Lesson learned - CGID based on the Method1 and Method 2 for digital equipment

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1. Introduction

CGID (Commercial Grade Item Dedication) is an acceptance process undertaken to provide reasonable assurance that a commercial grade item to be used as a basic component. The acceptance methods associated with commercial-grade dedication are the following:

1) Special tests and inspection (Method 1)
2) Commercial-grade surveys (Method 2)
3) Source verification (Method 3)
4) An acceptable item and supplier performance record (Method 4)

Special tests and inspections, often referred to as Method 1, are performed by the dedicating entity after the item is received to verify selected critical characteristics. Conducting a commercial-grade survey of a supplier is often referred to as Method 2. Supplier audits to verify compliance with a nuclear QA program do not meet the intent of a commercial-grade survey. Source verification, often referred to as Method 3, entails verification of critical characteristics during manufacture and testing of the item being procured. The performance history (good or bad) of the item and supplier is a consideration when determining the use of the other acceptance methods and the rigor with which they are used on a case-by-case basis.

Some digital equipment system has the delivery reference and its operating history for Nuclear Power Plant as far as surveyed. However it was found that there is difficulty in collecting this of supporting data sheet, so that supplier usually decide to conduct the CGID based on the Method-1 & Method-2 based on the initial qualification likely. It is conceived that the Method-4 might be a better approach for CGID even if there are some difficulties in data package for justifying CGID from the vendor and operating organization.

This paper present the lesson learned from the consulting for Method-1 and 2 for digital equipment dedication.

2. Approaches

Generally supplier is well aware of the guide of NP-5652 and other relevant guidelines and technical reports. Thus considering supplier's CGI dedication plan and procedure, it has generally covered all the topics that international reports, standards and guidelines describe. After then, when they get down to the dedication, we found that there is several remarkable issues in the way of conducting CGID for digital equipment.

2.1 The involvement of quality personnel vs. technical personnel

In the course of doing Method-1 and Method-2, most important things for integral CGID is the involvement of experienced technical engineer with the support of Quality Control. But the (small) number of engineer for CGID is not sufficiently experienced, and what is worse is that there is no experience engineer who is going to steer this CGID activity.

For example, the flow transmitter and the recorder are systems that is composed of hardware and software. However the engineer of supplier has taken this system as a simple type of indicator by neglecting the aspect of software (or firmware). This is a not a good approached in evaluating the digital equipment technically system.

2.2 Extracting the critical characteristics

There can be a several types of critical characteristics, physical, functional, performance and other installation, operation and maintenance.

All kind of technically critical characteristics should be collected based on the "functional requirement and description" for equipment itself. When supplier extracts the critical characteristics, the basis for them is internationally available guideline and/or technical reports. This is because of the absence of experienced technical engineer and misunderstanding of item's functionality. This is very important finding because this kind of efforts to collect the critical characteristics is truly solid basis for FMEA (Failure Mode and Effect Analysis) as well as "special test and inspection" of Method-1 vice versa in order to justify that there are counter measure to mitigate the consequences on emergency such as DBE or equivalent.

3. Vendor's position

3.1 Limited documentation

As we're all well recognized, the vendors selling the limited number of equipment and devices are very reluctant to prepare the SDLC documentation in manufacturing the hardware as well as in developing the software. Thus the survey (not audit) of commercial grade is very limited so that the CGIDer is trying to find the substitute that is proving the fundamental CGID efforts.

3.2 Sub-tier vendor and its sub-tier vendor

This is the topic of what we have seen many time in the series of report and/or NRC letters. The complicated sully chain is one of the difficulty in making this CGID out. Also internationally dispersed vendor's supplying documentation in their natural language like German and/or Japan that we're not usually familiar with. This is another difficulties in doing dedication.

4. Conclusions

Considering all the information above, there are a couple of issues to remind in order to perform the CGID for Method-2.

In doing commercial grade survey based on Method 2, quality personnel as well as technical engineer shall be involved for integral dedication. Other than this, the review of critical characteristics assessment and documentation developed in system development life cycle can be focused on the process aspect, not technical aspect.

Also before getting down to the equipment selection and purchase, the selection of dedication approaches among the available methods shall be established for ensuring the design integrity of digital equipment. Especially in case of the dedication including the software should conduct and verify the following;

1) All the SDLC document is well developed and maintained,
2) All the SDLC document is available to purchaser,
3) The environment for commercial grade survey is provided,
4) The document of vendors are understandable.

REFERENCES

[1] EPRI NP-5652, "Guideline for the Utilization of Commercial Grade Items in Nuclear Safety Related Applications", 1988
[2] EPRI TR-106439, "Guideline on Evaluation and Acceptance of Commercial Grade Digital Equipment for Nuclear Safety Applications", 1996