The South African Institute of Computer Science
and
Information Technology

The 1997 National Research and Development Conference

Riverside Sun
Vanderbijlpark
13 & 14 November

Hosted by

Potchefstroomse Universiteit
vir Christelike Hoër Onderwys

The Department of Computer Science and Information Systems
Potchefstroom University for Christian Higher Education
Vaal Triangle Campus

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Edited by L.M. Venter & R.R. Lombard

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and
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Towards 2000

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Foreword

This book contains a collection of papers presented at a Research and Development conference of the South African Institute of Computer Scientists and Information Technologists (SAICSIT). The conference was held on 13 & 14 November 1997 at the Riverside Sun, Vanderbijlpark. Most of the organization for the conference was done by the Department of Computer Science and Information Technology of the Vaal Triangle Campus, Potchefstroom University for Christian Higher Education.

The programming committee accepted a wide selection of papers for the conference. The papers range from detailed technical research work to reports of work in progress. The papers originate mainly from Academia, but also describe work done in and for Industry. It is hoped that the papers give a true reflection of the current research scene in Computer Science and Information Technology in South Africa. Since one of the aims of the conference is Research development, the papers were not subjected to a refereeing process.

A number of people spent numerous hours helping with the organization of this conference. In this regard, we wish to thank the members of the Organizing committee, and the Programming committee who had very little time to screen the abstracts and compile the program. A special thanks goes to the secretary of the department, Mrs Helei Jooste, whose very able work was interrupted by the birth of her first child.

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Early results of a comparative evaluation of ISO 9001 and ISO/IEC 15504 assessment methods applied to a software project

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Summary: *This paper presents early results of a comparative study undertaken on a software project. The methods used for assessment included an ISO 9001 based audit checklist for software (SABS ARP 042), and the emerging ISO/IEC 15504 standard for software process assessment and capability determination. While the two methods focus on different issues, namely - quality system compliance to ISO 9001 in the first case and determination of supplier capability in the case of ISO/IEC 15504, both have the common goal of process improvement. The software project used as the subject of the case study is supported by an ISO 9001 compliant quality management system within an enterprise certificated to ISO 9001 for the development of software. Consequently, a high level of compliance to ISO 9001 was indicated. The application of ISO/IEC 15504 revealed a level of capability indicative of processes entrenched and maintained at the organisational level, and pervasive in all projects supported in the enterprise. The paper examines the consequences of applying the two types of assessments, and suggests some scenarios for application in other contexts.*

Keywords: ISO 9001, ISO/IEC 15504, software quality management, software engineering standards, capability determination, software process assessment

1 Introduction

Although ISO 9001 [1] certification is widely used as a basis of supplier qualification, experience is showing that there remains considerable variability in the performance of suppliers which have achieved certification. The reasons advanced for this situation include:

a. The supplier has less than complete coverage of the compliance requirements to the ISO 9001 standard

b. The external auditor does not demand evidence from the supplier documented quality system that there is 100% traceability to the ISO 9001 compliance requirements

c. There is no agreed basis for an interpretation of ISO 9001 requirements and how they can be applied in various industry sectors

d. Although the ISO 9001 standard encourages continuous quality system improvement, in practice this evidence is muted since the audit culture associated with the standard tends to lead to a plateau in quality system performance, arising from a focus on deviations (i.e. non-conformances) from the present quality system requirements. The audit culture does not demand ongoing evidence of quality system improvement since the last audit.

Significantly, the above concerns can be addressed through:

a. harmonisation of ISO 9001 quality system assessment and audit practices of supplier and external auditor, and

b. by measuring quality system improvement

This paper presents early results of a case study in which an ongoing software project [17] was subjected to:

a. a comprehensive examination for ISO 9001 compliance requirements and review against accepted good software engineering practices using SABS ARP 042 [2], and

b. a software process and capability evaluation using the emerging international standard ISO/IEC 15504 [3].

The manner in which ISO 9001 and ISO/IEC 15504 can be applied simultaneously to identify and measure process improvement will be described. The former will be reviewed against the development of the recently published SABS ARP 042 'ISO 9001 audit checklist for software'. The latter is used to provide a capability determination framework for software.

1.1 Capability assessment in ISO 9001

Although not prominent in ISO 9001 audit practice, the need to assess supplier is capability identified in the following sub-clauses:

Clause 4.3.2 Contract Review: Before submission of a tender, or the acceptance of a contract or order the tender, contract of order shall be reviewed by the supplier to ensure that c) *the supplier has the capability to meet the contract or order.*

Clause 4.20.1 Identification of need: The supplier shall establish the need for statistical techniques required for *establishing, controlling and verifying process capability* and product characteristics.

