

# Software

QUALITY

## VISION:

To be the leading authority and recognized champion on issues related to software quality.

## MISSION:

To improve the ability of individuals and organizations to satisfy their customers with quality software products and services through education, communication, research, outreach, and professional development.

Check out the Software Division Web site at [www.asq-software.org/](http://www.asq-software.org/)

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## CERTIFICATION: A WIN-WIN INVESTMENT FOR EMPLOYEES AND EMPLOYERS

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### Introduction

*"What certification does is teach a person how to do a job. It gives them the skills to immediately be productive or at least to be productive a lot faster than an academic degree."*

Ann Beheler  
Director of Product and Technology Management,  
Raytheon  
*Certification Magazine, August 2001*

As an information technology (IT) engineer, you worked hard to get your undergraduate degree. You might have even complemented your undergrad studies with an advanced engineering degree focusing on a specialty. Perhaps you stay up late learning the newest programming language. It would only be natural to ask, "Why would I become certified?"

As a company competing in this high technology marketplace, one competitive advantage that is needed are employees who will generate products and services more effectively and efficiently. As a hiring manager, you look for individuals who are committed to refining their capabilities and growing. You want them to increase customer satisfaction and maximize your return on investment

(ROI). Certification of your software engineering staff cannot help your organization meet its goals...or can it?

We may ask ourselves these questions either as an employee looking for growth and achievement paths or as a manager looking to outfit an organization with knowledgeable engineers. Certification is a tool and when utilized to its full potential, can define career paths, contribute to a company's bottom line, and drive product quality and customer satisfaction upward.

Certification is commonly defined as formal recognition by an institution that an individual has demonstrated proficiency within and comprehension of a specified body of knowledge at a point in time. It's important to note that certification is not registration or a license. Nor is it proof of competency, a guarantee of performance, or a claim of expertise. It simply means that you have fulfilled the requirements to become certified and that you have passed an exam. Once you become certified, it will be important to maintain your certified status by performing approved recertification activities within a fixed time frame or retake the exam.

### Certifications: Benefits and Value

If you work in the IT industry you probably have heard of the various technical certifications being offered. In the past several years, the number of certifications being offered has skyrocketed. Starting back in 1989 with the trend-setting Certified Novell Engineer (CNE) to the current hot ticket Microsoft Certified Systems Engineer (MCSE), certification is now a buzzword for the new millennium.

Similar to these “product certifications,” software engineering certifications focus on qualifying an engineer’s ability to understand, apply, and utilize industry-defined practices, tools, techniques, and methodologies within the focus of software development. Four of the more widely recognized software quality and test certifications are:

- American Society for Quality’s (ASQ) Certified Software Quality Engineer (CSQE)
- Institute of Electrical and Electronics Engineers’ (IEEE) Certified Software Development Professional (CSDP)
- Quality Assurance Institute’s (QAI) Certified Software Test Engineer (CSTE)
- International Institute for Software Testing’s (IIST) Certified Software Test Professional (CSTP)

One thing you will note is that the differences in these certifications’ courses of study are minimal, and this makes sense. In order to drive software quality, an engineer needs to understand how software is developed in the first place. In order for a software engineer to develop high-quality products, there needs to be a fundamental understanding of what is needed. This “common denominator” information is what comprises the bodies of knowledge (BOKs) for certification programs. Another point is that when we refer to software engineering, we are not so much focusing on the sole skill of software programming, but the collective skills required to define, design, implement, test, and release a software product in its entirety.

Let’s take a look at how certification offers value to both the individuals who seek to be certified and to the organizations that sponsor such individuals.

### Value to the Employee

There are several ways to advance your career including, but not limited to, affiliations, meetings, conferences, speaking, writing, teaching, and continuing education. Maintaining your employability and staying competitive in the IT industry and this marketplace require lifelong learning. A common driving force for an engineer to achieve certification is that the knowledge gained and practiced on the job will, in effect, make your job easier.

It hasn’t been until very recently that software quality and test engineering have become their own professions. The applicable certification programs offer a defined course of study that focuses on “real world” knowledge to be utilized on a daily basis. These certification programs identify a vast BOK that can be

used for furthering career growth. Even if certification is not one of your career goals, these BOK “roadmaps” can be helpful in shaping your career path.

In addition to making your job easier and defining a career path, becoming certified grants you a mark of achievement. Achievements and recognition motivate us. Becoming—and staying—certified is one way to demonstrate your lifelong commitment to the profession. One distinction of being certified is that you are among a peer group of industry professionals. As a member of this community, you are integral to the review and ongoing discussions of updated BOKs. Your professional opinion is valued and sought after.

It has also been stated by several certifying boards that individuals who achieve

Table 1. Comparison of software quality and test certifications

Certification	Software Quality Centric		Software Test Centric	
	CSQE	CSDP	CSTE	CSTP
Organization	ASQ	IEEE	QAI	IIST
First started certifying	1996	2002 <sup>5</sup>	1996	2000
Total number of active certifications <sup>1</sup>	1,969	167	~1,700 <sup>6</sup>	153+
Work experience	3 – 8 yr.	4 1/2 yr.	0 – 6 yr.	1 yr.
Exam	(1) 4 hr., 160 multiple choice	(1) 3.5 hr., 180 multiple choice	(1) 4 hr., true/false, multiple choice, essay	(10) short essay exams (within 5 yr.)
Type	Open book	Closed book	Closed book	Closed book
Exam dates	June, December	Spring, Fall	Periodically	Periodically
Certification costs (est.)				
Exam fee(s)	\$180-\$285 <sup>2</sup>	\$450-\$600 <sup>2</sup>	\$250	\$4,450 <sup>8</sup>
Study materials	\$190 <sup>3</sup>	\$52-\$197	\$100	Included
Exam refresher / test prep course	\$355-\$415 <sup>2</sup>	\$750-\$875	\$300-\$400	N/AV
Travel	\$25	\$25	\$50	\$100-\$2,000
Total	\$180-\$915	\$450-\$1,672	\$250-\$800	\$4,450-\$6,450
Passing score	73% (550/750)	Unknown	75% (in each of four parts)	80% (each course)
Recertification period	3 yr.	3 yr.	3 yr.	3 yr.
Recertification credits	18 RUs	30 PDUs	120 CPEs	10 EUs
Average salary increase	3% <sup>4</sup>	N/AV	19% <sup>7</sup>	N/AV
For more information	www.asq.org	computer.org	www.software certifications.com	www.softdim.com

<sup>1</sup>As of December 2001

<sup>2</sup>Higher fee is for nonmembers

<sup>3</sup>CSQE Primer (\$65), CSQE CD-ROM (\$70), textbook (\$55)

<sup>4</sup>ASQ 2001 Salary Survey, *Quality Progress*, December 2001

<sup>5</sup>IEEE started offering exams in 2002

<sup>6</sup>As of March 2002

<sup>7</sup>CSTE brochure, QAI, all active CSTEs 1997-2000

<sup>8</sup>Two five-day Test Professional Weeks @ \$2,225/wk.

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certification have enjoyed monetary benefits. The data to support this claim are derived from annual salary surveys that are conducted. The increased compensation may take the form of a salary increase, bonus, and/or promotion.

Lastly, certification makes your resume stand out and may give you a competitive edge over your peers when applying for a position. Employers are starting to recognize these certification programs and are incorporating them into the qualifications for their applicants.

