Software Quality Assurance and Controls Standard

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**Software Quality Assurance and Controls Standard**

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Agenda

• What is Software Quality Assurance (SQA)?
• What is a Software Life Cycle (SLC) process?
• What is in a SQA Process?
• Where are SQA Controls?
• What is the SQA standards history?
• What is changing in SQA?
• What else is in the SQA standard?
• Where can you help?
What is SQA?
Where are SLC processes?

• The purpose of SQA is to provide assurance that work products and processes comply with predefined provisions and plans.

• According to International Standard (IS) 12207 – of the 44 system and software life cycle (SLC) processes, SQA is a support process with required outcomes, activities and tasks.
SQA Process Diagram

- Needs, Inputs
- Measurements
- Action, Control
- Product, Outputs
- Resources
- Outcomes

Process
- Activities
- Tasks
Process standards Approach

• Move from document (plan) focus to process focus
  – Alignment with framework standard IS 12207 software life cycle (SLC) processes with exact requirements and definitions
  – SQA outcomes are aligned with IS 15289 information products
  – Assimilate current best practices
Body of Knowledge

- Magazine Articles
- Research Reports
- Case Studies
- Certification Preparation
- Conferences Presentations
- White Papers
- Web Content
- Audio/Video
- Discussion Boards
- Training Materials
- Standards
- Books
- Speeches
- Newsletter Articles

American Society of Quality
Standards aligned with Practice & Education

Generally Agreed Knowledge (SWEBOK Guide) and Practice Principles

Education
- Curriculum
- Accreditation Criteria

Professional Development
- Continuing Education
- Certification

Practice
- Standards of Practice
  - Training Products
    - Books and Publications
    - Certified Software Development Professional
  - IEEE Software and Systems Engineering Standards
    - ISO/IEC JTC1/SC7

IEEE/ACM Software Engineering 2004 curriculum
ABET
University acceptance

Individual acceptance
Industrial acceptance
SQA Relationship to ISO 9001

• ISO 9001:2008 Quality Management Requirements
  – Management ➔ Assurance ➔ Process Controls

• IS 12207 SLC Processes
  – Quality Management process ➔ SQA process ➔ Controls in other SLC Processes

• IEEE 730 SQA will plan, monitor, and participate in SLC Process controls
  – Examples SLC Process Controls:
    • Audit: scope, report, corrective action sign-off
    • Configuration Management: Configuration control,
    • Review: notice, report, actions,
    • V&V: plan, report, corrective actions, report sign-off
    • Problem Resolution: Problem resolution sign-off
SQA relationship with other Life Cycle Processes

- Quality Management 6.2.5
- Software quality assurance (7.2.3)
- Software Verification (7.2.4)
- Software Validation (7.2.5)
- Software Audit (7.2.7)
- Software Support Processes (7.2.x):
  - Software Documentation Management (7.2.1)
  - Software Configuration Management (7.2.2)
  - Software Problem Resolution (7.2.8)
- Software Implementation Processes (7.1.x)
  &
- Software Reuse Processes (7.3.x)
## SQA & Life Cycle Standards History

<table>
<thead>
<tr>
<th>Life Cycle Standard Event</th>
<th>Year</th>
<th>SQA Standard Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Life Cycle</td>
<td>1979</td>
<td>SQAP Trial</td>
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<td></td>
<td>1981</td>
<td>SQAP Original</td>
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<td></td>
<td>1984</td>
<td>SQAP revised</td>
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<td>1986</td>
<td>SQAP Guide</td>
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<td>Software Life Cycle Implementation</td>
<td>1989</td>
<td>SQAP revised</td>
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<td>Information Products</td>
<td>1995</td>
<td>SQAP Guide</td>
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<td>Software Life Cycle</td>
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<td>Information Products</td>
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<td>System Life Cycle</td>
<td>1998</td>
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<tr>
<td>System Life Cycle</td>
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<td>System Life Cycle</td>
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<td>Information Products</td>
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<td>System Life Cycle</td>
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<td>Software Life Cycle</td>
<td>2008</td>
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<tr>
<td>Information Products</td>
<td>2011</td>
<td>SQA Process</td>
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What’s New?

