X: Probabilistic Risk Identification, Mapping and Evaluation

X:PRIME Methodology

X:PRIME

A methodology developed by GRafP Technologies for identifying, mapping and evaluating procedural and operational risks. Based on existing models such as the Taxonomy-Based Risk Identification and the Capability Maturity Model Integration (CMMI®) developed by the SEI, or custom models developed for specific applications, the methodology is designed to meet operational risk management needs of governments and industry.

The S:PRIME method, derived from the X:PRIME methodology for software, is referred to by the Canadian Government in its Enhanced Management Framework (http://www.tbs-sct.gc.ca/emf-cag/lessons-lecons/risk-risque/risk-risque_e.asp) and by the Quebec Government for assessing the risks in IT initiatives undertaken by the various government departments and agencies.

® Capability Maturity Model and CMMI are registered in the U.S. Patent and Trademark Office by Carnegie Mellon University

Objective of the methodology

- **Identification, assessment and management of procedural risks in domain X**
  - Specifically developed for initiatives and organizations that need to manage their procedural and operational risks
    - » Models such as the Taxonomy-Based Risk Identification and on the Capability Maturity Model Integration (CMMI®) can be used for development, acquisition, and services

® Capability Maturity Model and CMMI are registered in the U.S. Patent and Trademark Office by Carnegie Mellon University

Objective

To provide an accurate diagnosis of the operational areas which are under control and those where steps should be taken on a priority basis in order to reduce the risks faced by the organization or the initiative, while minimizing disruption of the initiative's or the organization's staff.

Surveys used in the method can also be broken up and periodically distributed throughout initiatives or the organization in order to identify, assess and manage operational risks on a continuous basis.

Characteristics of the methodology

- **Approach based on common sense**
  - Reducing the likelihood of problems will increase the chances of success along with efficiency and productivity
  - Combines process improvement with a forward-looking problem prevention approach
  - Relies on the assumption that the worst problems occur when undesirable situations are not anticipated, and no means are available to deal with them when they materialize

Characteristics

The most common consequences of ineffective or no risk management are the excessive time spent by managers in dealing with unanticipated difficulties and losses that prevent them from attending to other important issues, the deterioration in public image, the loss of customers, the reduction in forecasted growth and cash flow, and the abandonment of strategically desirable initiatives because of an inherent inability in managing loss exposures, not to mention the frustration of personnel who carry out their activities in an atmosphere of impending disaster.

X:PRIME has been designed to help an entity identify, assess and manage operational issues, that is, the means by which people, procedures, methods, equipment and tools are integrated in order to produce the desired end result. Reducing the frequency of so-called operational problems will increase the chances of delivering on schedule, within budget and with the required functionality.

Overview of the methodology

- **Use of two complementary surveys adapted to the context of specific initiatives or the entire organization**
  - Identification and analysis of procedural risks as perceived by task leaders and managers
  - Identification and analysis of the procedures governing operations as applied by practitioners
  - Modulation of the perceived risks by the operational capacity
  - Identification of the areas where the risks remain high
    - » Likelihood of experiencing problems, as a result of deficiencies observed in each key operational area
    - » Identification of vulnerable areas
    - » List of recommended actions
  - Optional formal team verification of survey results for increased reliability and accuracy
  - Preparation of a risk management plan based on the identified risks

Overview

The methodology relies on two different surveys used with two complementary groups of participants. Generic versions of these surveys are used as a starting point and are tailored to the needs of the assessed entity. The purpose of the first survey, referred to as the risk survey, is to identify the perception that personnel has of the level of incurred risk in the areas for which they are responsible, for each of pre-defined categories of risks defined in the method derived from the X:PRIME methodology. The second survey, referred to as the operational survey, is addressed to practitioners within the assessed entity and seeks to determine its operational capacity against key operational areas. The operational capacity, assessed with the help of the operational survey, is then used to modulate personnel's risk perception level, assessed with the help of the risk survey.