### Value to the Employer

Nowadays, getting products and services to market “better, faster, cheaper” has become a mantra. Companies know that there is no time to “reinvent the wheel.” How can you get your staff to work more efficiently and effectively? One answer is by education or training. However, simply sending employees to training classes doesn’t ensure that they will apply what they have learned. One alternative to institutional education is certification. Some of the aforementioned certification programs have requirements that include years of work experience. These criteria complement hands-on experience with a baseline of knowledge. This baseline helps employees “talk the same talk” by providing a common vocabulary and knowledge base.

Recruiting new talent is becoming more and more difficult. While the number of available candidates has increased, finding candidates with the right skill set hasn’t. Certification is an indicator of a candidate’s knowledge base and commitment to the profession. Nevertheless, certification, like other achievements, is not a tell-all. It is only one indicator and should be used with other indicators when evaluating people for positions. According to Barbara Hanscome of *Software Development* mag-

#### HOW TO PREPARE

Once a decision has been made as to which certification program you want to pursue, the next step is to determine whether you qualify to sit for the exam. If so, fill out the application form and submit it to the organization. If there is a doubt, the organization will make the final determination whether you qualify to sit for the exam. Once you’ve been accepted, the preparation phase begins. Resolving to pass the exam the first time is a great goal and, therefore, making the necessary time and effort to ensure that this happens is wise. A combinational program of formal education and self-study greatly increases your chances of success. Self-study can consist of additional textbook reading or courses. Depending on your level of skill and experience, the quantity of additional studying will vary from person to person. It’s generally recommended to start preparing months before the exam date.

Some organizations offer an exam preparation course. These are usually accelerated refresher courses that walk (and test) you through the parts of the BOK. Typically, they assume that you already know the BOK subject areas prior to taking the course. Since this is not always the case, a program of self-study and/or additional courses taken before or concurrently with the exam preparation course may be advisable. Maximizing your study program months before the exam date, taking practice questions, and studying additional material will significantly increase your odds for passing the certification exam—the first time.

azine, “Certification can be used as a tool to help differentiate people who are knowledgeable from people who claim they are knowledgeable.”

Finally, employers that value certification demonstrate a level of commitment similar to the commitment employees make to achieve certification. Through your support of certification programs you prove to your employees that you are serious about their professional development. This contributes to employee retention and satisfaction. Not only are you growing your individual employees, but also you are growing other areas of your organization. You are enhancing your staff’s ability to work together. In fact, managers are more committed than ever toward certification and training by paying for their employees’ certification, putting their “money where their mouth is.”

If this isn’t reason enough, similar to how a college or university highlights the degrees of its professors, imagine being able to promote the credentials of your staff. This can be a competitive advantage for your organization when a customer is making a decision, say, to outsource its testing needs.

### Certification Program Specifics

There are two general types of certification programs: one that is organization-based and one that is vendor-based. We will cover only the organization-based programs in this article. The vendor-based programs, while of merit, are too product-specific for an overall software quality or software test certification.

The organization that has been certifying individuals since 1968 is the American Society for Quality (ASQ). The ASQ certification that is most applicable to the software quality profession is the Certified Software Quality Engineer (CSQE) (see Table 1). The longevity of ASQ certification programs (85,000+ certified with 10+ different certifications) gives this certification a high degree of credibility and increased acceptance.

A newcomer to the certification market is the Institute of Electrical and Electronics Engineers (IEEE) with its Certified Software Development Professional (CSDP) certification. The IEEE is well known in the industry for its software engineering standards and its entry in the software quality certification category makes it a credible contender.

Another organization that has certified individuals since 1985 is the Quality Assurance Institute (QAI). The QAI certification that is most applicable to the software test profession is the Certified Software Test Engineer (CSTE) (see Table 1). QAI has one of the most relevant and software test-centric BOKs for its certification program on the market.

A fourth organization is the International Institute for Software Testing (IIST). The IIST certification that is most applicable to the software test profession is the Certified Software Test Professional (CSTP). Candidates have to take and pass 10 courses within five years in order to be certified, making this a unique education-based certification program.

Table 1 provides a comparison of various elements of each software quality and test certification.

### Recertification

Obtaining certification begins the journey of lifelong commitment to the profession. Recertification is the “maintenance” part of certification. Remember the “at a point in time” part of the definition of certification? If you want to remain certified, you will need to periodically perform various “certification enhancing” activities within a set period of time. While qualifying activities vary from certification to certification, the

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following are typical activities that will earn you recertification credit:

- Continuing education/courses/tutorials
- Attend or present at seminars/conferences
- Professional meetings
- Committees
- Publishing
- Speaking engagements, presentations

Some organizations will give you the option of retaking the exam instead of professional development activities. Because of the difficult nature of the exams, this typically is not a popular choice among the recertification applicants.

## Summary

Certification can be a win-win for both employees and employers. Candidates enjoy the personal and professional benefits that come with being certified and companies reap the business rewards from certified employees. Research the certification programs mentioned in this article and start preparing for the exam of your choice. Soon you and your company will join the community of professionals dedicated to software quality and test.

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# CHAIR'S CORNER

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BY MICHAEL P. KRESS

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Greetings to all new, existing, and potential members of the Software Division. I include all of you "potential members" who should be reading this along with existing and new members. I strongly encourage all members to share this newsletter with your nonmember associates and friends. While membership is a healthy 4,500 members, we are always eager to reach out to an ever-growing number of software quality professionals to bring them into our division. Through division membership you receive an ever-expanding newsletter and our soon-to-be-available more robust Web site. In addition, by attendance at our conferences you have the opportunity to network with some of the most respected software and management professionals in the world.



We just concluded the 12th International Conference on Software Quality in the beautiful city of Ottawa, Ontario, Canada. It was gratifying to see so many Canadians as well as a good number of our stateside and non-Canadian international members.

This year, we were treated to outstanding presentations. Tom DeMarco's keynote was particularly interesting in that he presented some revolutionary ideas about how "agility" in our management is becoming more important than "efficiency." He had some interesting theories on extreme programming and challenged some well-known and accepted practices such as code inspections. He left us with some very interesting concepts and ideas that we may wish to validate or reject in our own operations.

Dr. Alain Abran of IEEE took us through the chronology of work leading to the launch of the IEEE "Certified Software Development Professional" certification program. This is a new personnel credential that requires extensive experience and demonstrated knowledge in 11 categories of expertise. It has been created with the help of an international team of software experts and is endorsed by many universities, which are using its body of knowledge in planning their software engineering curricula. For more information you are invited to contact Leonard Tripp, l.tripp@computer.org, or Stacey Saul, s.saul@computer.org.

The Software Division also held its annual face-to-face council meeting in Ottawa along with a Leadership Training Seminar. This training is held for our council leaders to familiarize them with the infrastructure and operating policies and procedures for officers and council members. We also held our annual Software Division meeting and reported the exciting things we have done and have in the works:

- Quarterly newsletter and *SQP* journal
- *Software Quality Handbook* in the works
- CSQE cut-score workshop held in Milwaukee in June 2002
- 12ICSQ Ottawa, Oct. 28-29, 2002
- 13ICSQ Dallas, Oct. 5-6, 2003
- Software Track at 2003 AQC—Kansas City
- More robust Web site initiative in work—approved for phase 1
- New council organization structure
- New bylaws
- Operations manual in the works
- Continued support to ISO IEC SC7 U.S. TAG

We are looking forward to a very busy year in 2003 and will be soliciting your help in volunteering for several exciting new projects. Look for the invitation in an upcoming issue of this newsletter. We welcome your help and expertise in making the Software Division an even more effective resource for software quality professionals.

