The Evolution of Brazilian Software Quality: 1993/99

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Abstract. The consciousness of the quality is ascending worldwide, with the demanding of more and more clients and users. In this context, surveys have been carried out among Brazilian software companies aimed at assessing the evolution of this sector in key indicators, namely: *(i)* companies strategic planning, *(ii)* quality systems and certification, *(iii)* product and process quality, *(iv)* manpower management, *(v)* relationship among clients and companies, *(vi)* procedures and tools concerning the quality of software developed in Brazil, in the way to reinforce actions of the various agents within this sector.

1 Institutional Environment

In 1990, the Brazilian Program of Quality and Productivity - PBQP was created by the Federal Government action to help the effort of industry modernization through the Quality and Productivity promotion, seeking to meet international standards and to increase the competitiveness of goods and services manufactured in Brazil.

To stimulate, articulate, guide and support the efforts of the Brazilian society towards achieving international competitiveness, through the best quality and productivity increase implementation action, congregate the main goal of PBQP.

In 1993, was launched the Subcommittee of Software Quality and Productivity – SSQP/SW, aimed at reaching international standards on quality and productivity in the software sector. This Subcommittee seeks to promote a continuous improvement effort to achieve customer satisfaction, the improvement of the work environment for employees in the software industry and in the country as a whole to increase business competitiveness of the Brazilian software sector.

The SSQP/SW intends to stimulate the adoption of quality methods and techniques by companies, in order to make them more qualified to compete in a global market.

During that year, was created the SOFTEX 2000 Program as "a decisive contribution for a change in focus of the Brazilian information technology industry from hardware to software, from the domestic market to the international market, and from the production and distribution on a small scale to a large scale", that after 1996 had been maneuvered by Brazilian Society for Promoting Software Export- SOFTEX, a non-profit organization, under the sponsor of Ministry of Science and Technology.

The Brazilian Association for Technical Rules - ABNT puts Brazil as a permanent member of the ISO/IEC JTC1 initiative for standardization. Under the Brazilian Committee, has been created the Software Subcommittee that specifically treats the matter in the software area.

2 The Brazilian Software Quality Surveys

Since 1993, the *Brazilian Software Quality* surveys are accomplished to every two years with coordination, execution and publication for the Technology Information Policy Department from the Ministry of Science and Technology – SEPIN/MCT.

The number of companies present on the surveys duplicated from 282 in 1993 to 589 in 1997, still been expected 750 questionnaires at 1999.

The results are presented on the web site *http://www.mct.gov.br* and to each survey has been done publication with the delivering of 7.500 copies, distributed on all over the country and abroad, besides to been used on several reports and integral Diagnosis in the book titled *Software Quality and Productivity* in 3rd edition.

Table 1. Structuring and Contents on the Brazilian Software Quality Surveys

Categories	Main Subjects
Company Characterization	Activities on Technology Information
	Activities on software development
	Geographical location and Lifespan
	Size by manpower and by revenues
Professional Qualification	Carrier background
	Certified quality professionals
	Training for professionals
Outsourcing	Analysis and programming
	Marketing and sales
Software Characterization	Developed Products
Quality Systems	Strategic planning
	Goals and guidelines for quality
	Quality indicators and Quality costs
	Total Quality Management
Software Process Quality	ISO 9000 Certification
	CMM, SPICE, ISO/IEC 12207 - knowledge and use
Software Product Quality	ISO/IEC 9126, ISO/IEC 12119 - knowledge and use
	Software products evaluation by standards
Management of Employees	Methods to support participation
	Development evaluation
	Personal satisfaction surveys
Relation with Customers	Expectation and satisfaction surveys
	Client support
	Use of data in projects revision or new projects

Quality Procedures	Software Engineering
	    Prevention defects methods
	    Detection defects methods

	Development tools
	Documentation

3 Some Results

The Brazilian software agents has disseminated the quality culture in companies and has promoted training for thousands of professionals.

The SOFTEX especially contributed for the reversal of the diagnosis made in 1993, which revealed that most companies have low technical, managerial, marketing, and client support qualifications.

The SOFTEX has constructed a support basis formed by a network of partners and agents, mobilizing the government, industry and institutions. This network counts nowadays with 20 regional nuclei, 6 international offices for promotion of software exportation, 800 associated companies and 20 GENESIS Centers working as products incubators in order to generate new companies starting from groups working in Technical Institutions and Universities.

There are several Brazilian institutions that are currently able to provide services based on software quality improvement techniques such as CMM, PSP and TSP, Software Engineering and Quality Systems, where the main ones are CITS/CNTS, CTI, UFRJ/COPPE, USP/FCAV.

On the experimental application front, CTI leads this process having prepared 4 software product quality testing laboratories. These evaluations are accomplished using the own model denominated MEDE-PROS, based on ISO/IEC 9126.

Table 2. Results and Goals for Some Selected Indicators

Select Indicators	1995	1997	1999	2001
Number of annual approved projects on PBQP-SSQP/SW	37	54	79	100
Percentage of companies with total quality program, quality system or similar implanted	11%	18%	30%	50%
Percentage of companies with the ISO 9000 certification	2%	8%	20%	35%
Number of companies with software on the certificate	-	16	50	100
Percentage of companies that use the CMM	3%	5%	10%	20%
Number of certified professionals in quality (certification ASQ, Lead Assessor, masters degree lato sensu and stricto sensu in quality management)	390	366 [1]	500	700
Percentage of the annual investments in training for quality improvement of the software revenues	3%	3%	3%	3,5%
Percentage of the annual investments in training for Software Engineering / Technology of the revenues	3%	5% [1]	6%	7%
Number of software product quality testing laboratories	1	5	5	7
Number of software products evaluated by a third party based on ISO/IEC 9126	25	148	210	280
Number of ABNT' Committees which working with software product evaluation standards	4	12	12	...
Percentage of companies that use systematically surveys data or complaints in the projects revision	41%	44%	50%	60%
Percentage of companies that accomplish systematically customers satisfaction surveys	19%	25%	35%	40%

[1] Survey methodology different from 1995.