

Mexican Standards for Certification of Software Development Processes.

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Abstract: This article provides a description of two NMX (Normas Mexicanas, Mexican Standards) applied to the field of TI (Tecnologías de la Información, Information Technologies) and focus on the evaluation of software development processes. These standards are: NMX-I-059-NYCE, NMX-I-006-NYCE, NMX-I-045-NYCE, NMX-CC-9000 and NMX-CC-9001, [1] catalog of standards.

Furthermore, it explains in detail the characteristics of the NMX, as well as the advantages of their application in the development of software and so, helps PYMES (Pequeñas y Medianas Empresas, Small and Medium Enterprises) to produce Mexican software with quality. It aims to provide the reader a general idea of what you have currently advanced in the evaluation of software development processes. NMX is worth mentioning that can be updated, therefore, the objective is to make an invitation to work on their improvement, and in exceptional cases, the creation of new ones, well as in the development of support tools.

Keywords: Mexican Standard NMX, Information Technology, Process Assessment, PYMES, Software Quality, NYCE.

Introduction

In Mexico, the SE (Secretaría de Economía, Ministry of Economy) with the PROSOFT (Programa de Desarrollo para la Industria del Software, Development Program for the Software Industry) promotes national economic development by granting temporary subsidies to projects that promote the creation, development, consolidation, viability, productivity, competitiveness and sustainability of the sector companies TI.

The SE requires comply with the strategy PROSOFT No. 6 to reach international standards in process capability, with the line of action 6.2: Definition of process models and evaluation suitable for the Mexican software industry, which refers to the need of establish a discipline and culture of processes to improve software development, obtaining successful results and predictable. To achieve this, appropriate models of process are needed to the software industry, which collects the best available practices and recognized worldwide, are also needed evaluation mechanisms that correspond to the models identified. Thus, required to follow the NMX for development and maintenance of software, the standards are known by more

organizations and utilized as tools for competitiveness, transparency and trust to produce quality Mexican software, [2] official website NYCE (Normalización y Certificación Electrónica, Electronic Standardization and Certification) for more information.

Characteristics of the NMX

The NMX are voluntary standards, although of compliance is dependent upon the possibility of obtaining permission to use the official seal of guarantee, so you can not really call "optional". They also provide a reference for determining the quality of products and services, mainly in order to assist and protect consumers.

In accordance with the law, NMX can be issued both by the national standards bodies and the Ministry, for a common use of rules, specifications, features, test methods, guidelines, or requirements for a product, process, installation, system, activity, service or production or operating method, as well as those relating to terminology, symbols, packaging, marking or labeling.

Its production takes into account international standards, except when deemed ineffective or inappropriate, and are based on the consensus of participating stakeholders on the committee, also undergo public consultation for a period of at least 60 days previous natural to dispatch in order to get feedback and constructive criticism to enrich it. The NMX should be periodically reviewed and updated every five years, under the necessity of its evolution, [3] to increase knowledge about the characteristics of the NMX.

The Mexican standard NMX-I-059-NYCE

NYCE as UVTI (Unidad de Verificación de Tecnologías de la Información, Verification Unit for Information Technologies) accredited since November 2005 by the Mexican Accreditation Entity under the terms of the LFMN (Ley Federal sobre Metrología y Normalización, Federal Law on Metrology and Standardization). Evaluates the performance of the Mexican standard NMX-I-059-NYCE-2005 Information technology - Software engineering - Product quality, [2] official site NYCE.

The developing this standard is intended to provide the software industry in Mexico, the vast majority are PYMES, a model based on international best practices

easy to understand and implement, through an adoption that did not require high costs, addition to successful evaluations may meet with other models or standards such as CMMI (Integración de Modelos de Madurez de Capacidades, Capability Maturity Model Integration). This is MOPROSOFT (Modelo de Procesos para la Industria del Software, Process Model for Software Industry) that is an international standard and only recently created, is aimed at companies or internal areas dedicated to the development and/or maintenance of software. Allowing to organizations that do not have established processes, use it and adjust it according to your needs and the organizations that have established processes, use it as a reference point to identify the elements they need to cover. In addition, is based on the Mexican standard NMX-I-006-NYCE described later.

The NMX-I-059-NYCE has four parts

- Part 01: Definition of concepts and products. Introduces definitions of concepts and descriptions of work products used in other parts of the standard.
- Part 02: Requirements Process (MOPROSOFT). Establishes requirements for processes within the organization, products and practices necessary to assign capacity levels to each process and the maturity level of capacities of the organization.
- Part 03: Implementation Guide of Processes. It presents a practical example of documentation / implementation of defined processes MOPROSOFT.
- Part 04: Guidelines for the evaluation of processes (EVALPROSOFT). Sets of administrative rules for the assessment of development processes and software maintenance.