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# CERTIFICATION CHAIR REPORT

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BY DOUGLAS HAMILTON

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The feedback on the Certified Software Quality Engineer exam has been very positive regarding the new body of knowledge (BOK). We are now in the process of identifying gaps in existing education and training for people interested in learning more about the topics in the BOK. Please send any suggestions or ideas regarding education and training to me at [douglas.b.hamilton@accenture.com](mailto:douglas.b.hamilton@accenture.com).

The volunteers are what make the exam a success. The meetings are fun, challenging, and you learn something every time. If you are interested in volunteering, you must be a CSQE. Please mail your resume to Mary Martin at [MMartin@asq.org](mailto:MMartin@asq.org) for consideration for future workshops.

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# 13TH INTERNATIONAL CONFERENCE ON SOFTWARE QUALITY (13ICSQ)

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DALLAS, TEXAS  
RENAISSANCE DALLAS-RICHARDSON HOTEL  
CONFERENCE—OCTOBER 7 & 8, 2003  
TUTORIALS—OCTOBER 6 & 9, 2003

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## PRELIMINARY CALL FOR PAPERS AND TUTORIALS

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### Presented by the ASQ Software Division

If you're online, visit the following site for any updates to the following information: [www.asq-software.org](http://www.asq-software.org) or [www.icsq.org](http://www.icsq.org).

**Technical Program.** Technical papers and panels should be practitioner-oriented. They may be based on research of interest to practitioners or on experiences that relate to software quality. A complimentary admission to the two-day technical program is given for each technical paper or panel session selected by the committee for inclusion in the conference program.

**Tutorial/Workshop Sessions** are either half-day or full-day sessions that provide practical knowledge to participants. Workshops that promote the active participation of learners through problem solving, case studies, or other interactive learning methods will be favored. A complimentary admission to the two-day technical program is given for each tutorial selected by the committee for inclusion in the conference, in addition to other compensation that may be provided.

### Submission Requirements

**Technical Papers:** A biography and paper abstract of 450-600 words is required by January 31, 2003. To allow for proper review against competing submissions, papers should be complete drafts of the final paper including the abstract of 450-600 words, not presentation slides. Complete drafts along with speaker biography and author information form will be accepted through March 28, 2003. Notification will be sent on May 16, 2003. Final versions of accepted papers will be due June 13, 2003. Presentation slides will be due by August 1, 2003.

**Proposal for a Panel:** Send one-to-two pages describing the topic of the panel discussion along with panel speaker biographies and Author Information Form by March 28, 2003.

**Tutorials:** A biography and tutorial abstract of 450-600 words is required by January 31, 2003. Send a sufficiently detailed summary (two-to-five pages) describing the topic to be presented in the workshop, learning objectives, business need or challenge, solution or resolution, results/lessons learned, and the presentation methods used (i.e., lecture, case studies, group exercises) along with a speaker biography and Author Information Form by March 28, 2003. Notification will be sent on May 16, 2003. Presentation slides will be due by August 1, 2003.

### Suggested Conference Topics:

Software Quality Management and Alignment to Business Strategies and Goals	Configuration Management
Software Processes and Requirements Management Performance Metrics	Metrics, Measurement, and Their Links to Business
Program/Project Management	Software Quality Philosophies and Principles
Software Reviews, Inspection, Testing, Verification, and Validation	Organizational and Interpersonal Techniques, Problem-Solving Tools and Processes
Software Audits	Implications of Professional Conduct and Ethics
Software Engineering Processes and Practices	ISO and Other Software Standards

### Submissions for the Technical Program

Technical papers and panel proposals should be sent as MS Word compatible e-mail attachments to Rufus Turpin, 13ICSQ Technical Program chair, at [info@carpedieminfo.ca](mailto:info@carpedieminfo.ca). The guidelines and other forms are available at [ICSQ.org](http://ICSQ.org). Style guidelines will apply to the final papers and need not be followed for draft submissions offered for consideration. Please submit your author information form and your full paper to [info@carpedieminfo.ca](mailto:info@carpedieminfo.ca) before the deadline to ensure adequate time for Program Committee review and consideration.

### Submissions for the Tutorial Program

Tutorial proposals should be sent to Karen Bishop-Stone, 13ICSQ Tutorials chair, at [karen@testware-assoc.com](mailto:karen@testware-assoc.com) before the deadline to ensure adequate time for Program Committee review and consideration.

**Volunteers:** To volunteer as a reviewer, session moderator, or other position, send an e-mail to Linda Westfall, 13ICSQ Conference chair, at [LWestfall@WestfallTeam.com](mailto:LWestfall@WestfallTeam.com).

**Exhibitors and Sponsors:** To request information on 13ICSQ sponsor and exhibitor opportunities send an e-mail to Beth Adams, Exhibits & Sponsors chair, at [badams@lwcc.com](mailto:badams@lwcc.com).

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# SOFTWARE QUALITY ENGINEERING QUIZ

BY LINDA WESTFALL

Whether you are preparing for the Certified Software Quality Engineer (CSQE) examination or just testing out your knowledge of software quality engineering, why don't you sit back and let your brain do its thing. The answers can be found on p. 9 if you need a helping hand.

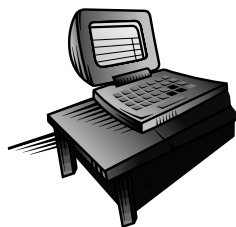
Note: The items in this quiz are NOT from past CSQE examinations NOR were they created as part of the CSQE exam development process.

1. Establishing which of the following team rules is an example of a win-win outcome?
  - A. The last person to arrive at the meeting keeps the minutes.
  - B. Team discussions will focus on products and processes and not on personalities.
  - C. Team decisions will be made through a multivoting process.
  - D. The meeting times will be adjusted weekly to accommodate team members' schedules.
2. A Software Engineering Process Group (SEPG) has defined and documented a new change request process to reduce the cycle time for requesting and implementing customer requested enhancements to company ABC's software. The SEPG's next step should be to:
  - A. Conduct a pilot implementation of the new process to test its effectiveness.
  - B. Perform an in-process audit to identify problems with the existing process.

- C. Implement a training program to teach the new process throughout the company.
  - D. Purchase a change request tool and site license to support the new process.
3. A preliminary design review meeting is held with the customer for a new software product. During this review, a defect is identified that results in changes to several requirements in the baselined requirements specification. Which of the following work products should be evaluated to determine the impact of this change?
    - I. Architectural design specification
    - II. Detailed design specification
    - III. Source code
    - A. I only
    - B. III only
    - C. II and III only
    - D. I, II, and III
  4. The completion and baselining of the User's Manual and Installation Instructions should be an entry criteria into which of the following phase gate reviews:
    - A. Critical design review
    - B. System test readiness review
    - C. Ready-to-ship review
    - D. Post-project review
  5. Which of the following metrics is a software product metric?
    - A. Cycle time
    - B. Phase containment effectiveness
    - C. Defect density
    - D. Effort hours expended during coding
  6. Which of the following tests would be considered a stress test for an accounting package that is required to handle 100,000 transactions an hour with a cycle time of 10 seconds per transaction or less?
    - A. Utilizing an automated program that simulates a varying stream ranging from no transactions per hour to 100,000 transactions per hour of various types while monitoring the software performance capabilities
    - B. Utilizing an automated program that simulates a steady stream of 99,999 transactions per hour of various types in the background while kicking off an additional occurrence of each type of transaction in sequence and monitoring their cycle times
    - C. Utilizing an automated program that simulates a steady stream of 100,000 transactions per hour of various types over a 48-hour period while monitoring the software performance capabilities
    - D. Utilizing an automated program that simulates a steady stream of 100,000 transactions per hour of various types in the background while periodically kicking off an additional 1,000 transactions and monitoring the resulting impact to the operations of the software
  7. Which of the following work products would be part of the functional baseline?
    - I. System requirements specification
    - II. Software requirements specification
    - III. Software architectural design specification
    - IV. Software detailed design specification
    - A. I only
    - B. II only
    - C. I and II only
    - D. III and IV only

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\*Based on ASQ BOK

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# STANDARDS CHAIR REPORT

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BY SCOTT DUNCAN

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This report includes material on the August 26 ASQ Standards Committee meeting in Washington, DC; the September 20, IEEE Software Engineering Standards Committee's Executive Committee conference call; and the September 25-27 U.S. TAG meeting.

