



# IEC 61850 and Quality Assurance

## The Quality Assurance Program of the UCA® International Users Group

Ever since IEC 61850 became an International Standard in 2003 manufacturers of substation automation equipment around the world have been implementing this advanced standard in their products. Conformance testing has become a pre-requisite for equipment and currently over 100 IEDs have been certified. Although the standard was put together very carefully, initially flaws were detected during product development and conformance testing. Some were typographic errors, others more severe. In all cases these 'technical issues' had to be solved by the engineers and testers. Luckily they had, and still have, a helping hand.

It seems that everything in our world is becoming more advanced in some way: computers, software, mobile phones, just to name a few. Electronic equipment can do more, is faster and is cheaper than a decade ago. One of the goals of this progress should be that it makes life easier, but in some cases it first makes life more complex, before we

can benefit from all the 'good stuff'. The same goes for IEC 61850. With this standard we can do more, in less time using less resources and money. Once manufacturers started to implement IEC 61850 they found issues they had to deal with. Not surprising, knowing that the standard was brand new and contained over a thousand pages. However dedicated developers and testers were not held back, but tackled the issues, created their products and had them conformance tested. Because of the amount and variety of issues, a platform was needed that facilitates the process for documenting and solving the (technical issues). This task was identified and picked up by the UCA® International Users Group Testing Subcommittee that defined a Quality Assurance Program for Testing.

### Quality Assurance Program

One of the primary activities of the UCA® International Users Group (UCAIUG) is to support the testing for devices, applications, and systems developed in conformance with International Standards and IEC 61850 is one of these standards.

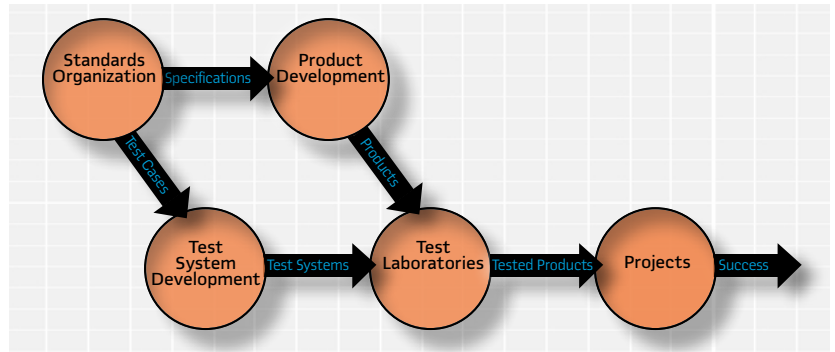
The establishment of a Quality Assurance Program (QAP) for Product Testing and Test System Accreditation and Recognition provides a major benefit to the members and is expected to save time and money for participants. The QAP is based on the following concepts:

- Members and non-members of the UCAIUG provide feedback from their developments and projects
- The process is decentralized. Activities related to testing of products are performed individually. The UCAIUG coordinates and manages information dissemination
- The process provides value for all who participate, and a strategy to bring all stakeholders together (users, vendors, testers, consultants)

The QAP is part of a bigger Quality Management System that supports the process of developing, producing, testing, and applying

The QAP is crucial in defining and managing the formal information exchange required to facilitate the process from development of standards to the successful application of products/projects.

## 1 Process for development, testing and integration of IEC 61 850 products



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conformed products and systems. In Figure 1 this process is shown.

The process describes the path from the development of standards to the development of products and test systems, to the testing of products and the execution of projects.

During each step in this process one can expect problems to occur that need to be solved and questions that need to be answered. This calls for effective mechanisms to document, track and solve these (technical) issues and answer the questions. Between the parties involved in the process, two different types of information flow exist.

The first type is the formal and procedural information exchange. This is shown as the blue arrows in Figure 2. Besides the formal exchange of information there is the informal information exchange, shown as black arrows in Figure 2.

The informal exchange of information is outside the scope of the QAP, but in order to facilitate recording, documenting, tracking, solving and sharing (technical) issues and questions, it is necessary to create a formal quality assurance process for the formal exchange of information. This is what the QAP for Testing does.

#### Information Exchange

Traceability of information is a key factor when it comes to the assurance of the quality of the process. Therefore the requirements for the documentation used in the process are very important.

All documentation distributed within the scope of this Quality Assurance Program shall at least:

- Contain a unique identification
- Contain the name and affiliation of the addressee
- Contain the name and affiliation of the sender
- Contain a description of the subject of the documentation
- Be written in the English language

Products and Systems are developed and maintained under responsibility of manufacturers, vendors and system integrators and they are tested by test laboratories. However if it becomes necessary to provide input to a vendor, manufacturer, system integrator or test laboratory, this documentation shall be provided to the UCAIUG containing at least detailed descriptions of the issue, problem or question, the application of the related product or system and the resolution required including a proposal for resolution. The UCAIUG will evaluate the documentation, inform the appropriate organization(s) and provide feedback to the members of the users group.

Vendors, manufacturers and system integrators under the QAP are requested to submit periodic updates to the UCAIUG regarding the status of their products and systems and UCAIUG will inform all related parties.

Periodically test laboratories submit updates to the UCAIUG regarding the status of their products and systems including descriptions of the test system(s) used, information on the test procedures used for the test cases, test system developments and a list of submitted questions, problems or other issues with regard to IEC compliant products and systems and their status. The UCAIUG will inform its members.

If products or systems are conformance tested and a certificate is issued, the UCAIUG shall receive not only the certificate but also the used test procedures and the validity of the certificate. The UCAIUG publishes a list of tested and certified products and systems.

The exchange of information with the users of IEC 61850 compliant products in projects is crucial. This requires that documentation containing a description of the project, the application of products or systems

## One of the main tasks of UCAIUG is to support the testing of IEC 61850 devices and systems.

and issues, problems and question raised and how they were answered be provided to the UCAIUG.

If the aforementioned process is followed by all parties involved in projects, it will provide a benefit to all members of the UCAIUG in general and the users in particular, as it facilitates providing information on projects with an implementation of the IEC standards, submitted questions, problems or other issues with regard to compliant products and systems applied within these projects, as well as their status and a description of the application of the related product or system. In other words, it allows everyone to learn from mistakes and solutions and thus provides a loop of continuous improvement from which we all benefit. ■

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received his BSc. degree in Electrical Engineering from the Polytechnic in Eindhoven, the Netherlands. He has worked for over 12 years in design and development of test software for the Utility Industry, testing and certification of IEC 61850 based products, and training. He has experience with Substation Automation and communication protocols including MMS, TASE.2, IEC 61850, IEC 60870-5, IEC 61400 and is an active member in the UCAIUG International Users Group Testing Subcommittee.

## 2 Formal (blue) and informal (black) information exchange

