



**Software:  
Probabilistic Risk  
Identification, Mapping and  
Evaluation<sup>Plus</sup>**

**S:PRIME<sup>Plus</sup>**

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A method derived from the X:PRIME methodology developed by GRafP Technologies for identifying, mapping and evaluating software process-related risks. Based on the Taxonomy-Based Risk Identification and the Capability Maturity Model Integration (CMMI<sup>®</sup>) developed by the SEI, the method is designed to meet the process metrology needs of organizations and projects involved in the field of Information Technology.

The S:PRIME<sup>Plus</sup> method has been approved by the Quebec Government for assessing the risks in IT projects 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 method

- **Identification, assessment and management of process-related risks**
  - Specifically developed for software projects and organizations involved in software development and maintenance
  - Fast and relatively inexpensive
  - Based on the SEI work on Taxonomy-Based Risk Identification and on the Capability Maturity Model Integration (CMMI®), augmented with elements of customer service and corporate culture

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### Objective

To provide an accurate diagnosis of the process 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 project, with a minimum involvement on the part of the project's or the organization's staff.

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

S:PRIME<sup>Plus</sup> is particularly relevant in organizations in which a number of software development or maintenance projects of limited scope are underway at the same time, where classical appraisal approaches are ill-suited.



## Characteristics of the method

- **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 projects 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.

S:PRIME<sup>Plus</sup> has been designed to help an organization or a project identify, assess and manage process-related 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 process-related problems will increase the chances of delivering software on schedule, within budget and with the required functionality.

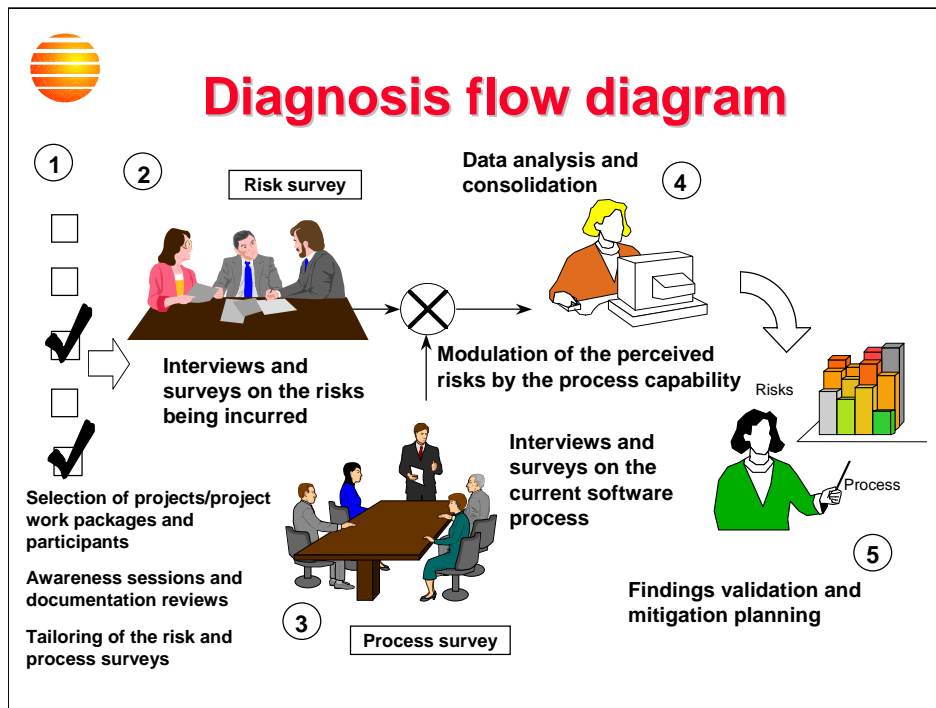


## Overview of the method

- **Use of two complementary surveys adapted to the context of the project or the organization**
  - Identification and analysis of the process-related risks as perceived by project leaders and managers
  - Identification and analysis of the practices making up the software process as applied by practitioners
  - Modulation of the perceived risks by the process capability
  - Identification of the areas where the risks remain high
    - » Likelihood of experiencing problems in the project or the organization, as a result of deficiencies observed in each key process 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 method 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 project or organization. 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 projects (or project work packages) for which they are responsible, for each of seven pre-defined categories of risks. The second survey, referred to as the process survey, is addressed to practitioners within the organization or project and seeks to determine the capability of the organization's or project's current process against up to 24 key process areas. The process capability, assessed with the help of the process survey, is then used to modulate personnel's risk perception level, assessed with the help of the risk survey.