The NMX-I-059-NYCE has 3 categories of processes (see Figure 1):

- Senior Management that contains only the Management Process of Bussines.
- Management consists of processes, Process Management, Project Management and Resource Management. In turn, the latter is divided into three sub-processes: Human Resources, Goods, services and infrastructure, and the Knowledge of Organization.
- Operation contains the processes of Specific Projects Management and Development and Software Maintenance. [10] To study the Processes Model of Software Development.

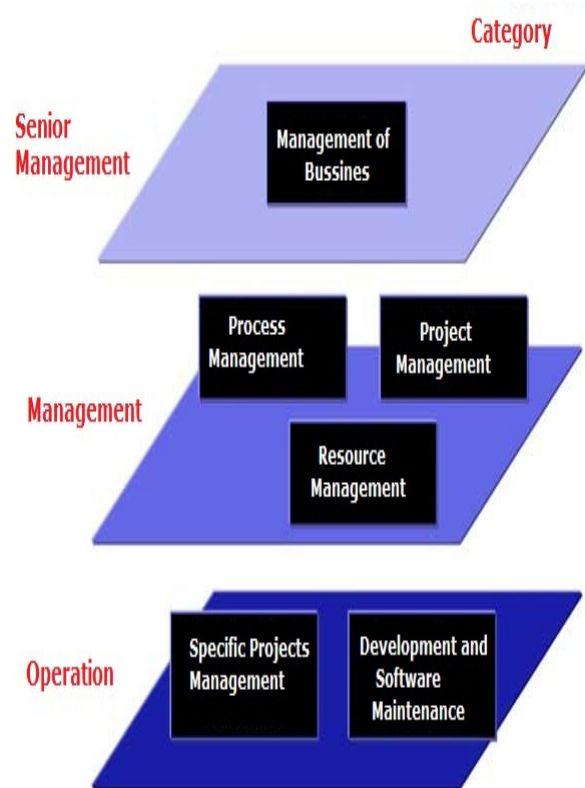


Fig. 1 Categories and processes of MOPROSOFT.

Each process is detailed through an instrument called Pattern of Processes. This description is divided into three parts: overview, description of practices and guides of adjustment. The overview includes the process name, category, purpose, description, objectives, indicators, quantitative targets, responsibility and authority. The description of the practice includes roles involved, training, activities, workflow diagrams, verification and validation, incorporating the knowledge base, infrastructure resources, measurement, exceptional situations, etc. MOPROSOFT determines the level of maturity of the capacity of each process through an evaluation and can position the organization into five levels: level 1 (process performed), level 2 (Managed Process), level 3 (established process), level 4 (Predictable Process) or Level 5 (Optimizing the process). There is also level 0 (incomplete process - chaos). The level of an organization corresponds to the maximum level of its 9 processes. To move from one level to the next, you must meet all the requirements (detailed in the model) from previous levels plus the new level. MOPROSOFT used to implement a continuous improvement program, allows to recognize to Mexican organizations by its level of process maturity

facilitating the selection of suppliers, also allows access to the software engineering practices world-class, [11] to determine the tool support for evaluation under the conformity of the NMX-I-059-NYCE.

The Mexican standard NMX-I-006-NYCE

NMX-I-006-NYCE Information Technology - Evaluation of processes is an international model oriented to software companies and companies with software development departments. It consists of five parts:

-Part 01: Concepts and vocabulary. Provides a general introduction to the concepts of process assessment and a glossary of terms related to the evaluation. [4] NYCE A.C., NMX-I006/01-NYCE 2004.

-Part 02: Performing an Assessment. Establishes minimum requirements of an assessment to ensure consistency and repetition frequency of results. The requirements help to ensure that the outcome of the evaluation is self-consistent and provide evidence to justify the ratings. [5] NYCE A.C., NMX-I006/02-NYCE 2006.

-Part 03: Guide for evaluation. Provides a guide to interpreting the requirements for an evaluation. [6] NYCE A.C., NMX-I006/03-NYCE 2006.

-Part 04: Guide for Process Improvement and Capability determination of processes. The purpose of process improvement is continually improve the effectiveness and efficiency of the organization, while the goal of Process Capability Determination is to identify the strengths, weaknesses and risks of the selected processes with respect to a specific requirement in particular, through the processes employed and their adaptation to business needs. [7] NYCE A.C., NMX-I006/04-NYCE 2006.

