# The diagnosis, a path for success in software processes improving

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***Abstract– SI.MPS.CU is a diagnostic model for organizations to start the MPS takes into account the critical success factors (CSF) from the literature review of scholarly articles and documented experiences, which in turn were enriched and particularized to Cuban environment organizations consulted experts and members of organizations. Integrates the value since CSF identify and assess measures and how the use of indicators, measures and case-based reasoning. The implementation methodology of SI.MPS.CU allows to adapt the model to different contexts, as well as a set of tools that facilitate processing for valuation. Implementation of the model helps reduce the negative influence of the MPS CSF, getting customers high satisfaction and positive criteria of their applicability and usefulness in real environments.***

***Keywords— software, processes, improving.***

## I. INTRODUCTION

The Software Process Improvement (SPI) is a relatively new concept, most of their ideas, concepts and methods have adopted the concept of quality in the development of the manufacturing system [1].

The SPI is a repetitive and regardless of the approach adopted activity, require time, resources, actions, and iterations for their effective and successful application. It is a systemic approach to improve the performance of an existing process, from developing a set of actions that are manifested in changes in the software development process.

Documented case studies of SPI indicate the most significant improvements in product quality and productivity which are the efforts for improvement [2-4]. Other reports are not as encouraging as they reflect the difficulties presented by the organizations to run programs [4]. The reports of the Software Engineering Institute (SEI) of Carnegie Mellon indicate that the number of failures is very high, reaching 70% [4]. Several authors conclude that the main causes that lead to these failures are associated with the conditions that the organization has to start the process improvement concerning the influence of individuals and senior management, the features of the organization and improving yes, among others [2-4].

Abundant literature on SPI contains case studies, evidence, anecdotes and research, and in them the tendency to identify the most frequent difficulties as CSF, which are considered in determining the success of a program is reflected SPI.

The analysis of the models and guides that can be defined with different names but all offer a framework to carry out the SPI from conception, diagnosis, implementation and evaluation. It is significant to note that all recognize the diagnosis as the basis for the rest of the phases and key within the SPI, consider identifying the strengths and weaknesses of the organization essential to achieving successful results in improving element. The diagnostic information is essential to begin developing the strategic action plan that provides guidance and direction to the SPI input.

Of the objectives can be identified which is focused on processes rather than determining the particular conditions of the organization to consider addressing the improvement of success. Given that the CSF encapsulate the main difficulties during the upgrade from the experiences of organizations is vital to expand the purpose of diagnosis: Rate the software developer organization to initiate process improvement considering factors Critical success to identify the strengths and weaknesses of undertaking change. To evaluate the software development organizations to initiate process improvement considering the CSF to identify the strengths and weaknesses of undertaking change is necessary to formalize what and how. The authors of the research formalize what rating the twelve CSF identified in the process of information management through theoretical and empirical methods of expert consultation [5].

## II. MODEL SI.MPS.CU

Creating a model to assess the software development organizations to initiate process improvement with the use of indicators, metrics, and a system of case-based reasoning considers the CSF for the recommendations constituted a significant stage in the research. The model is based on the following principles, approaches, and assumptions qualities.

The principles underlying the model are: integration, participatory and cooperative. Employee's scientific approaches to the construction of the model are: continuous improvement, systemic, and strategic. The qualities are: integration, iterative and incremental, and receive feedback. Finally the model is premised on the willingness of senior management of the organization of software developer from the need to improve software process.

The Impact Assessment of CSF component transforms the data of the organization and the desired reference model to evaluate the organization and get the metric indicators. In addition to the baseline measurements obtained are the input to the forecast improvement component based on experiences, which a system of case-based reasoning identifies similar cases and performs an analysis of the results of success and failure. With the evaluation of the indicators, metrics guarantee of success and improving the prognosis of similar cases based on

the evaluation component of the organization identifies the barriers to improvement and best practices to recommend, from which the organization can deciding whether to start improving. With the outputs of the model is proposed to analyze using methodological triangulation method, which information is collected to arrive at the conclusions of the diagnosis. The authors suggest based on experience and research studies that the interpretation of the results for each of the possible recommendations is:

Start software process improvement: when the metric is evaluated or Very Adequate and prognosis of success is greater than 60%.

Start improving software processes under risk: when the metric is evaluated Shortly Suited and / or prognosis is in the range of 40% to 60%.

No start software process improvement: when the metric is evaluated not suitable and / or the prognosis is less than 40%.

These recommendations are reinforced by the analysis of the ability of the organization to implement activities to reduce the negative impact of the CSF, which is obtained from the indicators. This should take into account the good practices that can be implemented in the organization of these risks and barriers that impact. The more risks and barriers are covered, has a better organization for improvement. Although it should not be as common, these elements can lead to vary the above recommendations especially in cases where it is close to the limits.

From model methodology was developed to evaluate the organizations to start software process improvement that defines a set of phases and activities that are in line with the inputs, outputs and model components. This methodology provides a framework for analyzing the state of the organizations to start software process improvement resulting from using the information model. For the application of the methodology is necessary that the following requirements are met: having data organization that are inputs to the components. Definition of the reference model you want to implement the organization. Have the managers of the organization for decision-making. Having the software application that automates the processing of information.

The phases of the methodology are: Architecture, Planning and Organization, Implementation and Evaluation. These phases are defined in terms of performing the activities described as part of the model components and the diagnostic process proposed models and reference guides discussed, some of which are set to contextualize the model elements it is necessary to adjust or set for each particular problem. The activities of the configuration phase is only required the first time performed by the methodology is applied in an organization and make changes if necessary.

From the experience of using the model and the criteria of the organizations that participated in the validation, three variants of implementing the model are proposed:

Implement the model without the forecast component process improvement. Implement only the component impact assessment of CSF. Implementing the model with other CSF.

## VI. Conclusions

The diagnostic process of reference models for software process improvement focuses on identifying the state of the processes that rather characterize the state of the organization fully considering the CSF, which is an important consideration in the decision to initiate a program to improve software process element. The Si.MPS.Cu proposed model uses indicators, metrics, and a system of case-based reasoning to evaluate an organization to initiate process improvement based on analysis of the CSF that identifies barriers and risks and recommends good practices. The methodology provides the framework for contextualization model by implementing its phases and activities. The results of the validation of the model yield the model helps reduce the negative impact of CSF. These results reaffirm the need to complement the diagnosis with comprehensive analysis of organizations, while creating the foundations to promote the improvement of software process.

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