

Case Study
**10 Years
of MPS.BR**

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Softex – Association for the Promotion of Brazilian Software Excellence

Established in December 1996, the company Softex, or simply Softex, is a Public Interest Civil Society Organization (OSCIP) based in Brasília and Campinas, São Paulo state, Brazil.

Softex's Mission

To increase the competitiveness of Brazilian software companies and IT services and their participation in national and international markets, promoting development in Brazil.

The Softex system, in turn, has national reach. It is made up of the Softex Company and regional players, linking more than 2,000 companies with activities in software and IT services.

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Among the activities of Softex regarding Quality Management, especially noteworthy is the MPS. BR Program – Improvement of the Brazilian Software Process, due to the results achieved since December 2003.

MPS.BR Program – Improvement of the Brazilian Software Process

Kival Chaves Weber – Executive Coordinator

Summary

Preface	5
1. Abstract	7
2. Background	7
3. Development	9
4. Conclusion	21
5. Issues for discussion	26
6. References	27

Preface

December 11, 2013 was the tenth anniversary of the creation of the MPS.BR program - Improvement of Brazilian Software Process, which is coordinated by Softex - Association for the Promotion of Brazilian Software Excellence.

To register this milestone and contribute to the process of managing institutional knowledge, Softex decided to produce the 'Case Study: 10 Years of MPS.BR'. Case studies emerged as an educational method at Harvard Business School in 1920.

The focus of this case study is both technical, aiming both at the creation and improvement of the MPS model for improving software processes, and the dissemination of this model in the market, contributing to the generation of employment and income in this country.

The protagonists of this case study are representatives of Academia, Government and Industry (the so-called Triple Helix), who have been collaborating over the last ten years to resolve this issue.

This report was prepared in accordance with the methodology for the production of cases and successful practices from SEBRAE - Brazilian Support Service for Micro and Small Enterprises, detailing both the background to the case study at the end of the last millennium and the beginning of the new millennium, and describing year-on-year how the issue was resolved from December 11, 2003 onwards.

The conclusions involve the following: a comparison of organizations with CMMI and MPS ratings in Brazil from 2004 to 2013; six testimonials from MPS customers; the main lessons learned; the main beneficiaries; new challenges and future issues.

Last but not least, especially when this report is used as a teaching case, we present four useful questions to lead others to critically reflect on this case and what can be learned from it.

I hope you gain something from this case study and wish you good teaching when using it!

Rubén Arnaldo Soto Delgado – President of Softex

Case Study: 10 Years of MPS.BR

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The focus of this case study is both the creation and refinement of the MPS model for software process improvement as well as its diffusion on the market within the framework of the MPS.BR program – Brazilian Software Process Improvement – under Softex coordination.

The protagonists are the representatives from university, government and industry (triple helix) [MELLO and ETZKOWITZ, 2000; ETZKOWITZ and MELLO, 2004] that collaborated in the solution of the dilemma of the case.

The study was accomplished in four stages, according to case study methodology [TELLIS, 1997]: i. Planning (DEZ2013-FEB2014); ii. Data collection (MAR-APR2014); iii. Data analysis (APR-MAY2014); iv. Conclusion (MAY-JUN2014).

This report comprises six sections (i. Opening, ii. Background, iii. Development, iv. Conclusion, v. Issues for Discussion and vi. References) in accordance with the methodology for the production of cases and successful practices from SEBRAE –Brazilian Support Service for Micro Companies and Small-scale Enterprises [SEBRAE, 2006].

1. Abstract

In this opening section the general context, the protagonists and the dilemma faced by them prior to the commencement of the MPS.BR program and the creation of the MPS model are presented.

At the beginning of this new millennium, a periodic study on quality in the Brazilian software industry showed that significant additional effort was required to improve the software processes in the country [MCT/SEPIN, 2001].

In 2003, a comparative study from the MIT – Massachusetts Institute of Technology – found that in recent years organizations which developed software in Brazil favored the generic approach of ISO 9000 quality management at the expense of standards and templates specific to the software process improvement [VELOSO et al., 2003].

The implementation of improvements in software processes based on standards and reference models, such as the international standards ISO/IEC 12207 – Processes of the Software Lifecycle and ISO/IEC 15504 – Process Evaluation (e.g. SPICE – Software Process Improvement and Capability Determination) and the model CMM – Capability Maturity Model (which was succeeded by CMMI – Capability Maturity Model Integration, whose first version CMMI-SE/SW V 1.0 was released in 2001), is a complex and long term effort that requires a considerable capital investment. Usually, these obstacles prevent that organizations successfully implement improvements in their software processes, especially in small and medium-sized businesses that operate under severe financial conditions. [GOLDENSON et al., 2003]

At that time, there was no doubt about the importance to adopt international standards such as ISO/IEC 12207 and 15504 in Brazil. In the second half of 2003, the dilemma was faced as to the reference model to be adopted for the improvement of software processes in the country. An alternative was to adopt the CMMI that had had very good results worldwide in large organizations and little result in MSMEs – micro, small and medium software enterprises for being expensive and requiring great effort in the implementation of the basic levels. The second alternative was to create a new model of software process improvement in the country and disseminate it on the market. In this case the role was exercised by representatives from university, government and industry (triple helix) in a collaborative form and under Softex coordination.

The crucial milestone was the launch of the MPS.BR program – Brazilian Software Process Improvement – on 11 December, 2003, at a meeting in the MCT – Ministry for Science and Technology (now MCTI- Ministry for Science, Technology and Innovation), in Brasília-DF, under Softex coordination and with the participation of representatives from the triple helix (university, government and industry).

2. Background

This section details the events and facts that preceded the dilemma so that the social and economic importance of the dilemma and the protagonists can be understood.

In 1993, the Sectoral Subprogramme for Quality and Productivity in Software [WEBER et al., 1994] (current PBQP Software) was created, under the Brazilian Program for Quality and Productivity, which

counted from the beginning on the collaborative participation of representatives from university, government and industry (triple helix) and became a source of ideas for relevant initiatives in this area in subsequent years.

In the 1990's, the country promoted both the improvement of product quality based on the standards ISO/IEC 9126, 12119 and 14598, (now ISO/IEC 25000 series) and the improvement of quality management in software enterprises based on the ISO 9000 certification [WEBER and PINHEIRO, 1995; WEBER et al., 1997].

In 2001, among other issues, the book 'Quality and Productivity in Software' [WEBER et al., 2001] presented the main trends in this area according to three points of view. The first stance is from Watts Humphrey (the 'father of Software Quality', creator of the CMM – Capability Maturity Model in 1987 and, subsequently, the PSP – Personal Software Process and the TSP – Team Software Process), who proposes changes in the software culture in a unique text of this book. The second stance is from Professor Ana Regina Rocha who considers the start of the new millennium a proper occasion for a reflection around the state of the art and practice, international trends for software process research and national trends for research in software quality. The third stance comes from Kival Weber, a consultant who claims that Brazil has good experience in assessing the quality of software products and that the interest in improving software processes based on standards such as ISO/IEC 12207 and 15504 as well as in process reference models such as the CMMI is expected to grow in the country within the next few years.

