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In **This Month’s Topic** I discuss evolving software engineering standards.

Regular features to look for each month are:

- **Monthly Morsels**
  Hints, tips, techniques, and references related to this month’s topic

**Changes Coming to Software Engineering Standards**

The very first software engineering standard published by IEEE was **IEEE-Std-730 Software Quality Assurance Plans** — first released in 1981. I was privileged to be a member of the working group that developed that first standard. Some three decades later, there are now over 160 IEEE Software Engineering standards covering every aspect of software engineering and software quality assurance.

Recently, two new international standards were approved. These two standards and their focus are:

- **ISO/IEC/IEEE 15288-2008**
  Systems and software engineering — System life cycle processes
  "This International Standard provides a common process framework covering the life cycle of man-made systems. This life cycle spans the conception of ideas through to the retirement of a system. It provides the processes for acquiring and supplying systems. In addition, this framework provides for the assessment and improvement of the life cycle processes."

- **ISO/IEC/IEEE 12207-2008**
  Systems and software engineering — Software life cycle processes
  "This International Standard establishes a common framework for software life cycle processes, with well defined terminology, that can be referenced by the software industry. It contains processes, activities, and tasks that are to be applied during the acquisition of a software product or service and during the supply, development, operation, maintenance and disposal of software"
products. Software includes the software portion of firmware.”

Within the IEEE Computer Society, the Software and Systems Engineering Standards Committee (S2ESC) has oversight over all of the IEEE Software Engineering Standards. This committee, working with their international counterparts, decided that existing IEEE software engineering standards should be revised to conform to the System life cycle processes described in ISO/IEC/IEEE 15288 and the Software Life cycle processes described in ISO/IEC/IEEE 12207.

The BIG Picture

ISO/IEC/IEEE 15288 provides high-level context for the development of complex systems that can include hardware, software and other complex components. The standard recognizes that many development projects are not just complex systems but rather, many are highly complex systems of systems. The standard identifies essential system life cycle processes organized into several groups as shown below:

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<th>System Life Cycle Processes</th>
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<td>Agreement Processes</td>
<td>Project Processes</td>
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<td><strong>Disposal Process</strong></td>
<td><strong>Disposal Process</strong></td>
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</tbody>
</table>
Each system life cycle process is defined in terms of:

- Outcomes
- Activities and Tasks

The system life cycle processes shown above are compatible with the software life cycle processes identified in ISO/IEC/IEEE 12207, which defines a framework for establishing software life cycles. ISO/IEC/IEEE 12207 identifies several essential software life cycle processes as illustrated below.

Each software life cycle process is also defined in terms of:

- Outcomes
- Activities and Tasks

Taken together, these two standards define a new framework for the IEEE Software Engineering Standards. Many IEEE Standards Working Groups are actively working to bring the standards into conformance with this new framework.

- Click to see a list of standards that currently have active working groups.

**What’s Changing in IEEE 730 Software Quality Assurance Plans?**

The current version of IEEE 730 provides guidance on the content of SQA Plans. Like many other standards, this standard is currently being revised to conform to
ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207. In addition, the S2ESC has requested that the revised standard also address SQA processes, tasks, and activities as well as defining the content of an SQA Plan.

The IEEE 730 Working Group is currently drafting revisions to IEEE 730 as illustrated in the diagram below.

The Software Quality Assurance (SQA) process falls under the Quality Management Process defined in ISO/IEC/IEEE 15288. The SQA Process is responsible for planning, coordinating, and using defined quality management mechanisms in each of the SQA related processes (which include Software Review, Software Verification, Software Validation and Software Audit) as well as in the Software Support Processes (Software Documentation Management, Software Configuration Management and Software Problem Resolution) as identified in ISO/IEC/IEEE 12207.

The challenge facing the IEEE 730 Working Group is daunting since the discipline of SQA is not well defined nor consistently practiced. Our goal is to create a new SQA Standard that addresses the challenges of complex systems of systems developed using a variety of software life cycles and is useful across many different types of project development environments, such as:

- Software-only projects
- Complex, embedded systems
- DoD and government-regulated software
- Commercial software
- Traditional IT software

The Working Group is also interested in sharing our collective SQA knowledge so that the next generation of SQA professionals can benefit from the many decades of SQA expertise represented on the Working Group.

To do this, we are planning to include several informative annexes that will discuss how to use the new SQA standard in different industries (i.e., medical devices, nuclear power, telecomm, etc.), as well as provide information on topics, such as software integrity levels, risk management, and software tool validation.

The IEEE P730 Working Group is interested in involving a diverse community of reviewers and authors to develop the new IEEE 730 standard. The current progress of the Working Group (WG) is viewable on a public Web Portal. Here’s how to see what the IEEE 730 WG has been up to:
Every month in this space, you’ll find additional information related to this month’s topic.

1. **IEEE Software Engineering Body of Knowledge (SWEBOK)**
2. **ASQ Certified Software Quality Engineer (CSQE) Body of Knowledge**
3. **Get a copy of IEEE Standard 15288-2008**
4. **Get a copy of IEEE Standard 12207-2008**

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