Food for Thought™

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Welcome to **Food for Thought™**, an e-newsletter from Software Quality Consulting. I've created free subscriptions for my valued business contacts. If you find this newsletter informative, I encourage you to continue reading. Feel free to pass this newsletter along to colleagues by using this Forward Email link. If you've received this newsletter from a colleague and would like to subscribe, please use this Enter New Subscription link. If you don't wish to receive this newsletter, use the SafeUnSubscribe link at the bottom of this newsletter, and you won't be bothered again.

> **Note:** If you have trouble reading this e-newsletter or accessing any of the links, click here to open the newsletter in a web browser.

Your continued feedback on this newsletter is most welcome. Please send your comments to **steve@swqual.com**

In This Issue

In **This Month's Topic** [link to This Month's Topic section] I discuss evolving software engineering standards.

Regular features to look for each month are:

- **Monthly Morsels** [link to Monthly Morsels section]
  Hints, tips, techniques, and references related to this month's topic

This Month's Topic

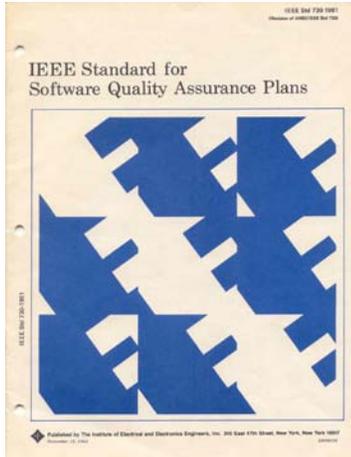### Changes Coming to Software Engineering Standards

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
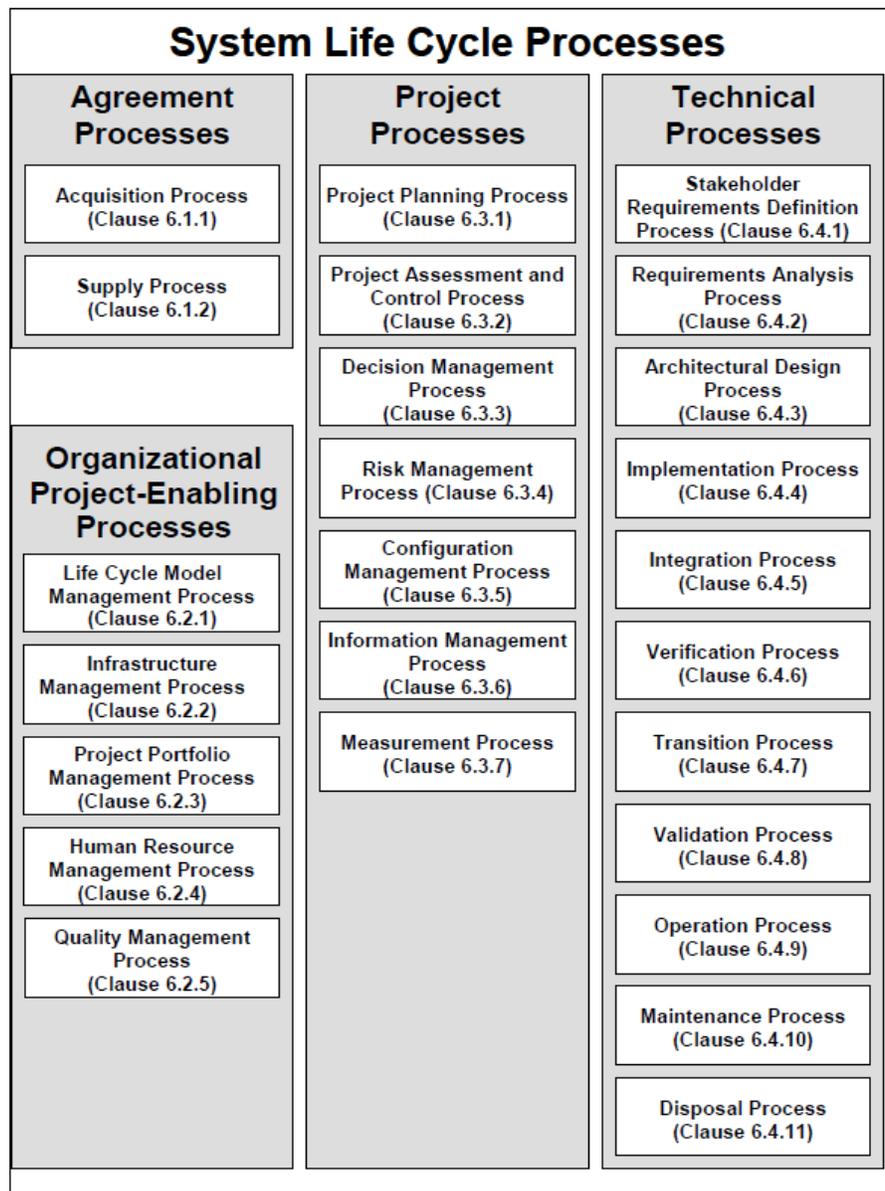
The cover of the first IEEE Software Engineering Standard published in 1981.