• IEEE 730 scope expanded to include all aspects of software quality assurance – not just the plan.
• Expand SQA to include all aspects of Software Quality Assurance process, as defined by IS 12207 and information (work) products (artifacts: documents and records) as defined by IS 15289
What’s New? (2)

- Guidance to show conformance to related industry specific SQA standards e.g. audits, reviews, configuration management, verification, and validation
- Guidance to help new SQA practitioners understand the role of SQA in reviews, audits, V&V, SCM, document management, and problem resolution.
Inputs to P730

- Practitioner Experience
- SWEBOK
- Industry sector specific additions
- Software engineering tools e.g. RUP
- Case studies with best practices showing quantified business improvements
SQA Task Descriptions

• Example from IS 12207 Task 7.2.3.3.2.1
  – It shall be assured that all the plans required by the contract are documented, comply with the contract, are mutually consistent, and are being executed as required.

• P730 5.2.1 will explain and have expanded content:
  – What to do if there is not a contract
  – Many checks of a plan (plausible, specific, etc)
  – Track plan milestones
## P730 SQA Outcomes - Example

<table>
<thead>
<tr>
<th>IS 12207 Activity and Task 7.2.3.3.2.1</th>
<th>a) a strategy for conducting quality assurance is developed;</th>
<th>b) evidence of software quality assurance is produced and maintained;</th>
<th>c) problems and/or non-conformance with requirements are identified and recorded; and</th>
<th>d) adherence of products, processes and activities to the applicable standards, procedures and requirements are verified.</th>
</tr>
</thead>
<tbody>
<tr>
<td>P730 5.2.1 Review plans for conformity and completion</td>
<td>SQA Plan</td>
<td>Quality Activity Record, QA sign-off</td>
<td>Problem Reports &amp; Non-Conformances</td>
<td>Audit report, Quality Activity Record, QA sign-off on V&amp;V report and Release Record</td>
</tr>
</tbody>
</table>
1. Overview (scope, purpose, field of application, limitations, conformance)
2. Normative references (IS 12207, IS 15289)
3. Definitions & terms
4. Application of the standard
5. SQA Process
   - Outcomes from IS 15289
   - Activities & Tasks from IS 12207
     • Process Implementation
     • Product Assurance
     • Process Assurance
     • Additional quality management activities
Outline (2)

6. Relationship with IS 12207 Support Processes
   – Software Documentation Management
   – Software Configuration Management
   – Software Verification
   – Software Validation
   – Software Review
   – Software Audit
   – Software Problem Resolution
   – Software Qualification Testing
Outline (3)

Annexes

• SQA Plan elements and associated SQA Activities & Tasks (normative)

• Goals and practices relationship to SQA outcomes, activities, & tasks (normative)

• All IS 12207 Software Life Cycle process Activities affected by SQA Activities & Tasks

• CMMI Development Product and Process Quality Assurance
  – Conformance support of PPQA Appraisal, Important Control Aspects of SQA
Outline (4)

- SQA tasks supporting in Agile Methods
- Support of SQA Organizations above IS 15504 Capability Level 2
- Practices Referenced by Certification Schemes
- Industry sector specific SQA requirements
Relationship of Software Audits and 12207 SLC

• Software Audit [example]
  – Perform planning activities for
    • Software Data Management
    • Software Configuration Management
    • Software Problem Resolution
  – Check Product artifacts in
    • Software Data Management
    • Software Configuration Management
  – Check Process artifacts in
    • Software Data Management
    • Software Configuration Management
    • Software Problem Resolution
  – Participate in Software Audit
Schedule

- P730 Standards Working group meetings continue throughout 2010
- IEEE Standards Association balloting P730 in 2011
- IEEE 730-2011 published
Future SQA user group 2011

• promote deployment
• promote & share best implementation practices
• link to key SQA training events
• link to key SQA Body of Knowledge
• link to certifications using SQA
• collect implementers change requests for next version
Where you can help?

• Attend a working group meeting in person or via LiveMeeting and phone, or
• Follow the working group progress, or
• Review the draft standard, or
• Ballot for the final standard!, or
• Participant in the User Group

• Send email to sue.carroll@sas.com and ask to be part of the listserv
Questions?

- Sue Carroll – sue.carroll@sas.com
- John Walz - johnwalz@ameritech.net
- P730 web portal - http://www.computer.org/portal/web/sqa
Acronyms

- Software Quality Assurance (SQA)
- Software Life Cycle (SLC)
- International Standard (IS)
- Software Engineering Body of Knowledge (SWEBOK)
- Software Quality Assurance Plan (SQAP)
- Rational Unified Process (RUP)
- Capability Maturity Model Integrated (CMMI)
- Process and Product Quality Assurance (PPQA)