Diagnosis flow diagram
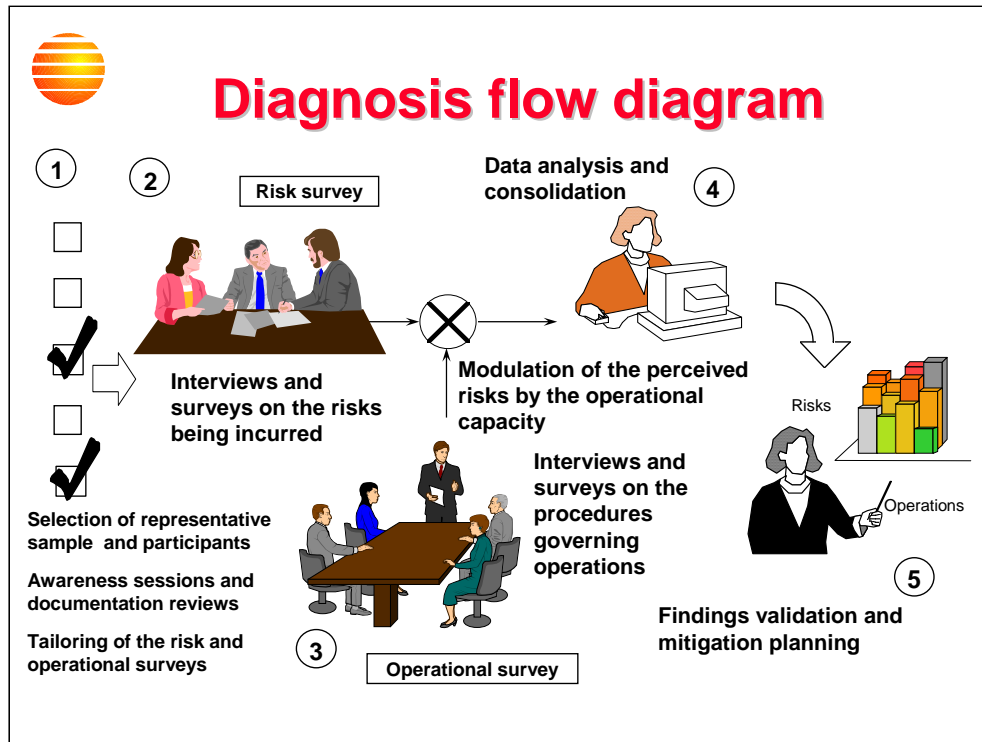
Flow of activities

a. Tailoring of a generic survey designed to measure the level of risk perceived by personnel to the needs of the assessed entity (step 1).

b. Tailoring of a generic survey designed to measure the current operational capacity to the needs of the assessed entity (step 1).

c. Selection of an sample representative of the assessed entity's activities (step 1).

d. Interviews, documentation reviews and surveys involving the managers of the selected sample and the practitioners performing or supervising execution of the work (steps 2 and 3).

e. Analysis and consolidation of the collected information (step 4).

f. Validation of results, compiled in graphic form, and planning of the subsequent steps required to mitigate identified risks (step 5).

Assessment results Example

Risk Profile

Rating Scale
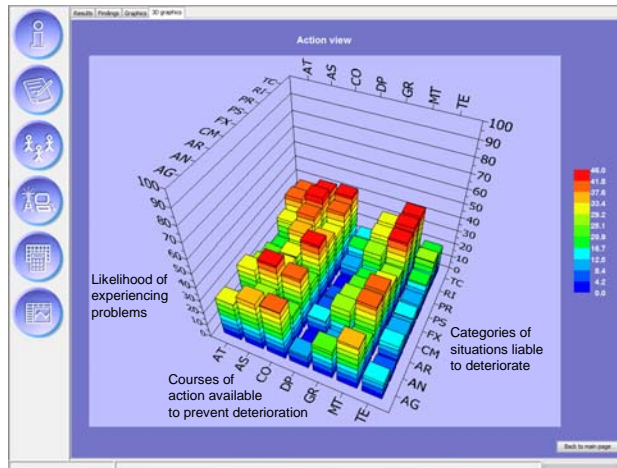
AAA (Excellent)
AA (Very Good)
A (Good)
BBB (Average)
BB (Mediocre)
B (Poor)
C (Speculative)