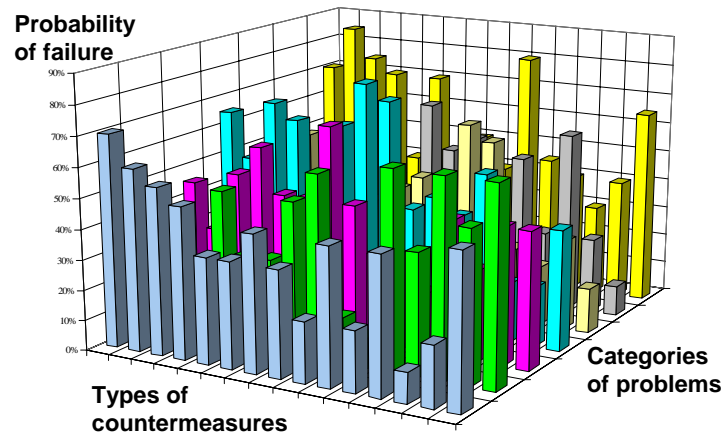


## Flow of activities

- Tailoring of a generic survey designed to measure the level of risk perceived by personnel to the needs of the assessed project or organization (step 1).
- Tailoring of a generic survey designed to measure the current process capability, against a subset of process areas overlapping the CMMI, to the needs of the assessed project or organization (step 1).
- Selection of an assessment sample representative of the organization's (or project's) activities (step 1).
- Interviews, documentation reviews and surveys involving the managers of the selected projects (or work packages) and the practitioners performing or supervising the work (steps 2 and 3).
- Analysis and consolidation of the collected information (step 4).
- Validation of results, compiled in graphic form, and planning of the subsequent steps required to mitigate identified risks (step 5).



## Assessment results Example



### **S:PRIME<sup>Plus</sup> results**

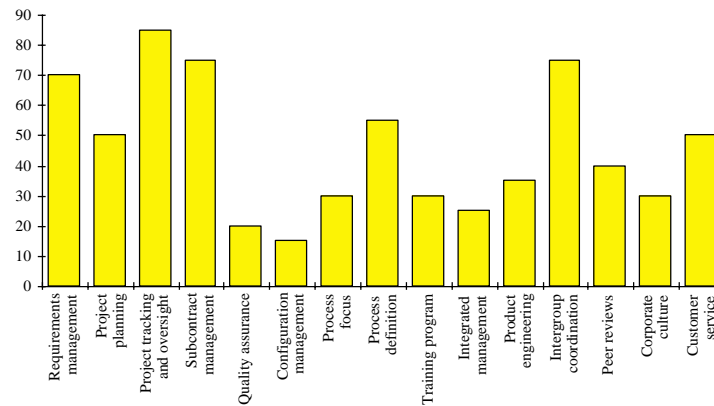
The Software: Probabilistic Risk Identification, Mapping and Evaluation Resolver<sup>Plus</sup> (S:PRIMER<sup>Plus</sup>) is a client-server, web-based tool supporting the S:PRIME<sup>Plus</sup> assessment method. It generates a risk profile by plotting the likelihood of experiencing problems (referred to as probable risk) for each risk category and each key process area. The highest peaks are identified, then the risks facing the organization or the project are extracted, along with the existing key practices 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 practices.

S:PRIMER<sup>Plus</sup> also supports the verification of an assessment results by a team of assessors who collect evidence and refine the assessment results.



## Assessment results Example (cont'd)

Likelihood of experiencing problems consolidated along key process areas



### Analysis process

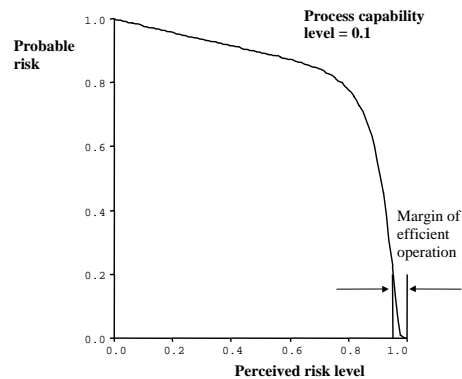
In the analysis algorithm implemented in the S:PRIMER<sup>Plus</sup> tool, the likelihood of experiencing problems can be consolidated different ways. When consolidated along key process areas, the graph corresponds to the likelihood of experiencing problems as a result of observed deficiencies in these process areas.

