소프트웨어 품질 프로세스 모델
(Software Quality Process Model)

1)최성운*

요 지

본 연구는 8단계 소프트웨어 프로세스 모델을 제시하고 그 중 중요한 역할을 수행하는 SCM 프로세스를 소개한다. 끝으로 소프트웨어 프로세스개선 모델인 CMM, SPICE, ISO/IEC 12207, ISO 9000-3을 소개한다.

1. SQ프로세스 모델

1단계 : Review program/project-level plans
2단계 : Develop QA plan
3단계 : Coordinate metrics
4단계 : Coordinate risk program
5단계 : Perform audits
6단계 : Coordinate review meetings
7단계 : Facilitate process improvement
8단계 : Monitor test program

1.1 1단계

1) Review the project management plan
2) Review the CM plan
3) Revies the software development plan

1.2 2단계

1) Develop QA plan introduction
2) Create management section
3) Identify documentation requirements
4) Identify standards
5) Specify reviews and audits
6) Review CM interface
7) Review defect reporting
8) Develop metrics strategy
9) Identify tools and techniques

1) *경원대 산업공학과 교수

10) Define supplier control

11) Define records approach

12) Document SQA plan

13)Review and approve SQA plan

1.3 3단계

1) Develop metrics strategy

2) Create metrics database schema

3) Document metrics plan

4) Review metrics plan

5) Collect measurement data

6) Compute metrics

7) Evaluate trends

8) Issue metrics report

9) Update metrics process and plans

1.4 4단계

known unknowns, unknown knowns, unknown unknowns

1) Develop risk plan

2) Review risk plan

3) Evaluate plans, schedules for risk

4) Collect process and product risks

5) Establish risk database

6) Perform risk assessment

7) Coordinate risk control

8) Coordinate risk meetings

9) Issue risk reports

1.5 5단계

1) Review project plans

2) Develop audit plan

3) Review audit plan

4) Establish audit database

5) Perform process audits

6) Perform product audits

7) Perform PCA

8) Perform FCA

9) Update audit process

1.6 6단계

1) Verify peer review schedule

2) Develop(peer review) agenda template

3) Support peer review meetings
4) Track(peer review)action items
5) Verify design review schedule
6) Develope design review agenda template
7) Coordinate design review data packs
8) Support design review meetings
9) Track design review action items

1.7 7단계
1) Review project plans
2) Identify Process improvement opportunities
3) Develop process improvement plan
4) Prepare for assessment
5) Perform assessment
6) Process assessment result
7) Monitor action plan progress
8) Update action plans

1.8 8단계
1) Establish test metrics database
2) Collect test metrics
3) Report test metrics
4) Review test documentation
5) Monitor test execution
6) Plan test process improvement
7) Assess test process
8) Develop test assessment report

2. SCM(Software Configuration Management)
2.1 SCM Process
1) Configuration Identification
2) Baselining
3) Configuration Control
4) Project Leader Approval of Baseline Change
5) Configuration Management Status Accounting
6) Configuration Management and the Use of Peer Reviews
7) Interface Control
8) Subcontractor control
9) Software Configuration Audits
① F(Functional)CA : Product vs Requirements

② P(Physical)CA : Product vs Documentation
③ In-process Audits
④ Traceability Audits
10) Software Library
11) SCM plan
2.2 SCM 표준비교
ISO 9001:2000
ISO 10007
MIL-STD-2549
EIA-649

3. 프로세스 개선 모델
3.1 CMM(Capability Maturity Model)
Level 1 : Initial
Level 2 : Repeatable
Level 3 : Defined
Level 4 : Managed
Level 5 : Optimizing
3.2 SPICE(Software Process Improvement of Capability dEtermination)
Level 1: Performed-Informally
CF(Common Feature) 1.1 : Performing Base Practices
Level 2 : Planned-and-Trackeld
CF 2.1 : Planning Performance
CF 2.2 : Disciplined Performance
CF 2.3 : Verifying Performance
CF 2.4 : Tracking Performance
Level 3 : Well-Defined
CF 3.1 : Defining a Standard Process
CF 3.2 : Performing the Defined Process
Level 4 : Quantitatively - Controlled
CF 4.1 : Establishing Measurable Quality Goals
CF 4.2 : Objectively Managing Performance
Level 5 : Continuously - Improving
CF 5.1 : Improving Organizational Capability
CF 5.2 : Improving Process Effectiveness