In the chapter 'Brazil' of the comparative study of the software industries in Brazil, China and India, conducted by MIT in 2002-2003 [VELOSO et al., 2003], the part concerning the process maturity contributed to set up the dilemma in this case. According to the MIT report, most Chinese and Brazilian companies were generally not at a high enough level of maturity to compete with Indian firms. At that time, the main reference for measuring the maturity of the software processes was the CMM model (followed by the CMMI) from the SEI – Software Engineering Institute at CMU – Carnegie Mellon University. A long way would be in front of the companies that plan to evolve the maturity of their software processes. These issues were not taken into consideration by many Chinese companies. In the 1990's emerged in Brazil a concern with processes but local companies favored the ISO 9000 and most software producers were ISO 9001 certified. One of the critical issues was whether these process capabilities were maintained after being conquered or if subsequent developments in capability could lead to India being further ahead, with Brazil and maybe China keeping the same pace. Another issue was the role of the processes capability in software products. In the world of that time the leaders in the production of software packages were not certified at the highest level of CMMI and few were concerned with this situation. This would suggest that success in product development does not depend on these types of capabilities and the strategy and skill of a company to offer a solution that met the requirements of a large group of consumers. A greater experience of Chinese and Brazilian firms in this dimension of the process could still be an important advantage over India considering these nations strive to have products and services with greater added value.

In the early 2000's, there was no doubt in Brazil anymore that a significant additional effort to improve software processes in the country was needed [MCT/SEPIN, 2001; WEBER et al., 2001], nor regarding the importance of adopted international standards ISO/IEC 12207 and 15504. The dilemma was which software process reference model with the best cost-benefit for the country was

to adopt? The first alternative was to adopt the CMMI, that had had very good results worldwide in large organizations and little result in micro, small and medium-sized software enterprises (MSME) for being expensive and requiring great effort in the implementation of their maturity levels 2 and 3. The second alternative, in fact an opportunity, was to create a new model in Brazil (the 1st challenge, technical, non-trivial in a country traditionally being importer of technologies in this area) and spread it on the market (2nd challenge, business, whose risk was large in relation to the 'brand' CMMI).

3. Development

This section describes year-by-year how this dilemma was solved in '10 years of MPS.BR', showing the developed activities and the achieved results in all three phases of the programme: 2004-2007 – Implementation of the MPS.BR. 2008-2011 – Consolidation of the MPS.BR. 2012-2015 – Expansion of the MPS.BR (ongoing). Among other explicitly cited references, were also consulted the notes of the biannual meetings of the Program Management Board (PMB) and the annual documents of the Critical Result Analysis (CRA) [SOFTEX, 2004-2013].

The idea of the MPS model creation – a Brazilian model for software process improvement as an alternative to CMMI – came from Márcio Girão Barroso – then CEO of Softex¹ – and was presented in August 2003 at a meeting at PBQP Software in Indaiatuba-SP [SOFTEX, 2014]. The kick-off meeting of the program was held on 11 December 2003 in Brasilia at the MCT (nowadays MCTI) with participation of personnel from university, government and industry (triple helix). Softex hired consultant Kival Weber for the Executive Coordination of the program MPS.BR– Brazilian Software Process Improvement. The ETM – Technical MPS Model Staff – coordination was the responsibility of Prof. Ana Regina Cavalcanti da Rocha from COPPE/UFRJ.

Right from the beginning, the protagonists of the program who aimed at the creation and dissemination of the MPS model were representatives from university, government and industry (triple helix) under coordination of Softex. The dilemma, namely the dual challenge, was to be successful in both the technical goal aimed at creating a new software process model in Brazil (1st challenge, technical, non-trivial, in software process research) and in the business goal aiming at the market acceptance of a Brazilian model (2nd challenge, business, as well non-trivial because it is to be seen as something new on the market in the face of an international 'de facto' standard as the CMMI).

3.1. MPS.BR Deployment: 2004-2007

The first four years were devoted to the construction of the foundations of the MPS.BR program, of the MPS model and their community of practice.

3.1.1. 2004

Kival Weber – Executive Coordinator of the MPS.BR program – reminds that the first year was marked by innovation and creativity in the activities of the coordinating team of the program (three people

1) At this time, Djalma Petit was the Softex General Coordinator and Eratosthenes Araújo was the co-coordinator of the responsible area for software quality.

from Softex and representatives of the triple helix), contributing to the solution of the first challenge of the dilemma (creation of the MPS model).

- In the period Dez2003-Dez2004 were held six meetings for the structuring of the MPS.BR program and creation of the MPS model: 11 December 2003 at the MCT/SEPIN in Brasília; on 04 February 2004 at RioSoft in Rio de Janeiro; on 01 April and 03 June at UCB in Brasília; on 13 August at Rio Info in Rio de Janeiro; on 07 and 08 December at ITS in São Paulo, always counting on voluntary participation from representatives of the triple helix (university, government and industry), making use of its own resources since the first MPS.BR program budget was only approved in 2005.
- In 2004, the technical team for the MPS model (ETM) was assembled for the technical part, composed of representatives of the triple helix invited by Softex (no fixed cost), chosen among professionals with extensive experience in software engineering and software process improvement and services. Since then, the ETM is responsible for: i) creation and continuous improvement of the MR-MPS reference model, assessment method MA-MPS and its specific guidelines; ii) empowerment of people through courses, exams and MPS workshops; iii) coordinating the submission of articles (papers) in relevant events and publications within the country and abroad.]
- That year, the MN-MPS business model was created in the business part, including both the cooperative business model (MNC-MPS, suitable for groups of companies that want to share cost and effort in the MPS implementation and evaluation) based on lessons learned from groups of enterprises 'Towards ISO 9000' [WEBER and PINHEIRO, 1995; WEBER et al., 1997], as well as the unique business model (MNE-MPS, suitable for companies that want exclusivity in MPS services).
- On the part of management, the organizational structure of the MPS.BR program under coordination of Softex was defined and the methodology of Marco Lógico (Logical Framework Approach) adopted [RODRIGUES, 2001]. There were also created both the Program Management Board (PMB), composed by the main stakeholders, with the objective of supporting Softex in the planning of the annual activities and in monitoring the implementation of these activities, as the Forum for Accreditation and Control (FAC) of the implementing institutions (II) and assessing institutions (AI), composed of representatives from university, government and industry.
- On 18 April 2004 was made the first PowerPoint presentation at TecSoft in Brasília on 'MPS.BR Program: Brazilian Software Process Improvement', in charge of the technical part Prof. Kathia Marçal de Oliveira/UCB – Universidade Católica de Brasília and of the business part Kival Weber with regard to the business model and the program management for an external audience pilot project (José Antonio Antonioni/SoftSul, José Vidal Belinetti/ITS, Welington Santos/FumSoft and Paulo Veras /TecSoft).
- As for the training of people in the MPS model, 637 people participated in twelve official courses (C1 – Introduction to MPS) from March to December 2004 and 137 people were approved in three official exams (P2 – MPS Implementers) between August and December 2004.
- An early version of the MPS model was developed between December 2003 and March 2004, compatible with the CMMI process areas, with seven maturity levels; from August to December 2004, an enhanced version of the MPS model in accordance with the international standards ISO/IEC 12207 – Software life cycle processes and 15504 – Process assessment and fully compatible with the CMMI-DEV (CMMI for Development) was developed. A recognized crucial success factor

of the MPS model was the strategy of 'divide and conquer', creating the levels G-F (bottom of the pyramid) equivalent to CMMI-2, E-D-C (center of the pyramid) equivalent to CMMI-3 and B-A (top of the pyramid) equivalent to CMMI 4-5.

