ISO/IEC JTC1/SC7
Software Engineering
Secretariat: CANADA (SCC)

ISO/IEC JTC1/SC7 Nxxx
2000-05-19

DOC TYPE: Ad-Hoc Working Group Final Report

TITLE: Ad-Hoc Working Group Final Report on Quality: Recommendations

SOURCE: ISO/IEC JTC1/SC7 Ad-Hoc Working Group Convenor

PROJECT: N/A

STATUS: Final

REFERENCES: Resolution 576, ISO/IEC JTC1/SC7 N2178

ACTION ID: FYI or ACT

DUE DATE: 2000-05-19

MAILING DATE: 2000-05-19

DISTRIBUTION: Electronic: SC7 Ad-Hoc Group on Quality

MEDIUM: Adobe Acrobat

NO. OF PAGES: 11

DISK NUMBER: xx

NOTE:

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ISO/IEC JTC1/SC7
Software Engineering
19 May 2000

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Ad-Hoc Working Group on Quality Final Report

INTRODUCTION

In May of 1999 at the Curitiba international plenary, ISO/IEC JTC1/SC7 Resolution 576 created an Ad-Hoc Working Group to develop and submit comments on the CD and DIS of ISO 9000, ISO 9001, and ISO 9004. Its mandate was enlarged to review aspects of software and systems quality to determine the most appropriate strategy to adopt in accordance increased market focus on quality.

Discussion and recommendations were consolidated into the proposal outlined in this report. The results of the Ad-Hoc group effort are submitted for consideration by ISO/IEC JTC1/SC7 at the 2000 plenary meeting in Madrid.

The Ad-Hoc Working Group on Quality included participants from eleven national bodies: Australia, Brazil, Canada, Finland, France, Israel, Italy, Japan, South Africa, UK, USA

OBJECTIVES

The Ad-Hoc Working Group on Quality objectives were twofold:

1. To develop and submit comments on behalf of JTC1/SC7 to ISO TC176/SC1 and SC2 on ISO 9000, ISO 9001, and ISO 9004.

2. To review aspects of software and systems quality to determine the most appropriate strategy to adopt in accordance with increased market focus on quality. The scope of work for the study period was to include:
   - A review of SC7's set and its relationship to aspects of quality;
   - A review of the impact of TL 9000 and other sector-specific and/or high-integrity software and system engineering standards on quality aspects;
   - A review of sector-specific technical specifications as additional requirements to ISO 9001;
   - An investigation of the marketplace response to the pending removal of ISO 9000-3;
   - Whether any work items relating to aspects of quality are justified for SC7 program of work;

- What the scope of identified work items should be based on SC7's unique requirements for quality;
- What the key interfaces with other groups in the standards community and other areas of expertise should be;
- A determination of the extent of support from national bodies for any identified work items.

RESULTS

Objective #1

SC7 comments were developed and submitted to ISO/TC 176 for both the CD and DIS ballots of ISO 9000, ISO 9001, and ISO 9004, as applicable.

Objective #2

WORK ITEM # 1

ISO/TC 176/SC2/N442 was submitted by the UK as a proposal to update ISO 9000-3:1994 to coincide with ISO 9001:2000 and provided a starting point for the discussion of the Ad-Hoc group to address the stated objectives. An initial review of the material by the Ad-Hoc group participants indicated that the need for guidance to the software and system community would be urgently required. The question arose as to what the guidance document should contain.

Having performed full reviews of the WD3, CD1, and CD 2 drafts of the future ISO 9001:2000, the SC7 Ad-Hoc Working Group on Quality considered that the future standard would not sufficiently meet the needs of the software and systems industry. Nor was there confidence that the situation would be improved through the development of the DIS or FDIS stages. Consequently, the SC7 Ad-Hoc WG on Quality proposed, through a NWI ballot, that should TC 176 offer ISO 9000-3:1997 to JTC1/SC7 for revision and alignment to the future ISO 9001:2000, that SC7 should accept this work and ownership. The results of the ballot were in favour of SC7 accepting TC 176's offer, should it be made.