Evaluations conducted in Europe, in North America and in South America have shown that a project 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 a project or an organization being randomly run, 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 maturity level



## Representation of the likelihood of experiencing problems

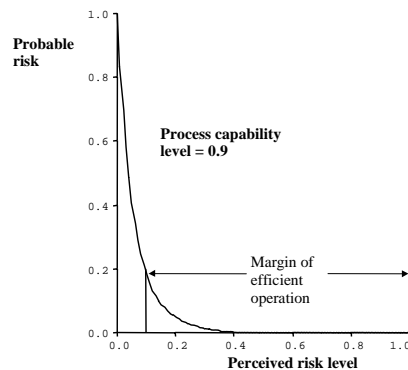
For an organization or a project with a low maturity level, the margin of efficient operation is narrow. However, such an entity can still be very successful if the few practices it has in place are well adapted to its business domain and allow managers to develop a good perception of the risks to which the organization or the project 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 S:PRIME<sup>Plus</sup> postulates that there exists at least one set of key practices that will make a project or an organization operate at an arbitrarily low likelihood of experiencing problems, as long as this set of practices does not exceed the capacity of the project or the organization to implement it. However, this optimal set of practices is unknown a priori.



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

### High maturity level



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

For an organization or a project with a high maturity level, the margin of efficient operation is wider. However, this status does not necessarily ensure success. If the practices in place are ill-adapted to the business domain or do not allow managers to perceive adequately the risks to which the organization or the project 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 maturity level will however require a significant investment and is likely to result in a higher overhead for the organization or the project. On the other hand, a higher maturity level will allow the organization to diversify and to undertake more complex and/or larger projects with better chances of success.



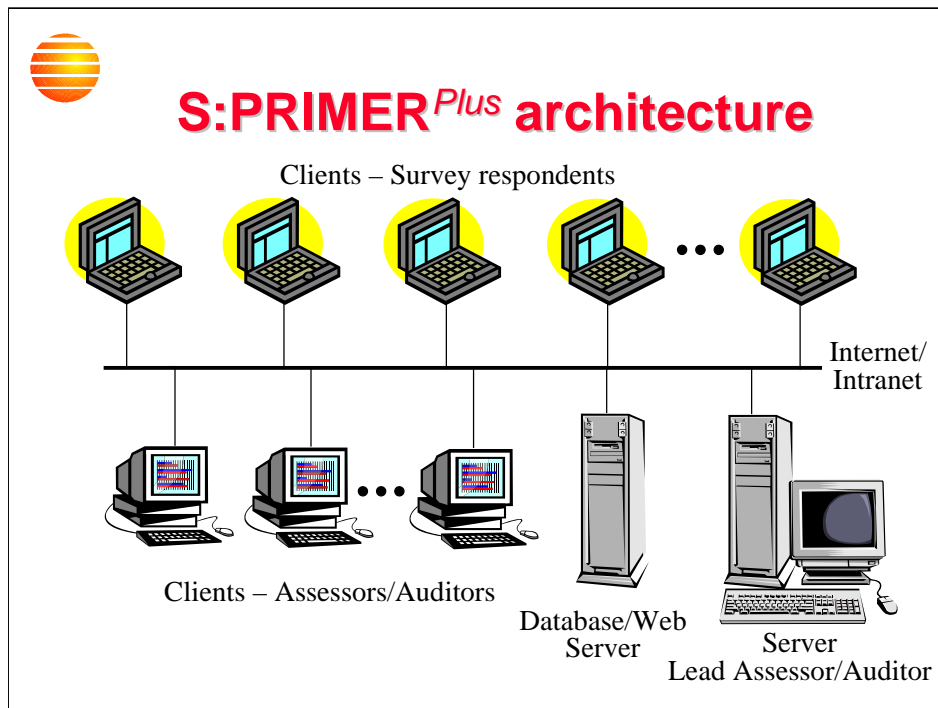
## Potential S:PRIMER<sup>Plus</sup> users

- **Executive managers**
  - Measure the capability of your organization and determine what should be done to improve its efficiency
  - Help secure financing and satisfy your customers' process improvement and risk management requirements
- **Project managers**
  - Help manage your risks and ensure successful delivery
- **IT auditors and process specialists**
  - Find problems before they occur
  - Carry out trend analyses and simulations
- **Procurement managers**
  - Verify the capability of your subcontractors
  - Perform management reviews of your suppliers
- **Investors**
  - Determine beforehand how much risk you are taking when you invest in an IT company

### Potential S:PRIMER<sup>Plus</sup> users

With S:PRIME<sup>Plus</sup>, senior managers can visually grasp the effect of tens of thousands of relationships liable to affect day-to-day decisions. Project personnel can efficiently monitor the risks facing their projects and take appropriate action to prevent these risks from deteriorating. Process specialists can use the system to conduct assessments at a fraction of the cost that securing the services of outside consultants entails. IT auditors and procurement managers can collect and analyze the information that will help them fulfill their verification responsibilities. Finally, investment specialists can assess the risk of investing in IT 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, as problems are better anticipated and dealt with, larger projects will be undertaken, which will contribute to the growth of the organization.