-Part 05: Example of an Evaluation Model processes. The evaluation is done using the model (s) assessment process related to one or more reference process models that adapt or conform to the provisions. [8] NYCE A.C., NMX-I006/05-NYCE 2006.

The NMX-I-006-NYCE has 3 categories of processes (see Figure 2)

These are processes of the primary life cycle, processes of the Organization and life cycle processes of the Support, ensuring total coverage of the organization. In turn, include process groups containing a total of 48 processes. Process evaluation is based on a two-dimensional model containing the process dimension and the dimension of capacity. The dimension of the process is provided by a Model Process Reference (external), which defines a set of processes characterized by the statement of objective of the process and results of the process. The dimension of the

capacity consists of a measurement framework which includes six process capability levels and process attributes associated with it.

The process evaluation model must be based on a set of evaluation indicators to determine compliance with the attributes of the process to all processes that are in the scope of the assessment. These indicators relate directly to the purposes and outcomes (dimension of process) and process attributes (dimension of the capacity). There are two types of indicators: Performance Indicators and Capacity Indicators. Performance Indicators are PB (Prácticas Base, Base Practices) and the PT (Productos de Trabajo, Products of Labor). Capacity Indicators are PG (Prácticas Genéricas, Generic Practices), RG (Recursos Genéricos, Genetic Resources) and the PTG (Productos de Trabajo Genéricos, Generics Work Products).

The result of the assessment consists of a set of evaluations of the Attribute Process estimated for each process, called a Profile of Process, and also may include the capacity level achieved by this process, [4-8] for a detailed study.

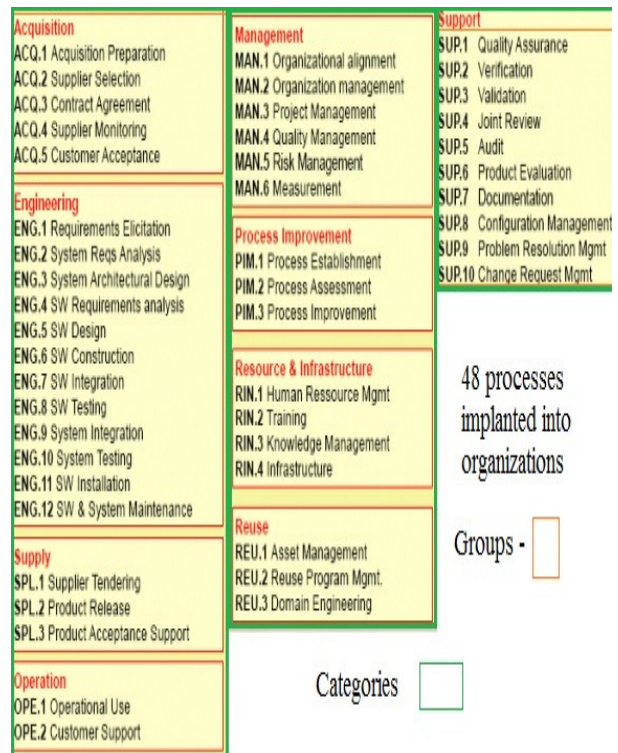


Fig. 2 Categories Process and Process Groups.

Verification of NMX-I-006-NYCE

Its verification is to determine the level of maturity of any of the 48 processes implanted into organizations that adhere to models related to the software life cycle.

Thus, is provided legitimacy and legal certainty to the maturity assessment model of the processes capacity, determine the maturity level of process capability of firms, making them more competitive and giving the opinion. Once the companies get the verification, they also show they are capable of (see Figure 3):

- Optimize the organization's internal processes.
- Creating continuous improvement in the organization.
- Emphasize on your competitors and your customers.
- Provide assurance to your customers.
- Appear in the List of organizations, which serves as an official reference for customers, authorities and competitors.

