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Improving Software Quality: a benchmarking approach

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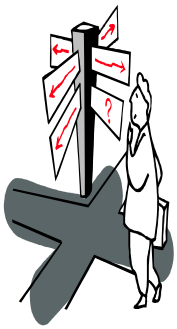
Presentation's cloud

Software Standards
Quality Management System Manual (QMM/QMSM)
Software Quality
Benchmarking
CMM (SW)
Research Survey
CMMI (staged, SW)
ISO 9001:2000 QMS

Problem

- Continuously improving Software quality
- Constantly changing Industrial Standards
- Complicated Exercise



Proposed Solution

- The software development system based on internal, commercial standards and improve over the years have proved to be a good system [11].
- I am unable to understand what do you mean by the lines above??? Please re-phrase your statements!!!!!!

Thesis Statement

- How to build up an efficient, workable quality system from basic principles to writing Quality Management System Manual which is compatible for ISO 9001:2000, CMM (SW) , CMMI (staged-SW) that will improve software quality.

Research Methodology

- Related research
- Study software standards
- Mappings of different software standards
- Market research survey
- Research on existing quality manuals
- Proposing a structure of QMSM
- Implementing QMSM and proving the result.

Related Research (research methodology-1)

- 1998-Improving Software Quality,
  there is no absolute formula that can be used to improve software quality but there are many guidelines and approaches that have been provided by the quality experts and industry professional [13]
- 2001-Software Quality Management and Software Process In Denmark,
  almost all organizations have a positive attitude towards Software Quality Management (SQM), but SQM standards and/or Software Process Improvement (SPI) methodologies are not known by 40% (44) organizations [4]

Related Research (contd.)

- 2001-The Complex Quality World – Developing Quality Management System,
  present a Quality Management System (QMS-Quality through Managed) model to improve software quality… This in turn will likely facilitate work on improved automation support of the software process [5]
- 2004-An Integrated Model of ISO 9001:2000 and CMMI for ISO Registered Organizations,
  present an integrated model of ISO 9001:2000 and CMMI which will be useful tool for ISO registered organizations aim to attain higher CMMI Levels.. but it was not practically implemented at any organization [8]

Related Research (contd.)

- 2006-ASQ, Are standards the answer?
  These standards and practices tend to be one size fits all approach that may be optimum for some projects but is often times ill-suited for others …. Because this exercise has become complicated by the fact that the standards are continually improving [1]
- 1996-IEEE discussion "Do standards improve quality?"
  Schneidewind says that there are many examples of standards improving software product quality [9],
  Fenton says that he found no evidence that software standards improve the quality of the resulting software products cost-effectively [9]
  G. Gordon Schulmeyer says that he has seen standards applied successfully, whereas previous implementation and quality assurance without standards was inadequate [2]

Research Conclusion

- There is always a need to enhanced and refined existing process and adapt it to the need of software producing units or software organizations.

Examples:

BOEING [11]

European Strategic Program for Research in Information Technology (ESPRIT) [13]

Study software standards (research methodology-2)

Assumed clauses and abbreviations of CMM (SW) Key Process Areas

Maturity Level	Clause	Process Areas of CMM (SW)
2. Repeatable	2.1 RM	Requirement Management
	2.2 SPP	Software Project Planning
	2.3 SPT	Software project tracking and oversight
	2.4 SSM	Software subcontract management
	2.5 SQA	Software quality assurance
	2.6 SCM	Software configuration management
3 Defined	3.1 OPF	Organization process focus

Study software standards (contd.)

Clauses and abbreviations of CMMI (SW) KPAs [50]

Maturity Level	Clause	Process Areas of CMM (SW)
2. Repeatable	2.1 RM	REQUIREMENTS MANAGEMENT
	2.2.PP	PROJECT PLANNING
	2.3 PMC	PROJECT MONITORING AND CONTROL
	2.4 SAM	SUPPLIER AGREEMENT MANAGEMENT
	2.5 M&A	MEASUREMENT AND ANALYSIS
	2.6 PPQA	PROCESS AND PRODUCT QUALITY ASSURANCE
	2.7 CM	CONFIGURATION MANAGEMENT
3- DEFINED	3.1 RD	REQUIREMENTS DEVELOPMENT

Mappings of software standards (3)

1-1 Correspondence between ISO 9001:2000 and ISO 9003:1997 (E)

ISO 9001:2000		ISO 9000-3:1997 (E)	
Clause Name	C.no	C.no	Clause Name
Quality Policy	5.3	4.1.1	Quality Policy
Planning [title]	5.4		
Quality objectives	5.4.1		
Quality management system planning	5.4.2		
		4.1.2	Organization [title]
Responsibility, authority and communication [title]	5.5		
Responsibility and authority	5.5.1	4.1.2.1	Responsibility and authority
		4.1.2.2	Resources

Mappings of software standards (contd.)

