations. The process includes a means for examining potential new opportunities as they arise to estimate their future likelihood of success, so that strategic planning decisions can be risk and opportunity informed.