The vote supported the position that should the transfer of this work occur, SC7's work should commence immediately, to enable a revised ISO 9000-3 to be published as soon after the publication of ISO 9001:2000 as is possible. The proposed schedule that was accepted was for a single International Standard to be developed by as early in 2001 as possible based on 4 months after DIS/ISO 9001:2000, with related work such as DIS and IS to be scheduled at the first WG meeting. To meet this aggressive timescale, the UK document

ISO/TC176/SC2/N244 would be used as a starting point with additional material gained from the WD revision of Australian Standard AS/NZS 3905.8:1996.

The NWI rationale that offered as justification, and which SC7 member bodies voted in favour of, was that:

1. There will be a need for internationally-agreed guidance on the interpretation of ISO 9001:2000 for the software and system industry and for organizations, certification bodies, and customers. (It should be noted that such guidance should not add to, amend, or remove any of the requirements from ISO 9001:2000.)
2. There may be a need for specific guidance on the application of the proposed clause 1.2 'Reduction in Scope' in ISO/DIS 9001:2000 within the software and systems industry.
3. There is a need for guidance for SC7 standards on quality aspects and the relationship to ISO 9001:2000.
4. SC7's requirement for market take up of its standards will be enhanced by presentation of a harmonious view of quality within its standards.
5. ISO TC176 recognises the need for guidance material and is balloting approval of transferring this work to SC7.

The favourable vote therefore supports the NWI approach to developing the ISO 9000-3 replacement guidance document:

1. The following document should be created: *Software and System Engineering: 'Guidelines for the Application of ISO 9001:2000 to the development, supply, installation and maintenance of computer software and systems'*

2. This revised IS or TR should include guidelines based on a number of SC7 standards for quality aspects of software and software-intensive systems and specifically relate these to ISO 9001:2000.

The only variable that currently exists is the result of the TC 176 ballot, which is currently pending. The Ad-Hoc group's understanding was that the ballot was to have been completed by early May 2000. As of the date of this report, the ballot has not yet been completed. Further, there exists the possibility that this ballot may not be completed until September 2000.

There was consensus among the group that the marketplace urgently needs a revision to ISO 9000-3 to keep its alignment with ISO 9001:2000. There was also consensus that such work should begin immediately. However, there are issues that have yet to be resolved as a result of the delay in TC 176's decision that cannot be answered by the Ad-Hoc WG. Among these issues are:

a. Who will own the responsibility to revise the ISO 9000-3 text?
b. Who will publish the ISO 9000-3 revision?
c. Who will be allowed to ballot the revised ISO 9000-3 content?
d. Who will be responsible for approval of the content revised ISO 9000-3 text?
e. Who will approve the final document for consistency with ISO 9001:2000?
f. Who will be able to comment on (and therefore request changes to) the revised ISO 9000-3?
g. Who will be responsible for updates to the revised ISO 9000-3?
h. If the ISO 9000-3 revision is transferred to SC7, will the standard number be changed?

While there is ample justification for SC7 to develop a sectorial document should it so desire, the group did not feel that this approach was a necessary one to explore until the above questions could be resolved. The justification that may be considered at a future date for a sectorial document is as follows:

- The scope of SC7's work products is considered to be sufficiently different and complex that a sector document could be useful. (TL 9000's justification is similar to that of SC7's. In fact there could be considerable overlap between the two, which is another reason to not immediately pursue the development of a sectorial document.) The proposed sector policy change outlined in ISO/TC 176/N299R2 would support this approach since the following points addressed within the proposed policy may be answered "yes", which the guidance indicates would be favourable to sectorial documents:
- *#2. Is the terminology used in the ISO 9001/4 standard relevant to the sector or is explanation needed for sector understanding?* – Yes – See SC7 Consolidated Vocabulary
- *#3. Is there an established best practice or Code of Practice that needs to be reflected for effective implementation of the generic ISO 9001/4 Standard?* – Yes – See 12207, 15504, 9126, etc.
- *#5. If the proposed sectorial document has implications for quality management system certification, accreditation, auditor training and qualification (eg possibility of multiple assessments and establishing criteria for accrediting sector specific Certification Bodies), are these unavoidable?* – Yes – See TL 9000 and TickIT

However, whether or not a software and system sectorial document is needed will depend on the outcome of Work Item #1. If SC7 is not permitted to play a significant role in the revision of ISO 9000-3, then a sectorial document may be justified.