While these requirements are highly laudable, in most circumstances it is extremely difficult to supply *quantitative* evidence of capability, most particularly in ISO 9001 applications where a non-tangible service is being rendered, e.g. software development, project management, education and training, and a design element is present.

Substantial progress towards measuring supplier capability has been made in the field of software, with the earliest activity being associated with the Capability Maturity Model [9] of the Software Engineering Institute. This model describes a one-dimensional relationship between levels of capability of an organisation and the key practices employed to develop products that satisfy client needs. The development of the CMM stimulated other initiatives in the same field [10 - 13].

Against the background of this activity, a significant international effort is underway to develop a reference model to which these other methods can map assessments results, and thereby provide a common framework for the exchange of assessment data.

2 Overview of SABS ARP 042

A project was initiated in November 1995 by the Software Engineering Applications Laboratory (SEAL) to develop a recommended practice under the auspices of the South African Bureau of Standards Technical Committee for Information Technology (TC71.1) to provide a common framework for the interpretation of ISO 9001 compliance requirements and the application of good software engineering practices to the subclauses.

At the beginning of the project the following requirements were identified:

a. The compliance requirements of ISO 9001 will be probed by a searching question (or series of questions) to identify the extent of compliance of the system under review.

b. The Checklist will address the domain of software.

c. The development of the Checklist questions will be strongly guided by current and emerging international good practices, and will seek to use compliance indicators being used for this purpose elsewhere.

d. The Checklist shall be available in both hardcopy and electronic format.

e. The layout of the Checklist will be guided by applicable SABS Recommended Practices i.e. ARP 013: Drafting and Presentation of Standards [15].

f. The header of the Checklist table will support the conduct of the audit/assessment, and make provision for recording:

   i. Client

   ii. Date

   iii. Reference number for the assessment/audit

   iv. Person(s) interviewed

   v. Auditor(s)/Assessor(s)

In addition to the above, certain other statements of intent were identified

a. The use of the Checklist will serve to:

   i. enhance customer confidence in the client quality management system

   ii. improve the effectiveness and efficiency of audits/assessments

   iii. improve the objectivity of the assessment/audit

b. That international recognition of the product will be promoted.

The technical work on the product was essentially completed in November 1996. SABS internal technical and editorial review commenced in May 1997. The recommended practice was published in August 1997.

3 Overview of ISO/IEC 15504

In June 1991, the fourth plenary meeting of ISO/IEC JTC1/SC7 approved a study period to investigate the needs and requirements for a standard for software process assessment. One of the conclusions reached in the Study Report [14] was that there was international consensus on the needs and requirements for a standard for software process assessment.

The ISO/IEC 15504 standard will provide a structured approach for the assessment of software processes for the following purposes:

a. by or on behalf of an organisation with the objective of understanding the state of its own processes for process improvement;

b. by or on behalf of an organisation with the objective of determining the suitability of its own processes for a particular requirement or class of requirements;

c. by or on behalf of one organisation with the objective of determining the suitability of another organisations processes for a particular contract or class of contracts.

The SC7/WG10 Workgroup, which was assigned the task of developing the new standard, completed its task of producing the set of working drafts in June 1995. These working drafts (Rev 1.0) have provided the basis for a Technical Report Type 2, which has recently become identified as the ISO/IEC 15504 Standard for Software Process Assessment.

3.1 Process assessment, process improvement and capability determination

The model adopted by ISO/IEC 15504 is shown in Figure 1 [3]. Fundamental to the model is the concept of a process, which in Part 9 [8] is described as *a set of interrelated activities, which transform inputs into outputs.*

Processes are examined using the mechanism of process assessment, defined as *a disciplined evaluation of an organisation's software processes against a model compatible with the reference model described Part 2 of ISO/IEC 15504* . The output of the assessment exercise is a profile, can be used variously for process improvement (*Action taken to change an organisation's processes so that they meet the organisation's business needs and achieve its business goals more effectively*) and/or for determination of process capability - *a systematic assessment and analysis of selected software processes within an organisation against a target capability, carried out with the aim of identifying the strengths, weaknesses and risks associated with deploying the processes to meet a particular specified requirement.*