## Architecture

Relying on a Web-based client-server architecture, S:PRIMER<sup>Plus</sup> provides a control panel that supports data acquisition, information exchange, and which interfaces with an organization's management information system. This ensures that users acquire an appropriate visibility over their software development and maintenance centers worldwide. S:PRIMER<sup>Plus</sup> embedded algorithms support the execution of self-assessments, in which users are inherently biased, as well as evaluations and audits performed by external, unbiased assessors.

With S:PRIMER<sup>Plus</sup>, an organization can establish its own risk repository and acquire a precise understanding of its IT processes, an essential component of the corporate knowledge base that will constitute the success factor of the IT enterprises and organizations of the XXI<sup>st</sup> century.



## Use of S:PRIMER<sup>Plus</sup> 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.

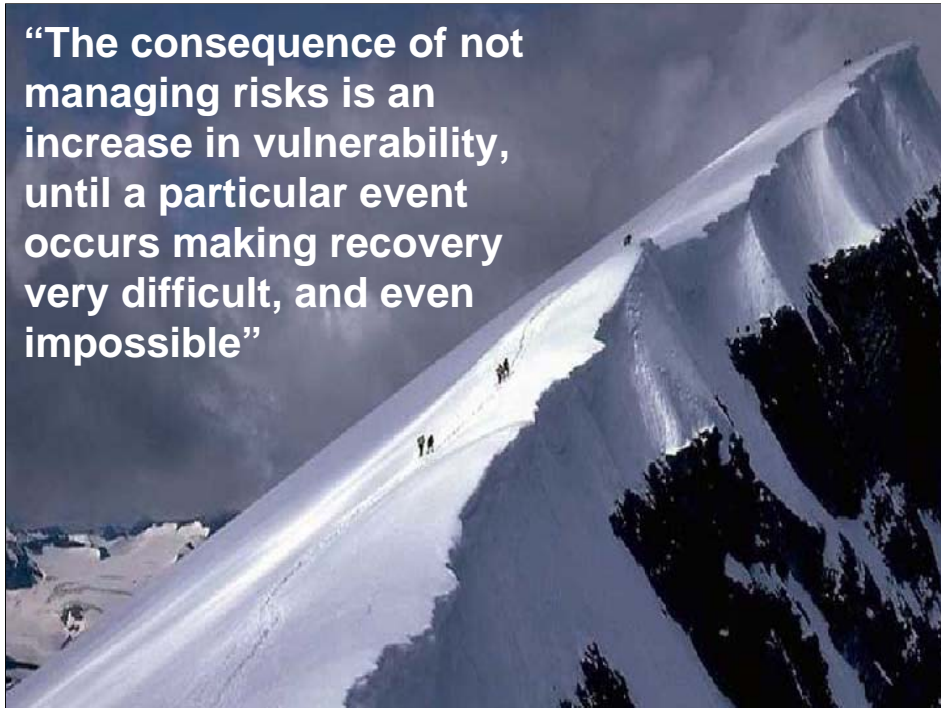
### Integration of other models

S:PRIMER<sup>Plus</sup> allows an organization to model its IT processes, to conduct regular assessments in order to prevent problems from occurring and to optimize its operations. The tool, 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.

S:PRIMER<sup>Plus</sup> comes with a model editor that allows users to modify the models currently integrated into the tool, and also to create new models from scratch. Therefore, users have the possibility of applying the tool in fields other than software development and maintenance. 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 software 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, and even 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 therefore not entirely surprising

On a more limited scale, the need to manage risks in IT projects and in organizations involved in developing or maintaining IT systems 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, a company involved in a field closely linked to Information Technology: 'Sooner or later, something fundamental in your business will change'.



## For additional information

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### Contacts

For additional information, check our Web site at [www.grafp.com](http://www.grafp.com).

We can perform an assessment with S:PRIMER<sup>Plus</sup> that will convince you of its usefulness and of its potential, while training your staff on how to use it most efficiently.

You can then decide whether you wish to acquire a license that will make it highly cost-effective for you to perform such assessments internally.