WORK ITEM # 2

Additional Ad-Hoc Working Group discussions indicated that an additional, secondary document is needed that would become an outgrowth and in-depth supplementation to ISO 9000-3. This document could become an IS or TR. Its requirements would need to be further defined, but it should essentially expand upon the ISO 9000-3 revision and provide the depth that the ISO 9000-3 revision necessarily lacks. The document would link the ISO 9000-3 revision to the SC7 family of standards within a guidance framework that defines the relationship between SC7's products and software and system quality.

Although there still remain inconsistencies within SC7's products, work is in progress to produce products that provide a consolidated direction for users of SC7 standards. This new guidance document(s) could provide a framework within which SC7 could integrate and reinforce the interrelationships between these products by directly relating them to the application of quality to software and systems. This cohesive guidance framework (herein called the Software and System Quality Framework or SSQF) should be defined and developed as in-depth, supplementary guidance. This framework would not be normative in nature since ISO 9001:2000 provides normative quality requirements. (SC7 products also contain their own normative requirements.) The SC7 SSQF would, however, tie together applicable, existing SC7 standards and TRs to provide guidance for the specific needs of software and system processes, process control, and product quality requirements.

A more detailed review of the SC7 work products and TL 9000 performed by the Ad-Hoc group helped to define a candidate set of quality process inputs to be addressed in the proposed SSQF document(s). These include but are not limited to the following:

1. Using N442 as a starting platform, adding through further development additional SC7 product material;
2. Further alignment with 12207 and its amendment;
3. Additional concepts from 15288 related to aspects that apply to both software and systems;
4. Additions from DIS/ISO 9001:2000;
5. New elements – especially metrics from TL 9000 – as guidelines with examples rather than requirements;
6. Assessment concepts from 15504 that relate to process improvement and capability determination;
7. Process capability and maturity concepts from 15504 that relate to process improvement and capability determination;
8. Concepts of software and systems integrity from 15026;
9. Software process measurement ideas from 15939;

10. Linkage to functional size measurement from 14143;
11. Linkage to Software Maintenance standard 14764;
12. Linkage to software product quality metrics and quality characteristics from 9126;
13. Linkage to software product evaluation concepts from 14598;
14. Product quality metrics concepts from 14939;
15. Guidance material from ISO/DIS 9004:2000 that has a value-added impact in software engineering;
16. Definitions needed and not included in ISO 9000:2000 that can be negotiated with the vocabulary group.

RECOMMENDATIONS

The majority of Ad-Hoc WG members (and countries) recommended that the following recommendations be implemented as stated. The only issue that seemed to incur debate was not the work products, but whether or not one or two new Working Groups should be established to perform the work. The majority felt that resources were sufficiently constrained to warrant only one new WG being formed. Of those who felt that two WGs should be formed, most stated that the justification for two WGs was based on the need for an assurance that the ISO 9000-3 revision would take priority and to ensure a fast-track to the marketplace.

The Ad-Hoc Working Group on Quality recommends that ISO/IEC JTC1/SC7 implement the following recommendations:

1. SC7 should establish immediately, at its opening Plenary in Madrid, a single new SC7 Working Group based on a continuation of the current membership of the Ad-Hoc Working Group on Quality. The formation of this new WG should be immediate so as to permit its first meeting to be held during that week of meetings. This new WG would be responsible for all the work products outlined in the recommendations below.

2. The new Working Group should be responsible for both the ISO 9000-3 revision as well as the definition of the Software and System Quality Framework (SSQF), but should recognize the need for urgency and immediacy of the ISO 9000-3 revision and should establish it as the priority work product. Once completed, the SSQF work product would commence its in-depth treatment of software and system quality. Consequently, the two projects should be developed in succession to each other, with the first work product being: *Software and System Engineering: 'Guidelines for the Application of ISO 9001:2000 to the development, supply, installation and maintenance of computer software and systems*' and the second being the SSQF.