3.3 프로세스 개선 모델비교

ISO 9001 : 2000 과 ISO/IEC 12207 : 1995

ISO 9001 : 1994 와 ISO 9000-3 : 1997

ISO 9001 : 1994 와 SPICE(ISO/IEC TR 15504)

ISO 9001 requirements	Process categories and processes
4.1 Management responsibility	Engineer the business Manage quality (build project teams) Asses customer satisfaction
4.2 Quality system	Manage quality Perform quality assurance Define the process (Improve the process)
4.3 Contract review	Establish contract Identify customer needs Develop system requirements and design Manage risks (Perform joint audits and reviews)
4.4 Design control	Identify customer needs Establish project plan Build project teams Manage requirements Manage resources and schedule Manage risks Develop system requirements and design Develop software requirements Develop software design (Enable reuse)
4.5 Document and data control	Develop documentation Define the process
4.6 Purchasing	Manage subcontractors
4.7 Control of customer-supplied product	Develop system requirements and design (Acquire software product and/or service)
4.8 Product identification and traceability	Develop documentation Perform configuration management Enable reuse

ISO 9001 requirements	Process categories and processes
4.9 Process control	Implement software design Provide software engineering environment Provide work facilities (Provide customer service)
4.10 Inspection and testing	Integrate and test software Integrate and test system Perform peer reviews
4.11 Control of inspection, measuring and test equipment	Integrate and test software Integrate and test system Provide software engineering environment
4.12 Inspection and test status	Integrate and test software Integrate and test system Perform configuration management (Perform problem resolution)
4.13 Control of nonconforming product	Perform configuration management
4.14 Corrective and preventive action	Perform problem resolution Improve the process
4.15 Handling, storage, packaging, preservation and delivery	Package, deliver, and install the software (Support operation of software) Perform configuration management
4.16 Control of quality records	Mostly covered by common features 2.3 and 2.4 (Assess customer satisfaction) (Develop documentation)
4.17 Internal quality audits	Perform quality assurance
4.18 Training	Perform training
4.19 Servicing	Provide customer service Maintain system and software
4.20 Statistical techniques	Covered mostly by common features 4.1 and 4.2 (Improve the process)

ISO/IEC 12207 : 1995 와 SPICE

ISO 12207 Process	Processes
Acquisition	Acquire software products and/or service Establish contract
Supply	Establish contract Perform joint audits and reviews Package, deliver, and install the software Support operation of software Plan project life cycle Establish project plan Manage project resources Mange quality
Development	Develop software requirements Develop software design Integrate and test software Integrate and test system Package, deliver, and install the software Perform audits and reviews Plan project life cycle Establish project plan
Operation	Support operation of software
Maintenance	Maintain system and software
Documentation	Develop documentation
Configuration Management	Perform configuration management
Quality Assurance	Perform quality assurance
Verification	Level 2 Generic Pracices Perform peer reviews
Validation	(to be completed)
Joint Review	Perform Audits and Reviews Manage Project Resources
Audit	Perform quality assurance Perform joint audits and reviews
Problem Resolution	Problem Resolution
Management	Level 2 Generic Practices Establish project plan Manage Project Resources
Infrastructure	Level 3 Generic Practices Define the process Provide development environment Provide work facilities
Improvement	Level 3,4,5 Generic Practices Define the process Improve Process
Training	Level 2 Generic Practices Training
Tailoring	Annex A Level 3 Generic Practices

3.4 Emerging Global Standard

ISO/IEC 12207 : 1995 : IT-Software Life Cycle Process
ISO/IEC TR 15504 : Software Process Assessment
ISO/IEC TR 16326 : Project Management
ISO/IEC 15846 : Configuration Management
ISO/IEC 15939 : Process Measurement Framework
ISO/IEC IS 15288 : System Engineering
ISO/IEC 15026 : System Integrity Levels
ISO/IEC 14756 : System Performance
ISO/IEC IS 9126 : Product Quality
ISO/IEC IS 12182 : Product Attributes
ISO/IEC IS 14143 : Functional Size Measurement

4. 결 론

1) 소프트웨어 품질, 프로세스 모델

2) SCM 프로세스

3) CMM, SPICE, ISO/IEC 12207, ISO 9000-3

4) Emerging Standards

[참고문헌]

1. Aycock D.G. et al., "TL 9000 Performance Metrices to Drive Improvement." Quality Progress, July, 1999.

2. Drabick R.,et al., "A Process Model Software Quality Assurance/Software Quality Engineering,"   Software Quality Professional, Vol.2, No. 4, 2000.

3. Kasse, T., et al., "Software Configuration Management for Project Leaders," Vol. 2, No. 4, 2000.