Relative strength within a rating category: High, Medium or Low
Rating Outlook: Progressive, Stable or Negative

X:PRIME results

The X: Probabilistic Risk Identification, Mapping and Evaluation Resolver (X:PRIMER) is a client-server, web-based tool supporting the X:PRIME assessment methodology. It generates a risk profile by plotting the likelihood of experiencing problems (referred to as probable risk) for each risk category and each key operational area. The highest peaks are identified, then the risks facing the assessed entity are extracted, along with the existing key operations to improve or the new ones to introduce in order to reduce these risks. Participants comments recorded with the help of the surveys are used to tailor and/or to elaborate on these risks and operations.

A scale similar to the one used in finance is applied to generate a rating.

X:PRIMER also supports the verification of an assessment results by a team of auditors who collect evidence and refine the assessment results.

Assessment results
Example (cont'd)

- **As a comparison**

Country	S&P Rating	S&P Outlook
Canada	AAA	STA
France	AA+	NEG
Belgium	AA	NEG
China	AA-	STA
Israel	A+	STA
Slovakia	A	STA
Poland	A-	STA
Italy	BBB+	NEG
Russia	BBB	STA
Spain	BBB-	NEG
Indonesia	BB+	POS
Portugal	BB	NEG
Bolivia	BB-	STA
Venezuela	B+	STA
Lebanon	B	NEG
Greece	B-	STA

As of March 1, 2013

Risk Rating

As ratings provided by financial rating agencies, the higher the rating the lower the risk.

The rationale behind a risk rating is to provide an organization or its lenders, partners, suppliers and investors with an indication of the strength of the organization's ability to mitigate risks. A low rating would jeopardize the organization's ability to achieve its business objectives in the area covered by the risk assessment.
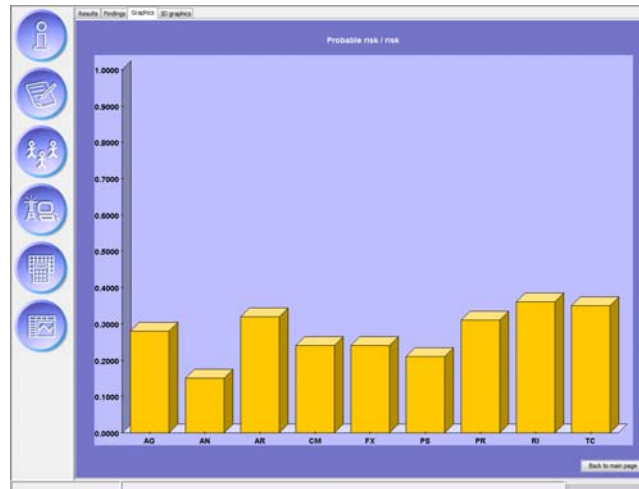
Both the rating and the likelihood of experiencing problems must be taken into account to obtain a complete understanding of the organization's operations. The rating represents the medium to long term capacity to achieve a conclusive outcome. The likelihood of experiencing problems provides a snapshot the difficulties that are likely to be encountered.

Too many and/or severe difficulties will affect the capacity to obtain the desired outcome. A high likelihood of experiencing problems and a low rating is a recipe for disaster i.e. a large number of problems and an inability to deal with them can be expected.

Assessment results
Example (cont'd)

Likelihood of experiencing problems consolidated along key operational areas

Analysis process

In the analysis algorithm implemented in the X:PRIMER application, the likelihood of experiencing problems can be consolidated in different ways. When consolidated along key operational areas, the graph corresponds to the likelihood of experiencing problems as a result of observed deficiencies in these operational areas. The algorithm also includes features for detecting and compensating "Faking good" and "Faking bad" responses.