## ASQ Standards Committee

### Technical Report Process

ANSI will be following a process similar to ISO in having a process for technical reports. Information on this is available on the ANSI Web site: ([www.ansi.org/public/library/std\\_proc/lib\\_e.html](http://www.ansi.org/public/library/std_proc/lib_e.html)) .

### Community Quality Manager Certification

Frank Voehl, of the Community Quality Councils Committee, noted that the committee is considering such a certification and would appreciate feedback from ASQ members on this. The Community Quality Councils Committee focuses on local government/community quality initiatives.

### Committee Future

Rudy Kittlitz (head of the U.S. TAG to ISO/TC 69) and others have a reporting structure proposal for the Standards Committee, which finds a home for the standards committee and replaces the standards group leadership council. This proposal creates a Standards Group Council made up of the chairs from the ASQ Standards Committee, the four Z1 committees, and the four ISO/TAG chairs. An overall chair would be appointed and report to the board of directors. The proposal would transfer official standards oversight from the Division Affairs Council to the board.

## IEEE SESC Executive Committee

### Standards Expiring in Next Few Years

Decisions will need to be made on the following schedule of standards that are due to expire over the next few years unless reaffirmed or updated:

Expiring in 2004 so action in 2003 needed (IEEE 1420.1b, IEEE 1517)

Expiring in 2005 so action in 2004 needed (IEEE 1471, IEEE 14143.1)

Expiring in 2006 so action in 2005 needed (IEEE 1063, IEEE 1540)

### Terminology

There are competing revision efforts for standards for software engineering terminology. IEEE will be considering offering 610.12 to ISO/IEC JTC1/SC7 for incorporation into their revision effort.

### IEEE 1012—V&V

This standard will be revised, not reaffirmed as is. Roger Fujii of Northrup Grumman will chair this effort. Those interested in commenting/reviewing should follow last month's instructions on becoming directly involved in standards review. If you think you would like to work on the group to actually revise the document (and there are a series of outstanding revisions already known), contact me at my e-mail address at the end of this column and let me know ASAP since, by the time you read this, work will have begun.

## Next Executive Committee Meetings

Dr. Norman Schneidewind has offered to host the next face-to-face meeting in Monterrey, CA, February 12-14, 2003. Conference calls are held every month when there is no face-to-face meeting, however.

## U.S. TAG

### Process Assessment (15504, WG10)

It is expected that this series of documents will be issued during 2003-04. Part 2, which contains the normative requirements, and Part 1 (overview and vocabulary) will likely be published in mid- to late 2003. Parts 3 and 4, providing guidance on performing assessments and using assessment results, will come out in late 2003 or early 2004. And Part 5, with the full exemplar model, will come out sometime after the others, i.e., mid- to late 2004.

### ISO 9000-3 Revision (WG18)

It is fully expected that this will be published early in 2003.

After this, there is a proposal that this working group pursue a software quality management framework standard. Work is being done in the UK to prepare a draft of this to offer as the basis for such a project.

### IEEE 1220 (System Engineering Process Standard)

The IEEE has offered SC7 the IEEE 1220 document for adoption by SC7.

[As always, people interested in standards work can contact Scott Duncan: [softqual@knology.net](mailto:softqual@knology.net), 706-649-2345 (weekdays), 706-565-9041 (evenings and weekends).]

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# FROM THE REGIONS

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BY REGIONAL COORDINATOR  
DAVID WALKER

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I have had good luck finding qualified candidates for the open regional councilor (RC) positions. Using a questionnaire, I get a significant amount of information from each candidate, then call and converse with candidates who look promising. I am hoping these positions stabilize soon. I am already aware of two more potential changes in the fourth quarter yet this year.

I have had one-on-one discussions with about half of the RCs. The newer RCs were targeted first. This is critical. The discussions are encouraging for the RCs and very informative for me.

The biggest obstacle I see at this point is corporate budget cuts. Most software quality engineers are hanging on to their jobs by a thread, with no financial support to perform their volunteer responsibilities. Our members are unable to participate in local activities, let alone the international conference. Our volunteers (RCs) are also hit hard by job and budget cuts.

We in the Software Division want to thank John Pustaver for his many years of service as a regional councilor for Region 1. We appreciate all he has done for ASQ, the Software Division, and his region. John has served in many roles in the Software Division, most notably, serving as the 9ICSQ Conference chair.

### Near-Term Objectives

- Assure all regions are filled
- One-on-one communication with all RCs
- Revise the RC Handbook
- Annual RC conference call

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# FROM THE REGIONS

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## **Region 1      John Pustaver**

Job hunters should check the Jobs page at [www.swquality.com/users/pustaver/jobs](http://www.swquality.com/users/pustaver/jobs). Jobs have been trickling in so keep checking. If you know of a job opening in the New England area, please send an HTML file with position description and contact information to John Pustaver, [Pustaver@swquality.com](mailto:Pustaver@swquality.com).

We would like to welcome Eric Patel as the new regional councilor for Region 1. Eric is the author of the lead article in this newsletter and a frequent contributor to ICSQ. Eric is the chief quality officer for RapidSQA.

## **Region 3      Bill Folsom**

Here in Region 3 we are getting ready for the 54th North East Quality Council (NEQC) Conference on October 22-23 in Mystic, CT. The conference includes several presentations related to software quality. The speakers are Jayesh Dalal, David L. Brown, and myself. I anticipate that these presentations might develop some interest in SQA at the individual section level and lead to dinner meeting engagements later this year.

## **Region 4      Chris Fitzgibbon**

By the time this newsletter goes to print, the **12th International Conference on Software Quality (12ICSQ)** in Ottawa will be history. Hundreds of participants will have enjoyed and benefited from the insightful presentations, tutorials, and networking that have made the annual ICSQ the premier conference for software professionals. Congratulations and a thank you go to all of those volunteers and participants who took part in the 12ICSQ and made it a success. Next year's ICSQ is in Dallas.

Another successful event was the **Toronto Quality Forum** on Oct. 3. The full-day session offered a software track that included topics such as software quality and testing, CRM, quality systems on the Internet, and the IT Infrastructure Library (ITIL). Plans are already under way for next year's Toronto Quality Forum.

The arrival of fall has also seen the resurgence of several of the monthly software quality meetings in Region 4. The **IEEE/ASQ Discussion Group for Software Quality** in Calgary has an exciting lineup of software-related discussion this fall and winter. Upcoming topics include QA on agile process, software metrics, software project management, and testing on the Web. The group meets every two weeks from September through May. More information is available from their Web site at [www.software-quality.ab.ca](http://www.software-quality.ab.ca).