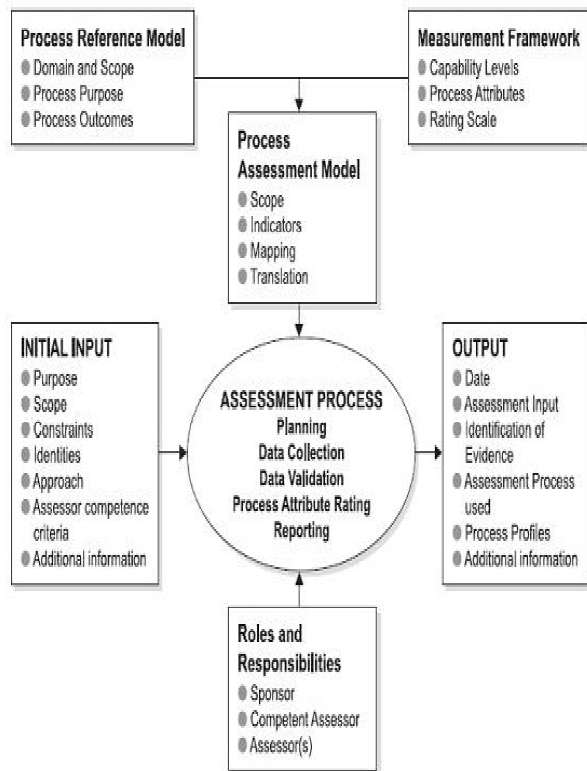


Fig. 3 Normative elements of the NMX-I-006-NYCE.

Other Mexican standards that complement

-NMX-I-045-NYCE-2005. Information Technology - Software - Life Cycle Processes Software. It establishes a common framework for the processes of software life cycle, with a well-defined terminology that can be referenced by the software industry. Contains processes, activities and tasks to be applied during the acquisition of a software system containing a pure software product or service software, also during the supply, development, operation and maintenance of software products. It also includes a process that can be

used to define, control and improve the processes of software life cycle, [9] to study this standard.

-NMX-CC-9000-IMNC. Systems Quality Management - Fundamentals and Vocabulary. Provides confidence in the administration of the quality of a provider, while giving buyers a framework for assessing whether potential suppliers have the ability to meet their needs. Process evaluation enables users to evaluate the ability of the process on a continuous scale, so you can compare and repeat, instead of using the feature pass / fail quality audits based on the NMX-CC-9001.

-NMX-CC-9001. Systems Quality Management - Requirements, paragraph 8.2.3 Verification and measurement of processes as a means to measure the quality of the Management System processes.

Contribution of the Research

Currently, it is difficult that software development companies will establish in the market, most have no chance to grow and disappears about the first year after birth. The pioneers in the use of facto standards that are at the second level (Managed) continue maintaining growth in the market and even carrying out projects for renowned companies such as DHL, HP, MetLife, Banamex, SAT (government), IBM, Loreal, Bridgestone, etc. Those companies are: Sofftek, Magnabyte Integration Advanced, Technology Advancement Center of Excellence in Software Engineering, Internet Development Network Group, GOPAC Solutions, among others, [2] is the list of companies dictated.

Our proposal is to develop a web tool designed to support the evaluators to make them less cumbersome assessments without the utilization of all information standards (avoid moving to the place of the evaluation of the standard, all parts and the standards under which this supported), with the main objective to support organizations in a self - evaluation that want to spend later by a formal verification process (to determine the level of capability of their processes), through support provided during the evaluation process (includes the 48 mentioned processes and levels 1-5) in order to familiarize businesses with the rules and promote its use for software development.

Conclusion

With the study and analysis of standards: NMX-I-059-NYCE and NMX-I-006-NYCE that apply to the TI sector and focus on the evaluation of software development processes. You can use the fact that they must be periodically reviewed and updated every five years, under the necessity of its evolution, to work on improving software development processes and

proposing initiatives to make changes and update these standards.

Because the software industry is an opportunity that many countries are viable and would like to take, is also composed mainly of PYMES, for Mexico obtaining a competitive advantage over other countries, has a big challenge for many actors, as the government, academia, business organizations and developers that should focus on research and innovation of the support tools and methodologies that take into account the issue of software quality.

Even can use of all advantages to be presented and exceptionally, as a college of professional or other private institutions, whether businesses or associations may be issued as voluntary standards NMX, also following the procedure provided by law, the technical secretariat of National Standards Commission shall orders its publication in the Official Journal of the Federation, and the applicability thereof for information.

Currently, there is a breakthrough and PYMES should take advantage of the support offered by this government organism (SE), because the greatest benefit is the cultural change in organizations. Since the processes implemented in an organization reap the benefits inherent in processes, such as a documented and orderly work, but mainly measured and at continuous improvement process. In addition, cultural change within the organization, moving from a mere mode of execution of orders to a more independent mode of administration, coordinated by common goals and purposes. That is, finally, how (by the definition of processes, procedures, etc.) is solved and people focus on what (in the projects in particular). In terms of quality, is the result of clever and constant application of all the practices defined to implement the model, and like the process capability is a direct result of continuous improvement. Product quality is a direct function of the quality of the process and to the extent that we can repeat the process, we are able to repeatedly deliver quality products.

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