3. The new WG should define and draft the requirements for the ISO 9000-3 revision (the approved NWI) and use these requirements to ensure that the ISO 9000-3 revision does not extend beyond its intended scope. These requirements would enable the revision work to begin by providing a clear definition of the content of the document so that work can commence immediately in accordance with market timing requirements as established through the NWI approval.

   Since the ISO 9000-3 revision is the prerequisite of the SSQF work product(s), the requirements definition would not only ensure a limit to the scope of the ISO 9000-3 revision, but would also provide the foundation for the follow-on document by establishing the linkage between the ISO 9000-3 revision and the proposed SSQF document(s).

   The SSQF requirements should be applicable to all software and system engineering quality requirements and should integrate and build on the existing SC7 IS and TRs. The SSQF document(s) should be published as a Technical Report Type X 2 or IS and should define, support, and provide guidance for the software and system community that brings a quality view to activities related to developing, operation, and maintenance of software and systems. This guidance document(s) would cover the larger issue of quality as it relates to software and system engineering standards and would provide guidance in the use and integration of SC7 work products (new and existing). This document would also provide quality aspect-related guidance in the development of new SC7 standards.

4. The new WG group should be independent of existing SC7 WGs, but must, to be successful, include members from relevant SC7 WGs, TC 176 Liaisons, TL 9000 Liaisons, and interested national bodies. To ease the travel and resource burden of WG members who are also participants of other WGs, arrangements to co-locate meetings is recommended. A convenor and product editor(s) should be assigned.

5. This first project should commence immediately, on a fast-track as voted in the NWI, irrespective of the TC176 ballot to transfer ISO 9000-3 to SC7 since waiting for a September ballot would seriously jeopardize SC7's ability to respond the urgent needs of the marketplace. If TC 176 member bodies decide to transfer the work to SC7, no time will have been lost and SC7 would stand in a better position to achieve market timing requirements. If TC 176 member bodies decide not to transfer the work to SC7, SC7 can offer all work-in-progress to TC 176 with the intent of facilitating TC 176's work and market timing requirements. If TC 176 does not accept SC7's work-in-progress, SC7 could publish its work product as a TR to ensure adequate coverage of the required content.

6. The process for preparing the revised ISO 9000-3 should be clarified up-front and immediately, however, without preventing the initiation of the revision work. If this process requires the support of JTC1, then the Ad-Hoc Group requests that SC7's Chair, Francois Coallier, assist in working the matter through with JTC1 and ultimately TC 176.

   Once and if TC 176 has agreed to transfer the revision of ISO 9000-3 to SC7, SC7 would undertake to complete the document in a timely manner, with urgency to respect the marketplace need. To accomplish this activity, SC7 should document its agreement with TC 176 regarding the various responsibilities to be assumed in the revision process. This documentation should include agreement on the questions (a-h) described earlier in this report under Work Item #1. The Ad-Hoc Group believes that, at a minimum, SC7 should have responsibility for questions a, c, d, f, and g.

Based on the expressed support from member bodies, there appears to be sufficient interest and resources to complete the ISO 9000-3 revision work. There also appears to be sufficient resources to develop the SSQF document(s), although there is not as much interest as in the ISO 9000-3 work.

SUMMARY

Quality management is becoming an established discipline providing a systematic approach to the standardization of quality through the proliferation and acceptance of ISO 9000. The need for specific software and system guidance for ISO 9000:2000 via a revision of ISO 9000-3 is clear and immediate.

SC7's audience has specific and unique software and system quality management requirements that have been defined through a variety of SC7 work products, none of which provide cohesive guidance in and of themselves. The new Working Group products would provide documents (as IS or TRs) that address the immediate need for software and system guidance for ISO 9001:2000 and would also, secondarily, define a common Software and System Quality Framework (SSQF) using terminology applicable to software and system processes, process control, and product requirements that would be a significant SC7 contribution to its marketplace. These IS or TRs should be an integration of the existing SC7 standards or TRs, using ISO 9001:2000 as a basis to provide a related work product(s) that should be drafted by an integrated (same) Working Group.

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