- Clause level mapping between ISO 9000-3:1997 with CMM for Software is explained by CMU/SEI [47].
- 1 to N mapping between CMMI (staged representation, SW) against the practices of CMM (SW) is explained by US Air Force Software Technology Support Centre. [48], also supported by CMU/SEI.
  - While mapping CMMI (SW) with CMM (SW), use the abbreviations assumed for CMM (SW)

Market research survey (research method.-4)

- Ratio of questions
  - 34% questions were related to the issues faced during the implementation of software standards which is a problem domain of the thesis,
  - 28% questions related to feedback after implementing any software standards to know if its brings some improvement/disciplines in core areas of development cycle or it is same as previous which is a solution domain of the thesis,
  - 26% questions were asked about the company profile to understand the organization background as how the policies working which will be utilized in defining the organization's scope in the quality manual,
  - 12% questions related to understand the process approach and the degree of quality assurance

Market research survey (contd.)

Results

Assessment Areas	% Questions	%No Total	%Yes Total	%No (NC)	%Yes (NC)	%No (C)	%Yes (C)
Organization	34	27.69	72.31	43.59	56.41	3.85	96.15
Quality Assurance	28	26.67	73.33	44.44	55.56	0.00	100.00
Software Standards/Software Models	26	60.00	40.00	82.35	17.65	26.47	73.53
Feedback on existing standards	12	25.71	74.29	26.19	73.81	25.00	75.00

Market research survey (contd.)

- Findings
  - Non certified organizations does not establish the organization purpose, vision, mission or quality objective.
  - 60% does not consider any guidelines for the improvement of processes (see question 20).
  - 40% were interested to get a label of higher level (Q.22 and Q.23) certification/assessment in order to gain some reputation in the market but were not familiar as how to improve productivity
  - All Organizations were interested in accepting thus quality manual which will help them to get a label of certification/assessment (Q.35)
  - 60% were interested in accepting any such integrated model which will either improve the quality of software or not (Q.36)

Market research survey (contd.)

- Conclusion
  - 80% responded low confident level in improving the processes themselves (Q.27)
  - Non certified organizations were ignoring the documentation process and they did not understand the measurement and analysis by replying low ratings in question 28 (Q.38 to Q.47).
- Consideration in Quality Management System Manual
  - Consolidated mapping
  - Study of existing quality management system manual
  - Feedback from survey

Quality Management System Manual (5)

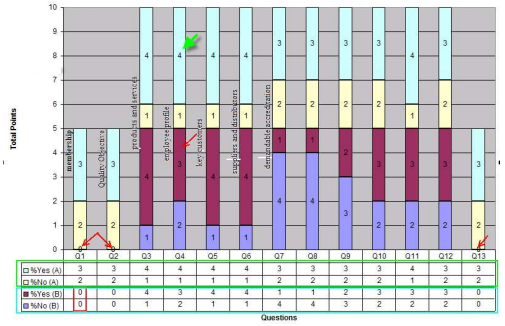
- Structure of QMSM [table 4.1]
- Scope of QMSM [table 4.2]
- Documentation Structure QMSM [table 4.3]

Research result

- Combination of all research methods could guaranteed improvement in software quality.
  - Mappings of software standards
  - Research survey / GAP analysis
  - Study of QMM
  - Implementation of QMSM
    - Don't skip the initial level
    - Don't strive for market label only
  - Improve the standard even further as the software development process matured

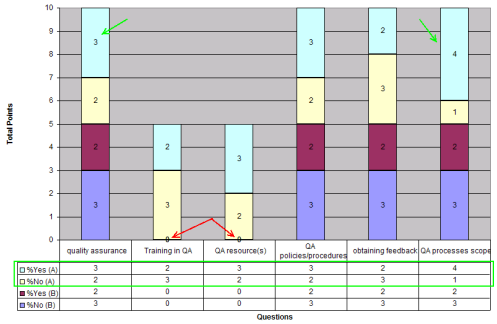
Differences

- Organization Profile



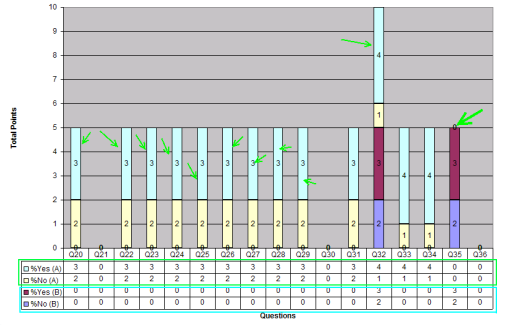
Differences

- Quality Assurance



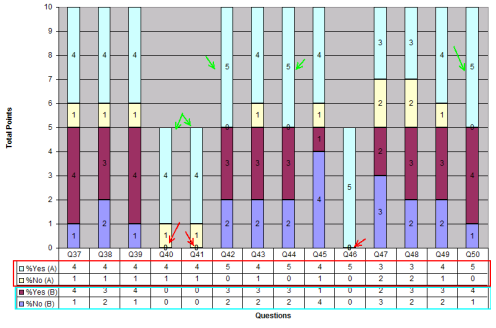
Differences

- Software Standards/Software Models



Differences

- Feedback on existing standards



Conclusion

- Feedback from market survey or gap analysis and study of existing quality manual will help in representing a better quality management system manual else only the mapping among standards will not guarantee the improvement in software quality
- Mappings of standards will make the processes compatible with IT standards but they also measure and analyzed existing process

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Questions ...

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