- MPS pilot implementations were conducted in groups of enterprises in Campinas, Rio de Janeiro and Recife, to test the pilot guidelines and prepare companies for the first MPS assessments.
- In October 2004, the 1st international communication in this case was made in Portugal, at the 5th International Conference on the Quality of Information and Communications Technology (QUATIC 2004) in an article [WEBER et al., 2004] whose summary is as follows: "Studies on the quality in the Brazilian software sector show the need for a significant effort capable of increasing the maturity of the software processes of enterprises. This article describes the MPS.BR Program – Brazilian Software Process Improvement, an initiative involving universities, research groups and companies under the coordination of Softex Society. The program is aimed at the definition and dissemination of a reference model, an assessment method and a business model for software process improvement (MR-MPS, MA-MPS and MN-MPS, respectively). Goal of this program is not to define something new with regard to standards and maturity models. Its novelty lies in the implementation strategy, created for the Brazilian reality. The business model has great potential for replicability in Brazil and in other countries of similar characteristics with regard to the software industry.

3.1.2. 2005

Kival Weber recalls that, from the second half of 2005, there were the first disbursements related to MPS.BR in connection with financial covenants, signed between Softex and FINEP, MCT (nowadays MCTI)² and IDB/FUMIN³ respectively, contributing to the financial sustainability of the program.

- That year, the participation of representatives of the triple helix (university, government and industry) without fixed costs for the program and Softex was fundamental for the production of the MPS Guidelines version 1.0 (General Guideline, Assessment Guideline and Acquisition Guideline).
- In June 2005, an article about the MR-MPS reference model and the assessment method MA-MPS won the award for the best technical article at the 4th Brazilian Symposium on Software Quality (SBQS 2005), held at PUC-RS in Porto Alegre. Its summary is as follows: "This article describes a Process Reference Model and a Process Assessment Model called MR-MPS and MPS, which are being developed in the MPS.BR Program – Brazilian Software Process Improvement. MR-MPS and MA-MPS were created according to the Brazilian reality and aimed at both the full compatibility with the CMMI and its compliance with the standards ISO/IEC 12207 and ISO/IEC 15504. The MPS model is described in three documents: General Guideline, Assessment Guideline and Acquisition Guideline. This article also presents the first results of this program. The MPS model has great potential for replicability in many cities in Brazil and in other countries with similar characteristics with regard to the software sector, as in Latin America. [WEBER et al., 2005]

2) The resources from FNDCT – National Fund for Scientific and Technological Development have been essential to both support the P&D&I of the MPS.BR program and the MPS model as well as the MPS enterprise groups focusing on the Brazilian MSMEs.

3) Both financial supports have been important to Softex so far – MIF Multilateral Investment Fund (member of the IDB Group – Inter-American Development Bank: i) 'International Competitiveness Support Program for Small and Medium-sized Enterprises' (BR-M1015) (Agreement ATN/ME-9183-BR), 2005-2009; ii) 'Proyecto BID/FOMIN - Mejora de la calidad de los procesos de software elaborados por PYME en Latinoamérica y Caribe (LAC): RELAIS – Red Latinoamericana de la Industria del Software' (ATN/ME 11882 RG), May 2010 – May 2014.

- As for the training of people (total since 2004): 1,422 people attended official MPS courses (C1 – Introduction to MPS, C2 – MPS Implementers, C3 – MPS Assessors and C4 – MPS-based Acquisition); 358 people were approved in official MPS exams (P1 – Introduction to MPS, P2 – MPS Implementers and P4 – MPS-based Acquisition). There were also official MPS workshops held (W2 – MPS Implementers, W4 – MPS-based Acquisition and W5 – Organizers of MPS enterprise groups).
- A highlight was the start of the construction of a comprehensive front-line staff network (II – MPS implementing institutions, IA – MPS assessment institutions, IOGE – institutions organizing enterprise groups, ICA-Acquisition Consulting Institutions and MPS Instructors), composed by the best specialists in each area, without fixed cost for the MPS.BR program.
 - In 2005, there were 11 MPS implementation institutions (II) accredited by Softex, based on the requirements of the Softex RELEASE 03/2004.
 - An important novelty was the Softex MPS RELEASE 20/2005 - Implementation support for enterprise groups (12 months) and MPS evaluation (3 months afterwards) – Levels G and F (bottom of the pyramid), who attended 15 groups from 11 IOGEs, starting with 93 MSMEs of which 83 were evaluated (89%) using the cooperated business model MN-MPS which became an accelerator (important success factor) in the dissemination of the MPS model in Brazil (2nd challenge to solve the dilemma).
- But the most relevant factor was the conduct of five pilot MPS evaluations in companies in Campinas, Recife and Rio de Janeiro under IA Softex coordination, since published under <www.softex.br/mpsbr> (Evaluation Result, Softex Declaration and note with picture).

3.1.3. 2006

Kival Weber recalls that, on this occasion, a blog published that the MPS was a 'Tupiniquim model' with less than 8 published evaluations, while the CMMI was a 'de facto standard' with more than 80 evaluations only in Brazil. Brazilian technology or not, eight or eighty, glass half full or half empty? The truth is that the second challenge of the dilemma (acceptance of the new model by the market) had not yet been resolved, even by a matter of time.

- Again, the protagonists of the triple helix (university, government and industry) were crucial for the improvement of the model in new versions of the MPS Guidelines (1st challenge), either to its diffusion in all Brazilian regions (2nd challenge) both through courses and official MPS exams and MPS assessment and implementation services as in the support of MPS enterprise groups.
- In 2006, there were 15 II – MPS Implementation Institutions and 2 IA – MPS Assessment Institutions accredited by Softex.
- The version 1.1 of the MPS Guidelines in Portuguese and as novelty also in Spanish was published under <www.softex.br/mpsbr>.
- As for the training of people (total since 2004): 1,984 people attended official MPS courses (C1 – Introduction to MPS, C2 – MPS Implementers, C3 – MPS Assessors and C4 – MPS-based Acquisition); 556 people were approved in official MPS exams (P1 – Introduction to MPS, P2 – MPS

Implementers and P4 – MPS-based Acquisition). There were also official MPS workshops held (W2 – MPS Implementers, W4 – MPS-based Acquisition and W5 – Organizers of MPS enterprise groups).

- From September 2005 to December 2006 were published 17 MPS assessments.

3.1.4. 2007⁴

Nelson Franco, at that time MPS.BR Operations Manager and currently Softex Quality Manager, remembers that it proved necessary to automate the MPS.BR program management, so the CoreKM Knowledge Management Environment (COPPE/UFRJ) was hired for both the assessment, assessor and IA control as for the implementer, II and IOGE control.