Evaluations conducted in Europe, in North America and in South America have shown that an initiative or an organization cannot sustain a likelihood of experiencing problems higher than 40% for any significant duration relative to the planned or current activities. For comparison purposes, a likelihood of experiencing problems equal to 50% would correspond to operations being randomly carried out, and in such a case, it would be wishful thinking to expect any successful outcome over a significant period of time.

Representation of the likelihood of experiencing problems

Low capacity

Probable risk

Operational capacity level = 0.1

Margin of efficient operation

Perceived risk level
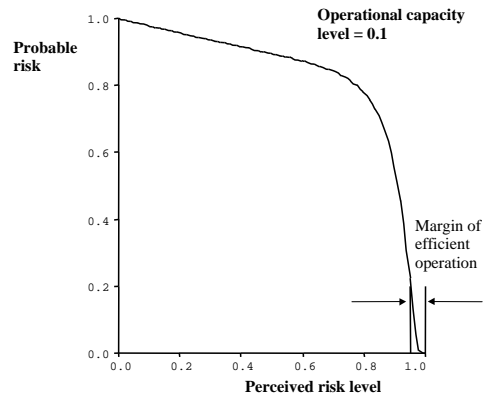
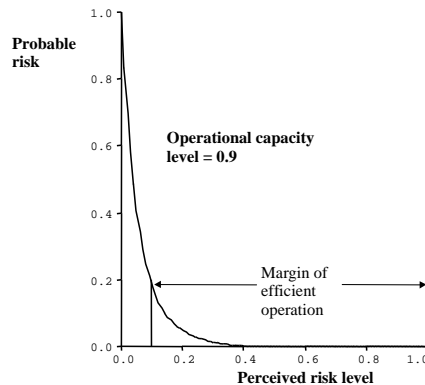## Representation of the likelihood of experiencing problems

For an entity characterized by a low capacity, the margin of efficient operation is narrow. However, such an entity can still be very successful if the established operational capacity is well adapted to its business domain and allow managers to develop a good perception of the risks to which the entity is exposed. However, should the business domain change for one reason or another, and the likelihood of experiencing problems will increase exponentially.

The theory behind X:PRIME postulates that there exists at least one course of action that will make an initiative or an organization operate at an arbitrarily low likelihood of experiencing problems, thereby maximizing the odds of fulfilling its business objectives, as long as this course of action does not exceed the initiative's or the organization's inherent capacity to implement it.

Representation of the likelihood of experiencing problems (cont'd)

High capacity

Representation of the likelihood of experiencing problems (cont'd)

For an entity characterized by a high capacity, the margin of efficient operation is wider. However, this status does not necessarily ensure success. If the established operational capacity is ill-adapted to the business domain or do not allow managers to perceive adequately the risks to which the entity is exposed, problems are bound to develop sooner or later. However, even a modest improvement in such an entity is likely to result in an exponential decrease in the likelihood of experiencing problems.

The establishment of a high capacity will require a significant investment and is likely to result in a higher overhead for the entity. On the other hand, a higher capacity will allow the entity to diversify and to undertake more complex and/or larger initiatives with better chances of success.