The **Ottawa Software Quality Association (OSQA)** holds events on the last Thursday of each month. To subscribe to this mailing list, please send e-mail to [bzottor@nubex.ca](mailto:bzottor@nubex.ca) with the subject line "Subscribe-OSQA."

And, there are several **Software Process Improvement Network (SPIN)** groups throughout Region 4. SPIN activities are scheduled this fall in Toronto ([www.torontospin.com](http://www.torontospin.com)) and Ottawa ([www.spin.org](http://www.spin.org)). Other Canadian SPINs are in Montreal, New Brunswick, and the Prairies; contact information is available from [www.sei.cmu.edu/collaborating/spins/spins.html](http://www.sei.cmu.edu/collaborating/spins/spins.html).

The Education Committee of the Toronto Section is trying to determine the level of interest in extending its **Toronto Quality Certificate Program** to include the ASQ Software Division

BoK. This multisection, part-time program is written and endorsed by the ASQ Toronto Education Committee and given for the last 10 years by 10 community colleges in Toronto and the surrounding area. It presently concentrates on the BoK's of CQE, CQA, CQ Manager, and CQT. If you have an interest in taking the software aspect of this program, please contact Pat Cross at [patcross@londonst.com](mailto:patcross@londonst.com).

If you have news that other Software Division members should know, contact me at [chris@orioncanada.com](mailto:chris@orioncanada.com) or 613-563-9000. I would be pleased to hear from you.

## **Region 5      Joel Glazer**

### **Section Dinner Meetings**

The Baltimore Section from Region 5 is planning two section dinner meetings for 2003, targeting software topics. The first will be in February and the topic will be related to software reliability. The second later in the year with the tentative topic on CMMi.

### **Request to all Region 5 members to contribute to Software News**

Please do not shy away from contributing to the newsletter via your regional councilor. If you are interested, please write about your experience on the CSQE exam, or other topics related to software quality, and forward it to Joel Glazer at [joelglazer@ieee.org](mailto:joelglazer@ieee.org).

### **Get connected**

Each of you is encouraged to provide ASQ headquarters with your e-mail address; you may request "no advertisement" be sent to you other than Society and/or division information.

## **Region 6      Tom Gilchrist**

On October 25, 2002, the Seattle Area Software Quality Assurance Group (SASQAG) held a "\$99 Training Day" event on Six Sigma with Russ Albright or Microsoft. This workshop helped people interested in Six Sigma to see how deployment and execution are different from using Six Sigma in a manufacturing environment. SASQAG is planning quarterly one-day affordable training events for the next year. For information on future events, visit [www.sasqag.org/99days](http://www.sasqag.org/99days).

On the third Thursday of every month (except December), SASQAG holds monthly public meetings in the Seattle area at Attachmate in Factoria. SASQAG also supports certification and study groups. If you are in the area and want to attend, please check out [www.sasqag.org](http://www.sasqag.org) for upcoming events, directions, and meeting time.

On October 15-16, the Pacific Northwest Software Quality Conference held its 12th annual conference in Portland, OR. The keynote speakers included Alberto Savoia on "Maximum Efficiency Testing" and James Bach on "How Testers Think." A single day of workshops was held Oct. 14.

If you have information on local software quality and testing events in your area of Region 6, please send them to me for our events calendar. I am looking for more information about activities and events in California. Visit [www.tomgtomg.com/asq6](http://www.tomgtomg.com/asq6) for information on events around Region 6. Send information to Tom Gilchrist, Region 6 ASQ Software Division, [tomg@tomgtomg.com](mailto:tomg@tomgtomg.com).

## **Region 10      Nancy Poma**

We held our 3rd Annual Michigan Quality Conference October 10, 2002, at Madonna University in Livonia, MI, with about 100 people in attendance. We offered three tracks on

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## FROM THE REGIONS

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automotive, software, and standards topics, with about half of the attendees participating in the software track. Other Software Division members who helped with this event were Deb Beaman, Mike St.Peter, and David Walker. If you have an interest in working on next year's event, please contact me at [nmpoma@comcast.net](mailto:nmpoma@comcast.net).

The Greater Detroit Section would like to include a CSQE Refresher Course in its long-standing Saturday morning program at Macomb Community College. If you are interested in this option, please contact either [kapur\\_jatinder@hotmail.com](mailto:kapur_jatinder@hotmail.com) or [salil\\_raje@compuware.com](mailto:salil_raje@compuware.com). If you would like an option for another time or location, let me know, as I have run CSQE Study Groups for my company and I have had some interest from people in the Ann Arbor area.

The GL-SPIN now holds meetings on the second Thursday evening of the month, where they alternate between U-of-M Dearborn and Oakland University in Rochester, MI. September's meeting at U-of-M Dearborn had about 30 people for an overview presentation on "Function Points." October's meeting was the first at Oakland University, and the topic was "Extreme Programming." For information on upcoming topics, speakers, and locations, check out their Web site at [www.gl-spin.org](http://www.gl-spin.org).

My goals for the next year are to continue to improve our MIQ Conference, work with the GL-SPIN more closely, and get CSQE refreshers going if there is enough interest.

### Region 13 Granville Jones

The ASQ Annual Quality Congress was held in Denver, CO, last May. The congress was a total success with many Region 13 Software Division members taking an active role. As the new regional councilor I want to thank each and every one of you who helped out. If you're interested in helping out in May 2003 in Kansas City, let me know.

I have set up a Yahoo group as a quick communication tool for all region 13 Software Division members. It's located at: <http://groups.yahoo.com/group/asqswdivisionregion13/>.

I am currently going through the membership list to learn where our division members come from. I have asked all of Region 13's chairs to put me on their newsletter mailing list so I can learn what is going on in the various sections.

As the new regional councilor I want to make sure I contact each section and personally get them involved in Software Division activities. My contact information is 303-969-0228 (home-office) and [granville.jones@att.net](mailto:granville.jones@att.net) for my e-mail.

Another one of my goals is to advertise the Rocky Mountain Quality Conference to be held in June 2003 in Lakewood, CO. The conference for the first time will have a two-day software track. I am actively seeking presenters. If you're interested let me know and I will send you the call for papers information.