- The protagonists of the triple helix (university, government and industry) continue being fundamental both for the improvement of the model in new versions of the MPS Guidelines (1st challenge) as for its diffusion in all Brazilian regions (2nd challenge).
- In 2007, there were 18 II – MPS Implementation Institutions and 6 IA – MPS Assessment Institutions accredited by Softex.
- The version 1.2 of the MPS Guidelines in Portuguese and in Spanish was published under <www.softex.br/mpsbr>.
- As for the training of people (total since 2004): 2,606 people attended official MPS courses (C1 – Introduction to MPS, C2 – MPS Implementers, C3 – MPS Assessors and C4 – MPS-based Acquisition); 738 people were approved in official MPS exams (P1 – Introduction to MPS, P2 – MPS Implementers and P4 – MPS-based Acquisition). There were also official MPS workshops held (W2 – MPS Implementers, W3 – MPS Assessors, W4 – MPS-based Acquisition, W5 – Organizers of MPS enterprise groups and W6 – MPS Company Workshop).
- That year were released:
 - The Softex MPS RELEASE 14/2007 - Implementation support for enterprise groups and MPS evaluation – Levels G and F (bottom of the pyramid), who attended 5 groups from 5 IOGEs, starting with 37 MSMEs of which 33 were evaluated (89%);
 - The Softex MPS RELEASE 31/2007 - Implementation support for enterprise groups and MPS evaluation – Levels G and F (bottom of the pyramid), who attended 2 groups from 2 IOGEs, starting with 14 MSMEs of which 14 were evaluated (100%).
- From September 2005 to December 2007 were published 72 MPS assessments, showing that ‘the glass was filling’. Here it is important to note that the validity period of MPS assessments is three years and, at the end of the second year, Softex always alerts the organization that there is enough time to plan the renovation of the evaluation.

4) In October 2007, Softex was restructured with the following developments in the MPS.BR program: José Antonio Antonioni/Director (responsible for MPS.BR) and Arnaldo Bacha de Almeida/Executive Vice President, respectively, assumed the functions hitherto performed by Eratosthenes Aguilar/Training Coordinator (responsible for MPS.BR) and José Antonio Antonioni/General Coordinator

3.2. MPS.BR Consolidation: 2008-2011

The second phase of the MPS.BR program was devoted to the consolidation of the programme and of the MPS model in Brazil, with focus on the solution of the 2nd challenge of the dilemma (growing acceptance of the new model in the market).

3.2.1. 2008

Kival Weber recalls that the business model MN-MPS that defines the business rules of the MPS.BR program and the MPS model was the crucial success factor in solving the second challenge of the dilemma (acceptance of the model by the market). The MN-MPS can be associated with the approach of the service triangle [TEBOUL, 2008], comprising the company (Softex), the front-line staff (II, IA, IOGE, ICA and MPS instructors) and the MPS Services client. Remember also that, after having been reached critical mass with the 100th published MPS assessment, the iMPS study – ‘Performance Results of Organizations that Adopted the MPS Model’ was commissioned, together with the Group for Experimental Software Engineering from COPPE/UFRJ [KALINOWSKI et al., 2008], to conduct annual quantitative research, worldwide unique, which presents objective evidence of great assistance in this area.

- The leading representatives of the triple helix (university, government and industry) continue collaborating in the MPS.BR program and the improvement of the MPS model as agents of change.
- In 2008, there were 19 II – MPS Implementation Institutions and 8 IA – MPS Assessment Institutions accredited by Softex.
- The version 1.2 of the MPS Guidelines in Portuguese and Spanish were published under <www.softex.br/mpsbr>, furthermore some of those guidelines in English.
- From 2004 to 2008 there were: 3,251 participants in all official MPS courses; 1,039 approved in all the official MPS exams; 665 participants in all official MPS.BR workshops; and 85 participants at the International MPS.BR Seminar (SI/2008 MPS).
- That year, ‘MPS.BR: lessons learned’ was published by Softex in Portuguese, Spanish and English [ROCHA and WEBER, 2008]. For more information, see section 4.3 of this study.
- The overall results obtained in the first round of the iMPS study – ‘Performance Results of Organizations that Adopted the MPS Model’, conducted in 2008, indicate that companies which adopt the MPS model showed greater customer satisfaction, greater productivity and capability to develop larger projects. Additionally, more than 80% of them were satisfied with the MPS model [TRAVASSOS and KALINOWSKI, 2008].
- The Softex MPS RELEASE 24/2008 was released - Implementation support for enterprise groups and MPS evaluation – Levels G and F (bottom of the pyramid), who attended 4 groups from 3 IOGEs, starting with 21 MSMEs of which 19 were evaluated (90%).
- From September 2005 to December 2008 were published 123 MPS assessments, surpassing in this year the milestone of the 100th assessment (a good indicator which began to solve the second challenge of the dilemma).

3.2.2. 2009

Antenor Correa, former General Software and Service Coordinator with SEPIN/MCTI, remembers that the Ministry of Science, Technology and Innovation invested more than 10 million dollars in the MPS.BR program. “We’ve always been aware that it was necessary to subsidize the incorporation of quality models in micro, small and medium-sized enterprises (MSMEs)”. Initially, the available fund at MCTI to support Softex in the ‘Quality’ issue could not directly benefit companies because it was focused on technological development, empowerment of people, etc; but, a second line from Sectorial Funds (FNDCT – National Fund for Scientific and Technological Development) used by MCTI allowed for this destination. However, this financial support took a long time and came after that which was contributed by IDB/MIF. The important part in this MIF support (Project BR-M1015, from 2005 to 2009) came at the opportune and proper moment: it served to validate the MPS model, gave it prestige and allowed to put the co-financing model for implementations and MPS assessments into motion. Thus, the number of companies that adopted the MPS model in Brazil began to grow. And in this way, the arrival of other support funds was promoted and unlocked. [BERCOVICH, 2014]

- The leading representatives of the triple helix (university, government and industry) continue collaborating both in ETM as in FCC, moreover on the front-line providing MPS services (II, IA, IOGE and MPS instructors).
- In 2009, there were 18 II – MPS Implementation Institutions and 10 IA – MPS Assessment Institutions accredited by Softex.
- Under <www.softex.br/mpsbr>, the MPS Guidelines 2009 (General Guideline, Acquisition Guideline, 10 Implementation Guidelines and Assessment Guideline) were published.
- From 2004 to 2009 there were: 3,780 participants in all MPS courses; 1,165 approved in all the MPS exams; 794 participants in all annual MPS workshops; 85 participants at the International MPS.BR Seminar held in October 2008.
- In order to provide more comprehensiveness and to strengthen the integration among the main players, as from this edition the Annual MPS Workshop (WAMPS 2009) shall promote in an integrated manner the events which were previously performed and represented by IV MPS Assessors Workshop, IV MPS Implementers Workshop, II MPS.BR Companies Workshop and III IOGE MPS.BR Workshop.
- The article “MPS.BR: A Successful Program for Software Process Improvement in Brazil”, was published in the renowned journal SOFTWARE PROCESS IMPROVEMENT AND PRACTICE (Research Section). Published online 23 June 2009 in Wiley InterScience (www.interscience.wiley.com). [MONTONI et al., 2009]
- In 2009, in the 2nd round of the iMPS research, the company satisfaction with the MPS model is notorious with more than 98% of the companies partially or fully satisfied. As for the analysis of performance variation 2008/2009, the companies reported that the return on investment was obtained and especially for those that have evolved or internalized the MPS in their processes it was possible to observe a trend to improvement of cost, quality, and productivity, the basic principles when software is developed following the precepts of engineering. [TRAVASSOS and KALINOWSKI, 2009]

- In the cooperative MN-MPS business model were released:
 - Softex MPS RELEASE 12/2009 - Implementation support for enterprise groups (12 months) and MPS evaluation (3 months afterwards) – Levels G and F, who attended 6 groups from 5 IOGEs, starting with 37 MSMEs of which 32 were evaluated (86%);
 - Softex MPS RELEASE 13/2009 - Implementation support for enterprise groups (15 months) and MPS evaluation (3 months afterwards) – Levels E-D-C (center of the pyramid), who attended 3 groups from 3 IOGEs, starting with 19 MSMEs of which 12 were evaluated (63%).
- From September 2005 to December 2009 were published 203 MPS assessments, surpassing the benchmark of the 200th assessment and contributing to solve the second challenge of the dilemma. A novelty was the first joint evaluation CMMI-3 with MPS-C, plus additional MPS-CMMI assessments, possible because both models are fully compatible. [ROCHA et al., 2009]

3.2.3. 2010

Prof. Guilherme Horta Travassos, who is the principal researcher of the Experimental Software Engineering Group at COPPE/UFRJ – Federal University Rio de Janeiro, is responsible for iMPS research and 'senior advisor' of the technical team of the MPS model (ETM), recalls that the values of the national subsidies (FINEP and MCTI/FNDCT), lack to include both the 'voluntary work' of people from the triple helix (university, government and industry) at ETM and FCC, as the significant part paid by companies, either explicitly (% of the financial contribution of each company required in the support for groups of companies) or implicitly (internal expenses of enterprises with the adoption of the MPS model which can reach 70% of the value of the contribution of the companies according to some studies).