Potential X:PRIMER usage

- **Executives**
  - Measure the capacity of the organization and determine what should be done to improve its efficiency
  - Help secure financing and satisfy customers' operational improvement and risk management requirements
- **Managers**
  - Help manage risks and ensure successful delivery
- **Auditors and operations specialists**
  - Find problems before they occur
  - Carry out trend analyses and simulations
- **Procurement managers**
  - Verify the capacity of subcontractors
  - Perform management reviews of suppliers
- **Investors**
  - Determine beforehand how much risk is being taken when an investment is made in an initiative

Potential X:PRIMER usage

With the results generated by X:PRIMER, senior managers can visually grasp the effect of tens of thousands of relationships liable to affect day-to-day decisions. Operational personnel can efficiently monitor the risks facing their initiatives and take appropriate action to prevent these risks from deteriorating. Auditors, operations specialist and procurement managers can analyze the resulting information that will help them fulfill their verification responsibilities. Finally, investment specialists can assess the risk of investing in ventures, manage their investment portfolios and negotiate fair conditions with their clients.
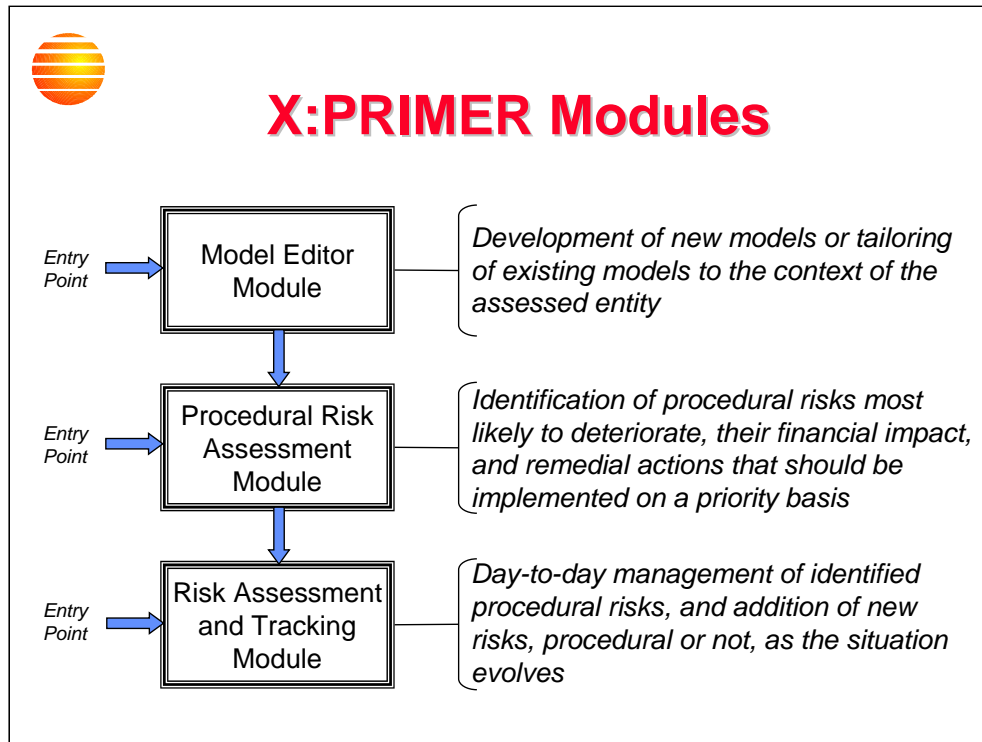
Given that organizations (and the individuals that are part of them) are known to operate at a constant risk level, larger initiatives will be undertaken as potential problems are better anticipated and dealt with, which will contribute to the growth of the organization.
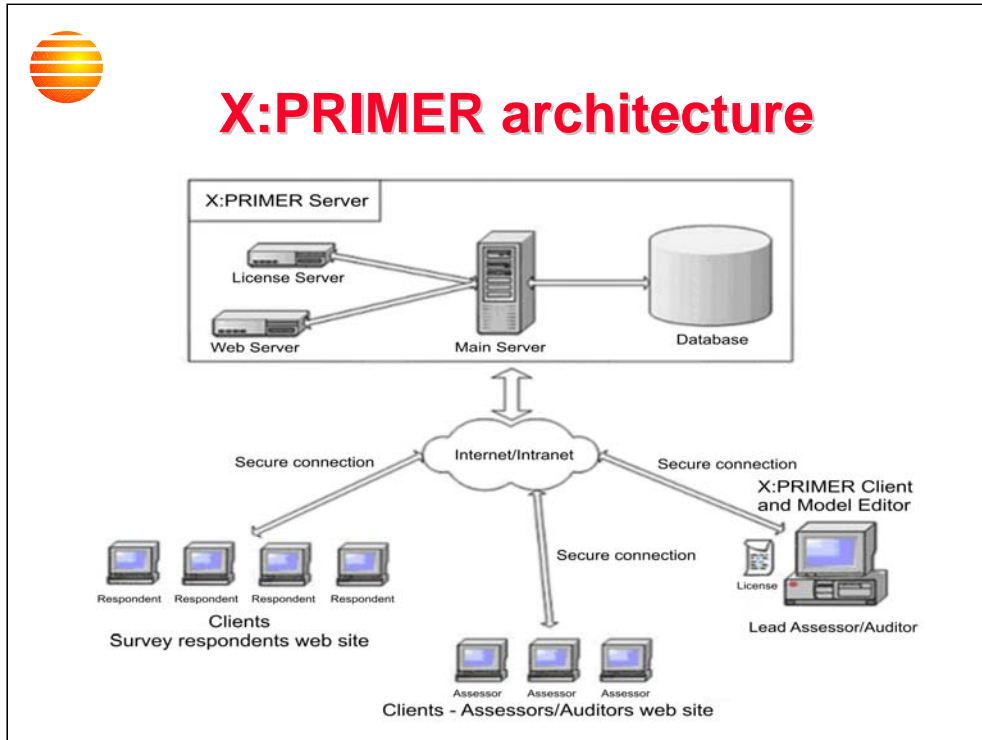
Architecture