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**.
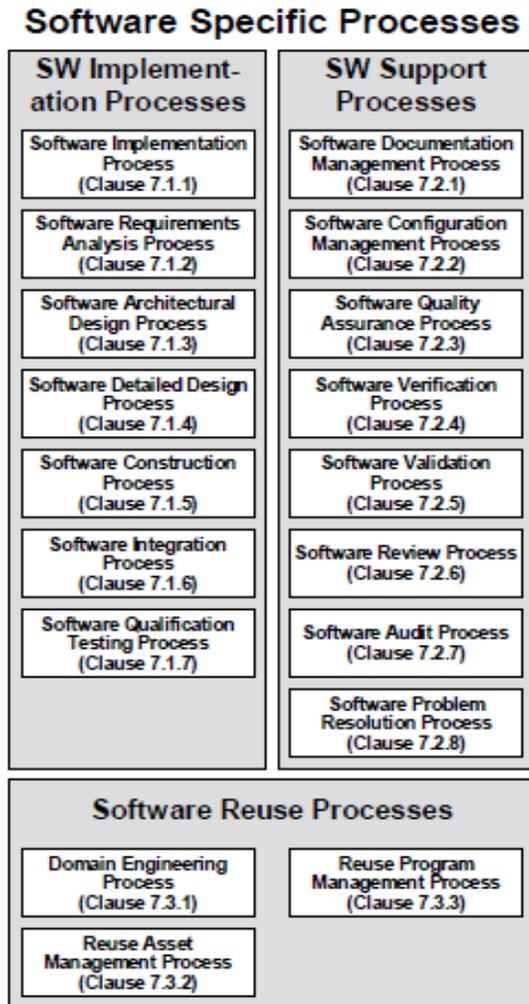
The BIG Picture

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:

System Life Cycle Processes

Agreement Processes

- Acquisition Process (Clause 6.1.1)
- Supply Process (Clause 6.1.2)

Organizational Project-Enabling Processes

- Life Cycle Model Management Process (Clause 6.2.1)
- Infrastructure Management Process (Clause 6.2.2)
- Project Portfolio Management Process (Clause 6.2.3)
- Human Resource Management Process (Clause 6.2.4)
- Quality Management Process (Clause 6.2.5)

Project Processes

- Project Planning Process (Clause 6.3.1)
- Project Assessment and Control Process (Clause 6.3.2)
- Decision Management Process (Clause 6.3.3)
- Risk Management Process (Clause 6.3.4)
- Configuration Management Process (Clause 6.3.5)
- Information Management Process (Clause 6.3.6)
- Measurement Process (Clause 6.3.7)

Technical Processes

- Stakeholder Requirements Definition Process (Clause 6.4.1)
- Requirements Analysis Process (Clause 6.4.2)
- Architectural Design Process (Clause 6.4.3)
- Implementation Process (Clause 6.4.4)
- Integration Process (Clause 6.4.5)
- Verification Process (Clause 6.4.6)
- Transition Process (Clause 6.4.7)
- Validation Process (Clause 6.4.8)
- Operation Process (Clause 6.4.9)
- Maintenance Process (Clause 6.4.10)
- Disposal Process (Clause 6.4.11)

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.