- The leading representatives of the triple helix (university, government and industry) continue collaborating proactively in the MPS.BR program and the improvement of the MPS model under coordination of Softex/MPS.BR.
- In 2010, there were 18 II – MPS Implementation Institutions and 12 IA – MPS Assessment Institutions accredited by Softex.
- In 2010, the Ethics Committee of the Program (CEP) was created as to propose the MPS.BR Code of Ethics, establish behavioural standards to be observed and formulate an opinion about violations of behavioral patterns laid down in the Code of Ethics.
- From 2004 to 2010 there were: 4,352 participants in all official MPS courses; 1,276 approved in all the official MPS exams.
- The Annual MPS Workshop (WAMPS 2011) had more than 150 enrolments.
- The results of the 2010 round of the iMPS Project (information to monitor and highlight performance variation in enterprises that adopted the MPS model) are presented under three perspectives: characterization, analysis of the 2009/2010 variation and variation analysis 2008/2009/2010. In general, the companies' satisfaction with the model is notorious with more than 92% of the firms partially or fully satisfied. Regarding the return on investment of the adoption of the model, more than 72 percent of companies reported having recovered more than the investment made in the implementation and MPS evaluation. Moreover, just as in 2009, it was especially possible for those

companies that have evolved or internalized the MPS in their processes to observe trends towards cost reduction, increased quality, reduction of deadlines and increased productivity. [TRAVASSOS and KALINOWSKI, 2010]

- That year were released:
 - Softex MPS RELEASE 35/2010 - Implementation support for enterprise groups (12 months) and MPS evaluation (3 months afterwards) – Levels G and F (bottom of the pyramid), who attended 11 groups from 9 IOGEs, starting with 71 MSMEs of which 57 were evaluated (80%);
 - Softex MPS RELEASE 36/2010 - Implementation support for enterprise groups (15 months) and MPS evaluation (3 months afterwards) – Levels E-D-C (center of the pyramid), who attended 5 groups from 5 IOGEs, starting with 20 MSMEs of which 14 were evaluated (70%).
- From September 2005 to December 2010 were published 274 MPS assessments, showing that ‘the glass continued filling’.

3.2.4. 2011

Christine Filipak Machado from CELEPAR – Company for information and communication technology from Paraná – Coordinator of IA QualityFocus and General Coordinator of the technical team for the MPS model (ETM) as from 2012, recalls that in 2003 the Brazilian reality in the area of Software Process Improvement (SPI) was one thing, both in companies and in qualified personnel. With the MPS.BR program and the MPS model that radically changed in the country and the challenge now is in higher levels, both to consolidate the MPS implementations and evaluations in levels E-D-C (center of the pyramid) and to evolve the capability for levels B-A (top of the pyramid). Remember that India was the reference in 2003; in 2013, this also changed in Brazil.

Prof. Marcello Thiry Comichioli da Costa from UNIVALI – Universidade do Vale do Itajaí – Coordinator of II and IA Incremental and Vice-General Coordinator of the technical team for the MPS model (ETM) as from 2013, also recalls that there was a substantial change in the country before and after the MPS model. “Before, the number of companies sensitized with the topic of software process improvement was very limited. It was an academic topic. With the CMMI it resulted in being too expensive since there were few consultants concentrated in few cities who charged a lot. The interest in the topic has grown with the MPS, it generated many events to raise awareness and for the formation of MPS implementers and assessors and there is already an extensive network in support of the MPS model across the country. This increased availability, proximity and accessibility to the MPS Implementing Institutions (II) and MPS assessing Institutions (IA) allowed that Brazil reached another level in quality software processes”. [BERCOVICH, 2014]

- As regards the leading representatives of the triple helix (university, government and industry), the influence and impact of the MPS.BR program and of the MPS model in research related to Software Quality in Brazil was highlighted both in the Brazilian Symposium on Software Quality (SBQS 2011) in Curitiba [SANTOS, 2011] and the Brazilian Symposium on Software Engineering (SBES 2011) in São Paulo. [KALINOWSKI et al, 2011]
- In 2011, the 18 II – MPS Implementation Institutions and 12 IA – MPS Assessment Institutions accredited by Softex were maintained.

- Under <www.softex.br/mpsbr>, the MPS Guidelines 2011 (General Guideline, Acquisition Guideline, 11 Implementation Guidelines and Assessment Guideline) were published.
- From 2004 to 2011 there were: 4,779 participants in all official MPS courses and 1,322 approved in all the official MPS exams. The Annual MPS Workshop (WAMPS 2011) had more than 130 enrolments.
- In the iMPS 2011 research results, the company satisfaction remains high with approximately 97% of the companies partially or fully satisfied with the MPS model in general. Regarding the return on investment of the adoption of the model, more than 50% of the companies reported having recovered over the previous 12 months more than the investment made in MPS implementation and evaluation. The performance variation indicators for companies that adopted the MPS model over the years indicate that possibly enterprises which remain persistent in using software engineering practices promoted by the MPS model have been able to deal with larger projects, in greater numbers and with greater control. [TRAVASSOS and KALINOWSKI, 2011]
- In 2011 were released in the cooperative business model MNC-MPS:
 - Softex MPS RELEASE 35-A/2010 - Implementation support for enterprise groups (12 months) and MPS evaluation (3 months afterwards) – Levels G and F (bottom of the pyramid), who attended 6 groups from 6 IOGEs, starting with 34 MSMEs of which 28 were evaluated (82%);
 - Softex MPS RELEASE 36-A/2010 - Implementation support for enterprise groups (15 months) and MPS evaluation (3 months afterwards) – Levels E-D-C (center of the pyramid), who attended 1 group from 1 IOGE, starting with 19 MSMEs of which 12 were evaluated (63%).
- From September 2005 to December 2010 were published 345 MPS assessments, surpassing the mark of the 300th rating and continuing to contribute to solving the second challenge of the dilemma.

3.3. MPS.BR Expansion: 2012-2015 (ongoing)

The third phase of the MPS.BR program is still in progress in order to increase the sustainability of the program, continuously improve the MPS-SW model (Software) including the creation of a MPS model family (holistic approach) and disseminate the use of the MPS model in Brazil and in other countries with similar characteristics in the software industry.

Therefore only the activities and results achieved in 2012 and 2013 will be presented.