Relying on a Web-based client-server architecture, X:PRIMER provides a control panel that supports data acquisition, information exchange, and which interfaces with an organization's management information system. It is therefore possible to acquire an appropriate visibility over the development, acquisition and service centers of an organization worldwide. X:PRIMER embedded algorithms support the execution of internal assessments, in which users are inherently biased, as well as evaluations and audits performed by external, unbiased assessors.

With the results generated by X:PRIMER, an organization can establish its own risk repository and acquire a precise understanding of its operations, an essential component of the corporate knowledge base that will constitute the success factor of the enterprises and organizations of the XXIst century.

X:PRIMER Modules

Entry Point → Model Editor Module — *Development of new models or tailoring of existing models to the context of the assessed entity*

Entry Point → Procedural Risk Assessment Module — *Identification of procedural risks most likely to deteriorate, their financial impact, and remedial actions that should be implemented on a priority basis*

Entry Point → Risk Assessment and Tracking Module — *Day-to-day management of identified procedural risks, and addition of new risks, procedural or not, as the situation evolves*

The X:PRIMER solution consists of three main modules:

1. The Model Editor allows developing models applicable to the context of the entity being assessed. The resulting models are used by the Operational Risk Assessment module to carry out the assessment.

2. The Operational Risk Assessment module allows identification of operational risks and of remedial actions that should be implemented to reduce the likelihood or impact of those risks. The resulting risks, along with the recommended remedial actions, can be exported to the Risk Assessment and Tracking module so that they can be tracked and managed.