### Region 14 Bill Trest

Please welcome Bill as the new RC for Region 14

### Region 15 Mark Neal

Please welcome Mark as the new RC for Region 15

### Region 25 Zigmund Bluvband

Please welcome Zigmund as the new RC for Region 25

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## ANSWERS TO THE SOFTWARE QUALITY ENGINEERING QUIZ

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BY LINDA WESTFALL

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- 1. Answer D is correct.** Answer D is an example of a win-win outcome, all team members win because their schedules are taken into consideration so they can attend the meeting without undue problems caused by conflicting work and because the team meetings are more productive when all team members are consistently in attendance. Answer A is an example of win-lose outcome; the last person in the room "loses" because he or she has to take the minutes and everyone else "wins" because they don't. Answer B is a useful team rule that helps minimize negative conflict within the team, but it doesn't have a direct outcome, win-win or otherwise. Answer C is an example of a rule that will prompt a win-lose outcome. In a multivoting process the items or ideas with the most votes "win" and the other items or ideas "lose." **CSQE Body of Knowledge Area: I.C.4**
- 2. Answer A is correct.** The new process should be tested through conducting a pilot implementation to ensure that it works effectively. This provides an opportunity to fine tune the process and correct any problems before it is propagated to the entire organization. It also minimizes the impact on the organization if the process doesn't have the desired results and a determination is made not to implement the process organizationwide. An in-process audit to identify problems with the existing process (Answer B) should have been conducted prior to defining and documenting the new process as input into determining the types of changes that need to be made. Implementing a training program to teach the new process throughout the company (Answer C) would be part of the roll out of the new process and should be done only after a successful pilot. Purchasing a change request tool and site license to support the new process (Answer D) would also be part of the roll out. The identification of the supporting tool would typically be part of the definition of the new process and it may be necessary to acquire enough demonstration copies or tool licenses to conduct the pilot. However, the expense of a site license is premature until after a successful pilot. **CSQE Body of Knowledge Area: II.B.2**
- 3. Answer A is correct.** A preliminary design review is held to evaluate the architectural design of the product. Since this is a new product, the detailed design and software source code have typically not been created at this point in the software development process. **CSQE Body of Knowledge Area: III.B.2**
- 4. Answer B is correct.** The User's Manual and Installation Instructions should be tested as part of System Testing. Therefore, their completion and baselining should be part of the entry criteria to the system test readiness phase gate review. **CSQE Body of Knowledge Area: IV.B.1**
- 5. Answer C is correct.** Defect density is a metric that measures the number of defects per size of the software product so it is a software product metric. Examples of defect density

(cont. on p. 10)

might be the number of coding defects per thousand lines of code, the number of user manual defects per page, or the number of defects per test case. Cycle time measures the calendar time it takes to perform a process or task, so it is a process metric. Phase containment effectiveness measures the percentage of defects that were found in the same phase of the software development life cycle in which they were introduced. An example of phase containment would include the number of requirements-type defects that were found during the requirements phase or the number of coding defects found during the coding and unit test phase. Therefore, phase containment is a process metric that measures the effectiveness of the defect detection processes during a phase. Effort hours expended during coding is a resource metric. **CSQE Body of Knowledge Area: V.B.1**

6. **Answer D is correct.** Stress testing subjects the software to surges or spikes of excess load over short periods of time and evaluates the software's capability. Answer A is an example of load testing that evaluates the software's performance capabilities at various levels of normal usage conditions. Answer B is an example of performance testing that is done to determine if the system has any problems meeting its performance requirements for throughput, response time, number of simultaneous users, number of terminals supported, and so on. Answer C is an example of volume testing that subjects the software to heavy loads over long periods of time. **CSQE Body of Knowledge Area: VI.C.1**

7. **Answer A is correct.** The functional baseline includes the initial, approved technical specification (system requirements) for the product. **CSQE Body of Knowledge Area: VII.B.2**

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## CHECK AND UPDATE YOUR MEMBER INFORMATION WITH ASQNET

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BY TOM GRIFFIN

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As more and more divisions and sections move to electronic communication, it becomes increasingly important for members to manage their member information and ensure that it is up to date. One of the useful things members can access with ASQNet is the ability to update your member information and contact options online. When you login to ASQNet from [www.asq.org](http://www.asq.org) you have the option to "Change your address and e-mail." This option takes you to a page that will allow you to change your home and business addresses, select home or business address as your preferred mailing address, and set your e-mail and privacy preferences. E-mail preferences control the kinds of e-mail you receive from ASQ, divisions, and sections. Privacy preferences control the sharing of your information with other organizations and whether you choose to receive broadcast fax.

After you have made your updates, if everything is "OK" you are supposed to click a submit button. Unfortunately, the image for the button is not on the page. If you "feel around" with your mouse on the bottom center of the page you may find it. Of course, if you wait long enough an "image not found" icon will appear and you can click it.

Please keep your member and contact information up to date. It has been estimated that almost half the members of the Software Division do not have working e-mail addresses in the ASQ database. If you don't have Web access, you can always call 800-248-1946 to take care of your updates. Don't be left out. Stay in touch.

Thanks,  
Tom Griffin

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### Software Quality Systems Software Process Improvement Software Testing

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- Software Quality Assurance*
- Quality Goals & Plans
- Process Improvement (using SEI CMM)*
- Software Project Management
- Software Testing
- Root Cause Analysis
- Software Metrics
- Software Inspections (peer reviews)
- Software Reliability

### Software Quality First

Jessee Ring—Principal

510-915-2353 Fax: 510-573-7464

[sqa1st@attbi.com](mailto:sqa1st@attbi.com)

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# SOFTWARE DIVISION WEB SITE UPDATE

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BY HANK SOBAAH  
VICE CHAIR, MEMBER SERVICES

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As some of you may know, and as others may have wished, the Software Division is currently in the beginning phase of updating the division's Web site. The process was actually started last year, after several division members began discussing some perceived shortcomings with the division's site, and what was needed to improve it. A Web site update committee was then put together, and high-level requirements were defined and documented.

One of the major goals that the council agreed upon was to bring a common look and feel to all parts of the Web site and to update the site's functionality, while at the same time serving as our members' portal into ASQ. Planning had begun, and a budget estimate was established and approved. Vendors were contacted, and several were invited to participate in the proposal process. They then began the process by developing and submitting design prototypes, estimating the amount of time and resources necessary, and were asked to submit their formal proposals to us by the end of October.

## Brief Design Overview

Development of our new site, as per the high-level design plan, is expected to be a three-phase process.

Phase I was to address provision of a general site, with access control, a process for content management, and will include several specific, standard pages. In Phase II, the plan is to add more indexing and site searchability, discussion boards, do some expansion on the Phase I pages, and add a few new items. Phase III will provide all division material, located in one place, including BOK, training material, certification reminders, possibly more discussion boards, etc.

## Process for Vendor Selection

After we submitted our design requirements to the vendors, one of the members of our Web site update committee served as their focal point into the division. Scott Duncan remained in contact with the vendors, and submitted the committee's feedback regarding their prototypes and any requirement changes. He also provided feedback from the vendors to the committee, ensuring clarification on any issues that they had brought up, and coordinated the review of their designs and their proposal submissions.

The prototypes were designed so that they could take us a couple of layers deep into what would ultimately turn into our Web site. In addition to their prototypes, we requested that they submit a proposal for all of the work specified in the high-level design document.

Open communication with vendors was key in order for them to fine tune their approach and their prototypes. The committee then reviewed sites that were submitted, received proposals, and evaluated one as the perceived best choice to move forward with.

## Decision Factors

Very key components of the decision criteria were the fact that the vendor selected had proven to be responsive, flexible, and accessible far beyond what the committee felt was the case with even the second best choice.

The committee felt that the selected vendor's pricing was fair for what we've asked so far. The vendor has been completely accessible, 100% responsive, and open with us throughout their involvement. They have shown us some of their other sites that (among several) have done everything we've asked for, thereby demonstrating their understanding of our requirements and their capability to do the things that we wanted. In addition, they have already offered suggestions to will potentially save us time and money on development of the site.

And, even though our requirements have and will continue to change somewhat, they were completely prepared for (and even expect through their experience) the fact that there will be changes—they have proven to be very flexible, and have expressed their expectation to work with us on and through the necessary changes.

Consequently, the Web site update committee presented a proposal to the Software Division Council at our October 27 meeting in Ottawa, and received council approval to move forward on Phase I of the Web site update development tasks, as briefly identified below.