3.3.1. 2012⁵

Prof. Ana Regina Cavalcanti da Rocha from the II and IA Foundation COPPETEC at COPPE/UFRJ, who coordinated the technical MPS model team (ETM) from 2004 to 2011 and is known as the 'mother of the MPS model', recalls that this is a recognized success of the triple helix (university, government and industry) in Brazil [SANTOS et al., 2012]. Remember also that, to help overcome the challenges

5) In December 2012, there was a new restructuring in Softex: i) President - Ruben Delgado, Executive Vice-President - Marcos Mandacarú until May 2014 and afterwards Ney Gilberto Leal. Director of Operations - Mariana Yazbeck and Controller - Fabian Appel Petrait; ii) Quality Manager - Nelson Franco who became the main responsible for the MPS.BR program and the MPS model.

in the course of High Maturity, the book 'Software Measurement and Statistical Process Control' was released in 2012 in order to foster people in the evolution to higher levels of the MPS model (top of the pyramid). [ROCHA et al., 2012]

- The leading representatives of the triple helix (university, government and industry) continue actively participating in the MPS.BR program and the improvement of the MPS model, both in the rear (ETM and FCC members) and as front-line employees (60% of II and IA/MPS are linked to university and 40% are private institutions).
- In 2012, there were 20 II – MPS Implementation institutions, including II JPE Consultants SC - Mexico and 12 IA – MPS Assessment institutions accredited by the Softex.
- Under <www.softex.br/mpsbr>, the MPS Guidelines 2012 (General Guideline, 13 Implementation Guidelines and Assessment Guideline) were published. Furthermore, the new General Service Guideline 2012 was published.
- From 2004 to 2012 there were: 5,494 participants in all official MPS courses and 1,360 approved in all official MPS exams. In addition, 91 people participated in the PoC – Proof of Concept of the official courses C1/C2 & MPS EAD in Portuguese (Brazil) and Spanish (Colombia, Mexico and Peru). That year the Annual MPS Workshop (WAMPS 2012) was held as an event of the CIBSS 2012 (I Congress of the Brazilian Software and IT Service Industry) along with the events III CONATI (III SOFTEX Congress for Business Alliances) and the I SOFTEX Observatory Meeting.
- In this fourth year of data collection, the results of the 2012 iMPS research are presented under four perspectives: characterization 2011, analysis of the 2010/2011 variation, variation analysis 2009/2010/2011 and variation analysis 2008/2009/2010/2011. In general, the companies' satisfaction remains high with approximately 97% of the firms partially or fully satisfied with the MPS model. Regarding the return on investment of the adoption of the model, more than 50% of companies reported having recovered over the previous 12 months more than the investment made in MPS implementation and evaluation. The performance variation indicators for companies that adopted the MPS model over the years indicate that possibly enterprises which remain persistent in using software engineering practices promoted by the MPS model have been able to deal with larger projects, in greater numbers and with greater control. [TRAVASSOS and KALINOWSKI, 2012]
- The Softex MPS RELEASE 15/2012 - Implementation support for enterprise groups and MPS evaluation – Levels G and F (bottom of the pyramid), who attended 5 groups from 5 IOGEs, starting with 31 MSMEs of which 17 have been evaluated till April 2014 (still in progress) was released.
- From September 2005 to December 2012 were published 428 MPS-SW (Software) assessments, surpassing the mark of 400 evaluations In September 2012, the first MPS assessment-SV (services) was published.

3.3.2. 2013

Jorge Boria, Vice-President of Liveware Inc., Austin, TX, and 'senior advisor' of the technical MPS model team (ETM), recalls that in 2004 he witnessed the birth of a dream. "When Professor Ana Regina Cavalcanti da Rocha was assigned to coordinate the technical MPS model team (ETM), I had

the opportunity to share my experience in CMMI with the people involved in the creation of the MPS model. In that opportunity there were some of the best Brazilian experts in software process improvement as students of my course 'CMMI – Capability Maturity Model Integration' in Rio de Janeiro and a surprising number of people in the course 'SCAMPI Appraisal Team Member'. I had no doubts that the MPS.BR program and the MPS model would succeed and this really happened." In 2013, he launched the book 'The history of Tahini-Tahini: Software Process Improvement with Versatile Methods and the MPS Model', in Portuguese [BORIA et al., 2013] and also in Spanish.

- Some of the leading representatives of the triple helix (university, government and industry) were nominated in this case study, but many others were not. Especially the ETM – technical model team – members stand out and from FCC – Accreditation and Control Forum < see http://www.softex.br/wp-content/uploads/2013/07/FCC_4.pdf >. These and other contributors deserve thanks for the role in the solution of the two challenges (dilemma) faced in the MPS.BR program and in the improvement of the MPS model since 2004 until now.
- In 2013, there were 19 II – MPS Implementation Institutions with 156 associated implementers and 13 IA – MPS Assessment Institutions accredited by Softex with 74 associated assessors, including the new IA Liveware Inc. in Austin, TX, Buenos Aires and São Paulo.
- Under <www.softex.br/mpsbr>, the MPS Guidelines 2013 (Acquisition Guideline, 13 Implementation Guidelines and Assessment Guideline) were published.
- From 2004 to 2013 there were: 5,653 participants in all official MPS courses and 1,409 approved in all the official MPS exams. Since 2012, 117 people have participated in official MPS EAD courses, within the country and abroad.
- The Annual MPS Workshop (WAMPS 2013) had a more balanced participation of the triple helix (university, government and industry), both in lectures and tasks as in audience.
- In 2013, 181 iMPS survey questionnaires of 148 different companies involved with the MPS-SW were received, causing that the historical basis of the iMPS can count on 923 questionnaires pertaining to 364 organizations that have participated in the iMPS rounds since 2008. The characterization of 2013 reinforces the indication of previous years that the higher the level of maturity, the better performance, estimation precision and quality. Companies mentioned to realize contributions of MPS-SW to the innovation of their processes and eventually also of their products. Satisfaction with the model remains high (above 95%). The global analysis, in a sample composed of 292 organizations, allowed to obtain more explicit indications (some statistically significant) about the benefits of the MPS-SW model for companies that use it and highlights the importance of searching for higher maturity levels than the size of the company and the profile of the projects evolve. Conclusions: MPS-SW fulfills its objective to attend the micro, small and medium-sized enterprises, contributing to the fact that organizations at different MPS-SW maturity levels present different performance. In general, the higher the maturity level, the better the performance of the organization. Companies, especially those in lower maturity levels, need to improve their measurement processes and quality assurance with a view to the use of inadequate and inconsistent measures, eventually showing volatility that hinders management and improvement observation in the respective processes. [TRAVASSOS and KALINOWSKI, 2013]

- The Softex MPS RELEASE 28/2013 - Implementation support for enterprise groups and MPS evaluation – Levels G and F (bottom of the pyramid), who attended 9 groups from 8 IOGEs, starting with 60 MSMEs of which 10 have been evaluated till April 2014 (still in progress) was released.
- From September 2005 to December 2013, 538 MPS assessments were published (surpassing the benchmark of 500 evaluations), of which 70% were in MSMEs and 30% in large public and private organizations, highlighting that the MPS model is suitable for companies of any size. Thus, a micro or small enterprise can adopt it and grow until it becomes a large organization without the need to change the template for improving its software processes and organizational performance.

4. Conclusion

In this closing section are presented: i) comparisons of MPS-SW (Software) and CMMI (SCAMPI A) assessments in Brazil for the period 2004-2013; ii) MPS-SW (Software) client testimonials; iii) lessons learned in this case; iv) the main beneficiaries of this case; v) new challenges and future dilemmas.