3. The Risk Assessment and Tracking module is used to track and manage identified risks and remedial actions. New risks, operational or other types of risk, can be added and their financial impact assessed as applicable.
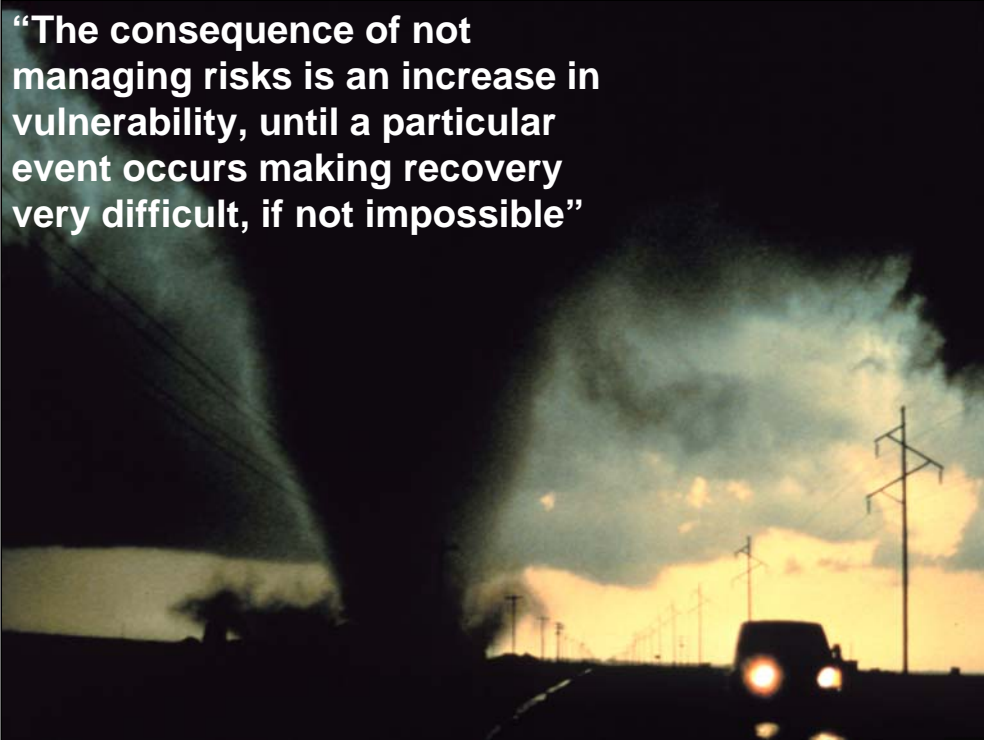
Use of X:PRIMER with other models

- **Built-in model editor**
- **Two types of data sources (through surveys, checklists, databases, electro-mechanical sensors,…)**
  - Risk
  - Action
- **Supports the definition and integration of other models, allowing assessments and audits to be carried out in various fields**
  - Business
  - Information security
  - Defense
  - etc.

Integration of other models

X:PRIMER allows an organization to model and optimize its operations. The application, through its data acquisition, reduction and analysis functionality, lends itself to simulations and the use of models specifically developed for the assessed entity's expressly stated needs. Sanitized assessment results can also be exported into a database in order to perform trend analyses and benchmarking.

X:PRIMER includes a model editor that allows the creation of new models from scratch and methods tailored to the needs of specific business domains. The model editor essentially makes it an easy task to specify how a given entity should operate, such that its actual performance can be assessed to minimize mishaps and maximize efficiency.

Ultimately, electromechanical sensors can be interfaced to the application such that physical systems can be monitored and controlled.

"The consequence of not managing risks is an increase in vulnerability, until a particular event occurs making recovery very difficult, if not impossible"

Conclusion

Managing risks, in any field, can be a daunting task unless it is supported by appropriate methods and tools. Given the large number of interactions that can lead to failure, statements such as the one made by Napoleon Bonaparte, to the effect that all he wanted from his generals is that they be lucky, are not entirely surprising.

The need to manage operational risk can be summarized by the statement made by Andrew Grove in his book 'Only the paranoid survive', in which he sums up his tenure as CEO of Intel Corporation: 'Sooner or later, something fundamental in your business will change'.

For additional information

- **In the United States**
  - sniaz@grafp.com

- **In Canada**
  - scherla@grafp.com
  - lpoulin@grafp.com

- **In Colombia**
  - mlopez@grafp.com

- **In China**
  - betazhang@grafp.com

- **World Wide Web**
  - http://www.grafp.com

Contacts

For additional information, check our Web site at www.grafp.com.