## Phase I

- Detailed design planning
- Project planning
- Provide nontechnical capability to add and change information
- Provide the council with access to Web site statistics
- Provide an access controlled, council-only area
- Provide an access controlled, member-only area
- Implement a Web site that is open to all major browsers
- Provide menus from each area to all other major areas
- Indexed for search engines

## Phase I Specific Pages

- General site info
  - Vision, mission, goals, etc.
- Council-only area
  - Forms, policies, procedures, minutes, bylaws, etc.
- Member-only area
  - Key council business, key policies/procedures, bylaws, officer responsibilities, job postings, etc.
- Regional area
  - Focusing on RCs, events, and activities, etc.
- Calendar of events
- BOK
- SQE related conferences and seminars
- Certification page
- A new page on metrics information
- A new page on methods information
- Standards area

If you have any interest in working with the Software Division as a part of the Internet Committee, please contact me, Hank Sobah, at 412-937-7687 or [hsobah@innovativesystems.com](mailto:hsobah@innovativesystems.com) with your interest and qualifications. In addition, if you have any questions or comments, please feel free to get in touch with me.

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# AWARDS

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BY SUE CARROLL

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Congratulations to two new ASQ Senior members sponsored by the Software Division: Scott Duncan and John Lowe. Software Division members are invited to contact Sue Carroll at [sue\\_carroll@bellsouth.net](mailto:sue_carroll@bellsouth.net) to obtain applications or information about upgrading their membership.

Also, the Software Division recognized its 2000<sup>th</sup> CSQE at the Division Council meeting in Ottawa, Canada, in October. William F. Craft will receive a complimentary admission to 13ICSQ in Dallas next October. Congratulations to our 2000<sup>th</sup> CSQE!

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## "YOUR WORLD DEPENDS ON QUALITY SOFTWARE"

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UPDATE ON OUR SOFTWARE DIVISION  
TRACK FOR AQC 2003  
KANSAS CITY, MO, USA  
MAY 19-21, 2003

BY CAROL DEKKERS, AQC SOFTWARE  
DIVISION TRACK CHAIR

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Start making plans today to attend the world-class Annual Quality Congress (AQC) in Kansas City, MO, May 19-21, 2003! AQC is the single largest ASQ event of the year—and again our Software Division has stepped up to the challenge of creating an entire track (seven sessions) with outstanding speakers who are experts on quality in software topics.

In order to create an event to maximize the value of your attendance to your employer, we've created several "cross functional" sessions where software and another industry meet. These joint division sessions are indicated by an asterisk (\*) in the descriptions below. What can you expect at AQC 2003? Our theme "Your World Depends on Quality Software" (within the overall AQC 2003 theme of: Expanding Horizons—Global, Personal, Tools, Networking, Solutions) provided us with the perfect opportunity to feature the following confirmed Software Division sessions:

1. **Software Validation in a Regulated Environment** Joint session with the BioMedical Division. Led by track session chair Sue Carroll, with confirmed speakers David Chevlin of DHC Associates, and Dan Olivier of Certified Software Solutions, Inc.
2. **Certification of Software Professionals** The benefits of the Certified Software Quality Engineer (CSQE) designation to you. Led by track session chair Scott Duncan, this session features a panel of presenters Rufus Turpin of Carpe Diem Informatics, Inc., Doug Hamilton of Accenture, and Taz Daughtrey.
3. **HIPAA—Where Health Care and Software Quality Meet** This is a joint session with ASQ's Health Care Division. Led by track session chair Tim Surratt, this session features Peggy Bowling of LEO Management & Associates, Ltd.

4. **Software Acquisition and Supplier Management** Led by track session chair, Jayesh Dalal, this session features confirmed speakers Linda Westfall and Theresa Hunt, both of the Westfall Team.
5. **Maximizing Your Productivity on Software Projects Use Cases for Users** This session will be moderated by Jean Burns, and we have experts Carol Dekkers of Quality Plus Technologies, Inc., and Hank Sobah of Innovative Systems, Inc., confirmed as presenters.
6. **Measuring Quality—Best Practice Approaches** Led by moderator Thomas Ehrhorn, this session is also a panel session with confirmed speakers Taz Daughtrey of James Madison University, and Stephen Splawn of Bechtel SAIC Co., LLC. A representative from the Sustainable Software Consortium (the SSC) of Carnegie Mellon University is also being confirmed for the panel.
7. **Planes, Trains, and Automobiles—What's the Connection to Software Quality?** This final session also features a panel of experts including John Pawlicki of EDS (representing the views of the automobile industry), and others currently being confirmed.

If you have never attended an AQC in the past, 2003 is the year to consider it! While previous conferences featured presentations across the industry and interest map of ASQ members, (there are typically more than 2,000 attendees), we are fortunate in 2003 to feature an entire Software Division track for SOFTWARE-Related presentations. Make 2003 the year you attend AQC!

If you'd like to help out as a volunteer before or during AQC—or if you've got ideas to help our division grow and flourish, send me, Carol Dekkers ([Dekkers@qualityplustech.com](mailto:Dekkers@qualityplustech.com)), or our Software Division, chair elect Tim Surratt (e-mail: [TSurratt@wmsgaming.com](mailto:TSurratt@wmsgaming.com)) your thoughts.

For more information on the AQC, hotels, tutorials, and other details, please visit the ASQ Web site at [www.asq.org](http://www.asq.org)—or send me an e-mail ([Dekkers@qualityplustech.com](mailto:Dekkers@qualityplustech.com)).

Best wishes for a joyous, healthy, and happy 2003!

Regards,

Carol Dekkers, AQC 2003 Track Chair (Software Division)

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- Click on the "Interact" channel
- Click on "Create an ASQNet Member Profile" under the 'Related Content' sidebar.
- Share only the contact information you prefer.

# SOFTWARE PRODUCT QUALITY MEASUREMENT

In the most recent issue of *SQP* there is an article, "Measurement Software Product Quality." It refers to ISO 9126, a standard on measuring software product quality. In this column I want to provide you with an update on that standard. Currently, two series of standards exist that relate to the measurement of software product quality. The first is ISO 9126, which focuses on describing a set of software product quality characteristics and subcharacteristics. The second series is ISO 14598, which focuses on software product quality evaluation. These standards are being revised and harmonized into one series. The new series is called Software Quality Requirements and Evaluation (SQuaRE) and has a series number 25000.

ISO 9126 contains a quality model that addresses three levels of product quality: internal quality characteristics, external quality characteristics, and quality in use. Internal quality characteristics are those exhibited by the artifacts used to develop the software product. Examples here are the designs and code. External quality characteristics relate to the behavior of the software product when it is operating. Examples of this come from various types of testing. Finally, quality in use represents the impact on the actual user of the software product. In the remainder of this column I will focus on the internal and external quality characteristics.

The internal and external characteristics and subcharacteristics are shown in Figure 1.