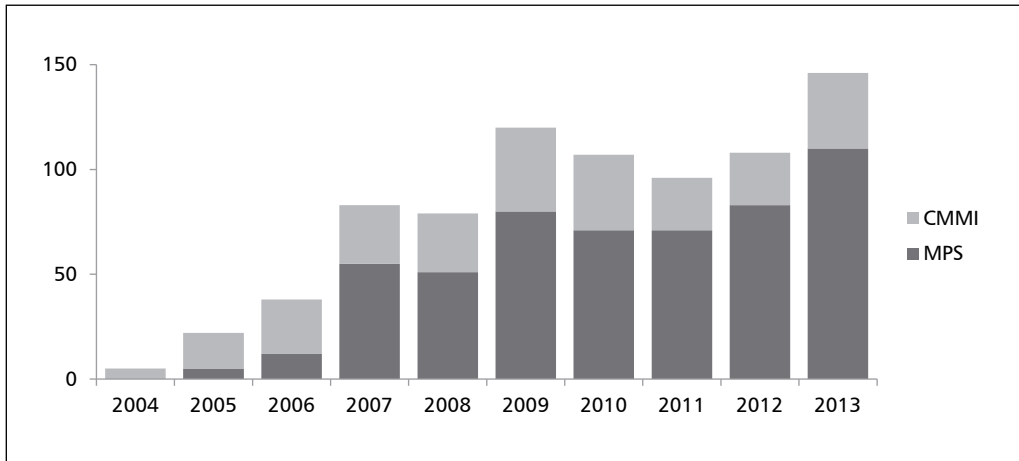
4.1. MPS and CMMI assessments in Brazil in the period 2004-2013

Table/Figure 1 shows the number of MPS-SW (Software) and CMMI (SCAMPI A) assessments, published annually from 2004 to 2013, showing the predominance of the MPS model in Brazil in this period.

Table/Figure 2 shows the total of MPS-SW (Software) and CMMI (SCAMPI A) assessments in Brazil year-by-year from 2004 to 2013, illustrating a more accelerated growth of MPS assessments in the country. Of 538 MPS-SW (Software) assessments published until April 2014, 226 (42%) were carried out without Softex support to company groups in the MPS implementation and evaluation.

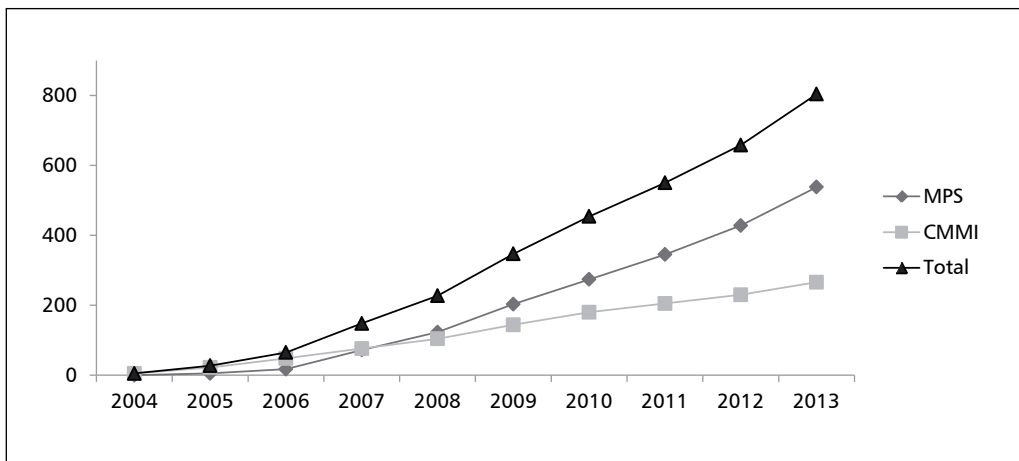
Table/Figure 1 – MPS-SW⁶ and CMMI⁷ (SCAMPI A) assessments, published annually

Brazil	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
MPS	0	5	12	55	51	80	71	71	83	110
CMMI	5	17	26	28	28	40	36	25	25	36
Total	5	22	38	83	79	120	107	96	108	146



Table/Figure 2 – Total of MPS-SW and CMMI (SCAMPI A) assessments 2004-2013

Brazil	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
MPS	0	5	17	72	123	203	274	345	428	538
CMMI	5	22	48	76	104	144	180	205	230	266
Total	5	27	65	148	227	347	454	550	658	804



According to the ‘Maturity Profile Report 2007-2013’ [CMMI INSTITUTE, 2014], the ten countries with the highest total number of CMMI (ACQ + CMMI + DEV + People CMM + SVC + Not Given) assessments in this period are: i) China = 3,316; ii) USA = 2,168; iii) India = 959; iv) Spain = 333; v) Japan = 279; vi) South Korea = 255; vii) Mexico = 253; viii) Brazil = 221; ix) France = 185; x) Taiwan = 158.

6) See < www.softex.br/mpsbr >

7) See < <http://cmmiinstitute.com/resource/process-maturity-profiles/> >

As MPS and CMMI assessments are fully compatible, they sum up (see Table/Figure 2 Total) in the period 2004-2013 in Brazil to a total of 804 assessments: 538 MPS (67%) and 266 CMMI (33%). Thus, in the period 2007-2013, the total number of MPS and CMMI assessments puts Brazil in fourth place among the countries in the whole world with best quality in their software processes (behind China, the United States and India).

4.2. MPS client testimonials

4.2.1. Nelson Kendi Komikawa – Director of Tree Tools, Curitiba-PR

(MPS-SW – Level F, valid till 03 July 2015)

“With the process standardization, well-defined routines and training of people, resulting from the implementation of the MPS model, our Software Factory now works without the need for direct management by the Board. Time and cost estimations have improved. We were able to start participating in public biddings, for which it is often necessary to have the MPS level F-SW (Software). And it has greatly improved the company’s image, its prestige, which facilitates the relationship with employees. Anyway, it’s a differentiator for the market.” [BERCOVICH, 2014]

4.2.2. Renato Bolzan – Director for Operations of S2IT, Araraquara-SP

(MPS-SW – Level E, valid till 16 April 2015)

“We have metrics that clearly indicate an increase of productivity, assertiveness and maturity in software development projects as we move forward in the levels of the MPS-SW model (Software). Since 2008, we have eliminated more than 60% of our rework index, providing a significant improvement in the business profitability indicators. We are fully satisfied with the return on investment (ROI) that we had in the MPS model.”

4.2.3. Rodrigo Moreira – Partner/Director of Eteg, Belo Horizonte-MG

(MPS-SW – Level C, valid till 14 February 2015)

“The gain the MPS model provides for companies that effectively want to raise the quality of their software is invaluable. To be successful in the software business, it is not possible to always count on improvisation or on the initiative of some exceptional people. If there is no process improvement model that causes the quality to become part of the business routine, delays and failures in projects inevitably occur. Developing software is not simple; develop high quality software is an even greater challenge. Therefore, the required effort for obtaining an ‘MPS’ certification is not small. However, it is increasingly necessary to compete in this increasingly demanding and global market.”

4.2.4. Ismar Kaufman – Partner/Director of In Forma, Recife-PE

(MPS-SW – Level C, valid till 24 January 2016)

“In 2005, In Form was the first Brazilian company to adopt this model and MPS practices were important to retain our customers, especially in software exports to the United States. In 2008, In Forma began its expansion to the rest of Brazil. In this movement, the ‘MPS.BR seal’ helped to break the prejudices of southern and southeastern clients against a northeastern company which stubbornly refused to compete with the biggest software multinationals regarding asset management of the

companies in the electricity sector. In 2013, in fact, almost half of Brazil's electric energy transmission used our software."