Software Specific Processes

SW Implement-ation Processes	SW Support Processes
Software Implementation Process (Clause 7.1.1)	Software Documentation Management Process (Clause 7.2.1)
Software Requirements Analysis Process (Clause 7.1.2)	Software Configuration Management Process (Clause 7.2.2)
Software Architectural Design Process (Clause 7.1.3)	Software Quality Assurance Process (Clause 7.2.3)
Software Detailed Design Process (Clause 7.1.4)	Software Verification Process (Clause 7.2.4)
Software Construction Process (Clause 7.1.5)	Software Validation Process (Clause 7.2.5)
Software Integration Process (Clause 7.1.6)	Software Review Process (Clause 7.2.6)
Software Qualification Testing Process (Clause 7.1.7)	Software Audit Process (Clause 7.2.7)
	Software Problem Resolution Process (Clause 7.2.8)

Software Reuse Processes

Domain Engineering Process (Clause 7.3.1)	Reuse Program Management Process (Clause 7.3.3)
Reuse Asset Management Process (Clause 7.3.2)	

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.
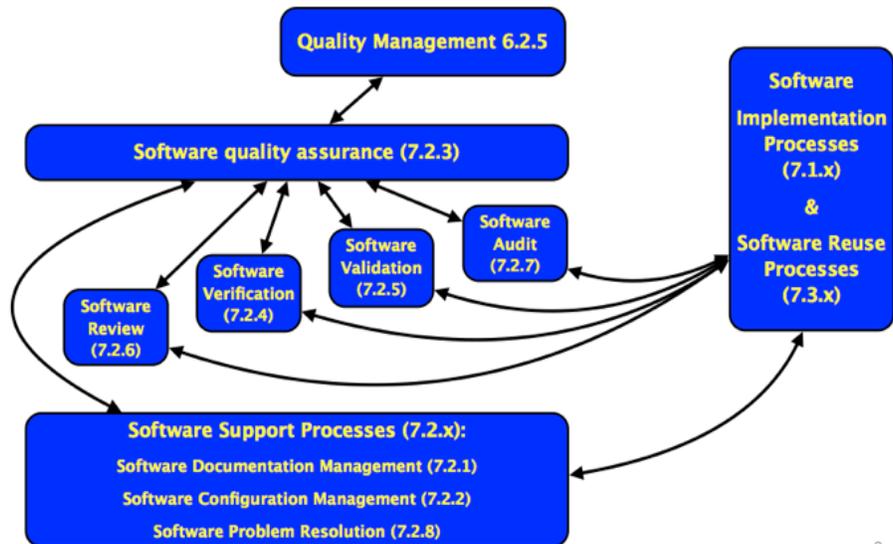
The Software Quality Assurance (SQA) process falls under the Quality Management Process defined in **ISO/IEC/IEEE 15288**. The SQA Process is responsible for planning, coordinating, and using defined quality management mechanisms in each of the SQA related processes (which include Software Review, Software 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:

- Navigate to the **IEEE-730 WG Web portal**

- At the web portal home page, click on the link labeled File Library

- Three folders are shown – <u>Copyright Standards</u>, <u>Deliverables</u>, and <u>General</u>

- Click <u>Deliverables</u> folder and you'll see <u>Annexes</u>, <u>Section 5.2</u>, and <u>Sections</u>

- The <u>Section 5.2</u> folder contains the meat of the standard. In this folder are several drafts of sections of the new standard that you can view. In most of the draft sections, requirements from **12207** are often included in blue.

- The <u>Sections</u> folder has drafts of other sections of the standard and the <u>Annexes</u> folder has drafts of some of the annexes we have identified so far.

You don't have to be a member of the IEEE 730 WG to submit comments. Comments on anything we've done so far are welcome. Send your comments to the IEEE 730 WG Chairperson - Sue Carroll. Contact Sue if you are interested in becoming a member of the Working Group.

In a future newsletter, I'll give an update on the progress of the IEEE Standard 1012 Software Verification and Validation Working Group...

And on another note...

You may have noticed that this newsletter looks a bit different. We've recently re-designed our **website** and have carried the new design over to the newsletter. The new design was by created by **Sarah Cole Design**

'Til next time...

Monthly Morsels

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**

About SQC

Software Quality Consulting provides a full-range of software engineering services for safety-critical industries and mission-critical projects. Our goal is to help create safety-critical and mission-critical software that meets our client's needs, complies with all applicable standards and regulations, with the highest level of quality possible, and in the most cost-effective and timely manner possible.

To learn more about how we can help your organization, **<u>visit our web site</u>** or **send us an email**.