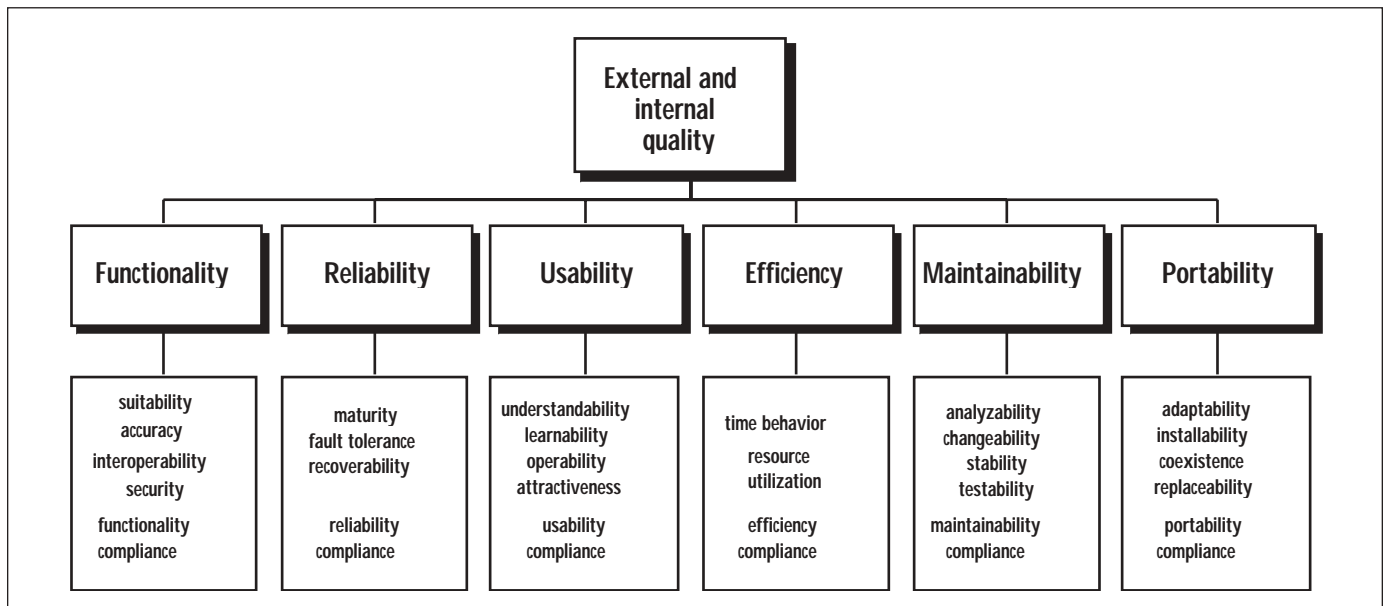
The standard series goes on to expand on possible measures of these quality characteristics. The ISO 14598 series provides guidance on how to use the quality characteristics and measures for the purposes of software product evaluation from various perspectives, including developers, acquirers, and evaluators.

What I find interesting regarding many of the proposed measures is that relatively few have been empirically validated as to whether they really do capture their corresponding quality characteristic. Some have faced validity in the sense that the correspondence appears obvious. Others, the relationship is more ambiguous.

Furthermore, much work remains to be done with respect to the predictive relationships in the overall quality model. Theoretically, the internal quality characteristics have some degree of predictive power for the external quality characteristics.

Now is a good time to share your experiences with software product quality measurement. Work is underway to combine the 9126 and 14598 series in a new series (25000). One benefit of this revision will be closer correspondence between quality requirements and quality evaluation with a common measurement base. The measures will help support both quality requirements specification and hopefully ensure the testability of the requirements from an evaluation perspective. If you are interested in sharing your experience or learning more about this effort, please contact me, Dave Zubrow, at [dz@sei.cmu.edu](mailto:dz@sei.cmu.edu).

Figure 1. External and internal quality characteristics and subcharacteristics.



# ASQ's Quality Information Center

*The Software Division's best source for quality information.*

**Quality InfoSearch**—database of published articles from ASQ's magazine, journals, and conference proceedings accessible 24 hours a day via [qic.asq.org/](http://qic.asq.org/). Order copies of documents at a special member rate.

**Electronic articles**—access the past several years of *Quality Progress* magazine and the most recent AQC conference proceedings via ASQ's members-only Web site, [www.asqnet.org](http://www.asqnet.org).

**Library Collection**—includes books and materials on software quality assurance and engineering principles.

**Research Librarians**—connect you to the best resources to meet your information needs including referrals to subject-matter experts.

For more information, visit  
[www.asq.org/info/library/](http://www.asq.org/info/library/)  
or e-mail [qic@asq.org](mailto:qic@asq.org)  
or call 800-248-1946, x8693.

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## ATTENTION DESIGNERS

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WIN A FREE REGISTRATION  
TO 13ICSQ IN DALLAS,  
OCTOBER 2003!

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The Software Division is looking for a logo. We invite all interested Division members to submit a design for consideration. The winning logo should reflect our special interest—software quality, and must be suitable to be used in a pin, button, Web page, letterhead, and so on.

Submitted designs will be reviewed by the Software Division Council and a winner announced in April 2003. Designs must be submitted no later than Jan. 31, 2003. Please submit your design by e-mail to Rufus Turpin, marketing chair at [info@carpedieminfo.ca](mailto:info@carpedieminfo.ca). Clearly mark entry as Software Division Logo Contest. Designs can be in the form of a JPEG, TIFF, WMF file formats.

The Software Division reserves the right not to declare a winner should no suitable design be received. The winner agrees to transfer copyright of the winning design to the ASQ Software Division.

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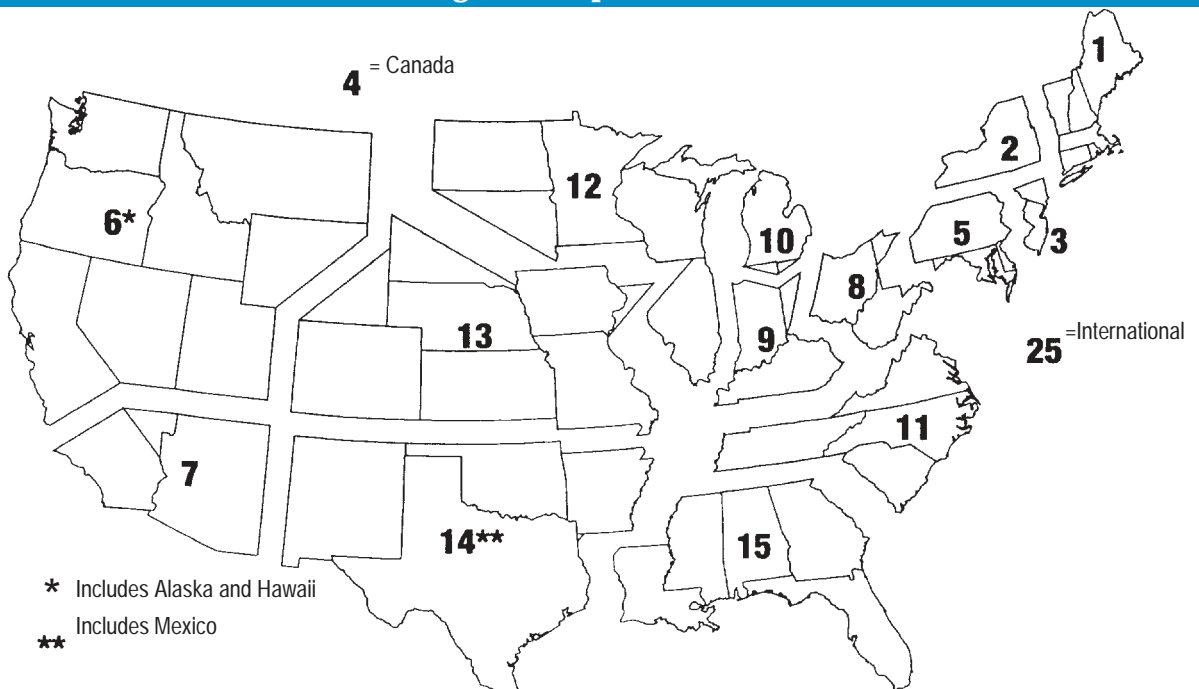
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