4.2.5. Moacir Marafón – Director of Softplan, Florianópolis-SC

(MPS-SW – Level C, valid till 14 May 2016)

"The processes of the MR-MPS-SW reference model allowed improving our project management practices, such as the task control and monitoring, risk analysis and performance indicators. The organizational processes such as human resource management also improved, just like the process standardization in the company. Among other positive results, the implementation of the MPS model was actually imposed as a requirement of our customers regarding the quality of the offered software. Furthermore, with the recent rapid growth of our company, it was essential that the processes were well defined and increasingly mature." [BERCOVICH, 2014]

4.2.6. Braulio Carvalho – Vice Presidente da Stefanini, de Jaguariúna-SP

(MPS-SW – Level A, valid till 25 November 2015)

"Stefanini has currently in Brazil nine software development centers that add up to 4,380 staff. All our centers are already working with the good software engineering practices of the MPS-SW model (Software). Furthermore, the 'MPS.BR certification' causes our software factories which are geographically distributed all over the world can work together, united. In this globalized operation we launched 'Follow the Sun', in which a software project begins the day in Brazil and, when it ends at 6 pm it resumes in India, maintaining a cycle that never ends."

4.3. Lessons learned

Softex published two documents with the lessons learned in the MPS.BR program and the MPS model:

- 'MPS.BR: Lessons Learned' [ROCHA and WEBER, 2008] < <http://www.softex.br/wp-content/uploads/2013/08/MPS.BR-Lições-Aprendidas.pdf> >:
 - in the MPS.BR Program Management;
 - in the Organization of MPS Company Groups;
 - in the Implementation of the MPS Model;
 - in the MPS Assessments.
- 'Lessons Learned from the MPS Acquisition Process' [SCALET et al., 2010] < <http://www.softex.br/wp-content/uploads/2013/08/Lições-Aprendidas-com-o-Processo-de-Aquisição-MPS.pdf> >.

But the main lesson learnt by the leading representatives of the triple helix is that this case was only possible due to the synergistic collaboration⁸ of university, government and industry in the '10 years of MPS.BR'.

8) 8 Synergy or synergism (from greek συνεργία, συν- (syn-) "union" or "junction" and -εργία (-ergy), "working together") is defined as the active and retroactive effect of work or coordinated effort from several sub-systems in the accomplishment of a complex task or function. When you have the concomitant association of several executing devices of certain functions that contribute to a coordinated action, i.e. the sum of efforts towards the same end, there is synergy. The resulting effect of the action of various agents that act in a coordinated manner to a common goal can have a higher value than the set of these agents if those were acting individually without this previously established common goal. All that wants to say that "the whole exceeds the sum of its parts". [Wikipedia]

4.4. Main beneficiaries

The main beneficiaries of the software process improvement in Brazil from 2004 until now are:

- **Industry:** the main beneficiary is the IBSS – Brazilian Industry for Software and Services, both MSME – micro, small and medium-sized enterprises (70% of the published MPS assessments) and large organizations (30% of these).
 - Certainly, the users/customers of the software produced by organizations that adopted the MPS-SW model (Software) also benefited.
- **Government:** another great beneficiary is the Brazilian Government.
 - In the period 2007-2010, the Federal Government designed public policies to stimulate the implementation of best practices in software engineering: the goal was to introduce best practices in 400 companies, mainly in MSMEs, to be checked by means of published MPS and CMMI assessments. This was achieved in 2010 as shown in Table/Figure 2 (see subsection 4.1).
 - According to a study of MCTI/SEPIN supported by UNESCO [STEINER NETO et al., 2012], there was a migration of generic ISO 9000 certificated companies for specific approaches of software quality with focus on process improvement, as MPS and CMMI, from 1994 to 2010 in Brazil.
 - Within the period 2012-2015, the Strategic Program for Software and Information Technology Services (TI MAIOR) was launched that, among other important objectives, aims to improve quality and increase competitiveness in the sector of software and IT services. [MCTI, 2012]
- **University:** University also benefited through both contributing to the transfer of software engineering knowledge into the industry and from new challenges and problems to be solved in its research and education activities.
 - University has a key role in this direct support for the industry, acting as a bridge between the 'state of the art' and the 'state of practice' in software engineering.
 - The MPS.BR program and the MPS model have explicitly promoted this non-trivial and important university-industry relationship in Brazil.
 - Moreover, more than 60% of the MPS front-line employees are from university (Instructors, II – Implementing Institutions and IA – Assessment Institutions).

4.5. Challenges and future dilemmas

Just like CMMI, MPS.BR is a long-term program and its expansion phase 2012-2015 is still ongoing.

As future task, the main challenges and dilemmas to be faced by the leaders of the triple helix (Academia, Government and industry) in 2014 are:

- Improvements in the MPS.BR program and the MPS model [SOFTEX, 2013].
- Development of the holistic approach of the MPS model (family of MPS models): MPS-SW (Software) since 2005; MPS-SV (Services) since 2012; MPS-RH (Personnel Management) as from 2014-15; among others.
- Coexistence in the market with multiple templates for software process improvement, such as CMMI, which is more suitable for large organizations, and the new series ISO/IEC 29110 – Software Engineering — Life cycle profiles for micro-organizations (VSEs — Very Small Entities, which are companies, organizations, departments or projects of up to 25 people). [SEBRAE, 2013].
- Disseminate the use of the MPS model in many other companies both in Brazil and abroad, having started in 2014 with MPS-SW pilot evaluations in some countries in the context of both the RELAIS project – Latin American Network of the Software Industry (May 2010 – May 2014) with support from the IDB/MIF and the MPS Global initiative.
- Strategic planning of the next four-yearly phases, provisionally termed:
 - 2016-2019 – Implementation MPS Global;
 - 2020-2023 – Consolidation MPS Global;
 - 2024-2027 – Expansion MPS Global.

5. Issues for discussion

Last but not least, this section presents four useful questions to bring other people in the country and abroad to reflect critically about this case and what can be learned through it, considering only the issues presented in the development of the case:

- What would you do different?
- Which alternatives could be adopted?
- Which additional actions would you suggest?
- How to multiply such an initiative?

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Case Study: 10 Years of MPS.BR

December 11, 2013 was the tenth anniversary of the creation of the MPS.BR program - Improvement of Brazilian Software Process, which is coordinated by Softex - Association for the Promotion of Brazilian Software Excellence.

To register this milestone and contribute to the process of managing institutional knowledge, Softex decided to produce the 'Case Study: 10 Years of MPS.BR'. Case studies emerged as an educational method at Harvard Business School in 1920.

The focus of this case study is both technical, aiming both at the creation and improvement of the MPS model for improving software processes, and the dissemination of this model in the market, contributing to the generation of employment and income in this country.

The protagonists of this case study are representatives of Academia, Government and Industry (the so-called Triple Helix), who have been collaborating over the last ten years to resolve this issue.

This report was prepared in accordance with the methodology for the production of cases and successful practices from SEBRAE - Brazilian Support Service for Micro and Small Enterprises, detailing both the background to the case study at the end of the last millennium and the beginning of the new millennium, and describing year-on-year how the issue was resolved from December 11, 2003 onwards.

Support:



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