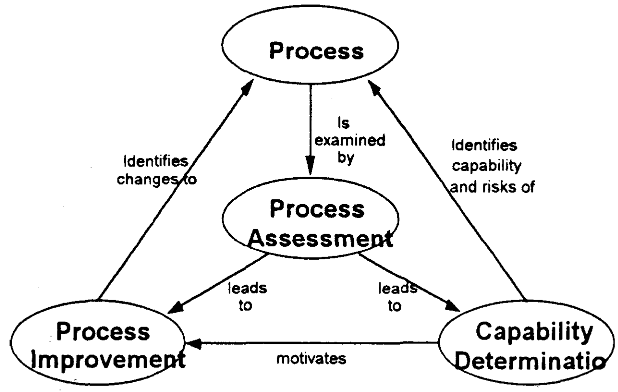

Figure 1 The assessment process

The relationships presented in this model are sufficiently generic to be widely useful outside the field of software.

3.2 The ISO/IEC 15504 architecture

The Standard presently comprises a set of nine documents. The two key components of the standard are a process model (Part 2) [4] and guidance on conducting assessments (Part 3) [5]. The process model against which an organisation is assessed includes a top-level normative reference model (Part 2) as well as an informative embedded model (Part 5) [7] which contains lower-level detail.

The process model is made up of a framework of attributes in two dimensions: The process dimension contains process categories, processes and base practices, and the capability dimension contains capability levels, process attributes and management practices. Input and output work products are associated to products to be used as indicators.

The normative part of the guidance to conducting assessments (Part 3) includes a set of requirements for the collection of data. The informative part to conducting assessments (Part 4) [6] allows for other existing compatible methodologies to be implemented, providing that a clear mapping exists between the attributes of that methodology to the reference model (Part 2).

3.3 The ISO/IEC 15504 process categories

The process categories described in ISO/IEC 15504 Part 2 are sufficiently generic to find wide application outside the software domain. The process categories are listed in concept Table 1, and in detail in Table A1 (Appendix A).

Table 1 – Description of process categories

Process category	Brief description
Customer-Supplier	Processes that directly impact the customer, support development and transition of the product to the customer, and provide for its correct operation and use.
Engineering	Processes that directly specify, implement, or maintain a system and product and its user documentation.
Support	Processes that may be employed by any of the other processes (including other supporting processes) at various points in the product development life cycle.
Management	Processes that contain practices of a generic nature which may be used by anyone who manages any sort of project.
Organisation	Processes that establish the business goals of the organisation and develop process, product, and resource assets which, when used by the projects in the organisation, will help the organisation achieve its business goals.

While ISO/IEC 15504 has software specific references in all five categories, the term 'software' can be comfortably replaced by 'product' in most instances - allowing the model to be used widely within an enterprise.

If a non-software company wishes to use the ISO/IEC 15504 model for process assessment, the embedded model (Part 5) will have to be adapted for the process domain of interest.

3.4 The ISO/IEC 15504 Capability levels

As indicated in Part 2, a capability level is *a set of process and management attribute(s) that work together to provide a major enhancement in the capability of a Supplier to perform a process.*

Each level provides a major enhancement of capability in the performance of a process. The levels constitute a rational way of progressing through improvement of the capability of any process.

There are six capability levels in the reference model:

Level 0 *Incomplete:* There is general failure to attain the purpose of the process. There are no easily identifiable work products or outputs of the process.

Level 1 *Performed:* The purpose of the process is generally achieved. There may not be evidence of rigorous project planning and tracking. Individuals within the organisation recognise that an action should be performed, and there is general agreement that this action is performed as and when required. There are identifiable work products for the process, and these provide evidence to the achievement of the purpose.

Level 2 *Managed:* The process delivers work products of acceptable quality within defined timescales. Performance according to specified procedures is planned and tracked. Work products conform to specified standards and requirements.

Level 3 *Established:* The process is performed and managed using a defined process based upon good product engineering principles. Individual implementations of the process use approved, tailored versions of standard, documented processes. The resources necessary to establish the process definition are also in place.

Level 4 *Predictable:* The defined process is performed consistently in practice within defined control limits, to achieve its goals. Detailed measures of performance are collected and analysed. This leads to a quantitative understanding of process capability and an improved ability to predict performance. Performance is objectively managed. The quality of work products is quantitatively known.

Level 5 *Optimising:* Performance of the process is optimised to meet current and future business needs, and the process achieves repeatability in meeting its defined business goals. Quantitative process effectiveness and efficiency goals (targets) for performance are established, based on the business goals of the organisation. Continuous process monitoring against these goals is enabled by obtaining quantitative feedback and improvement is achieved by analysis of the results.

The capability level of each processes is independently assessed, leading to a collection of profiles which represent the assessment output.

Assessments can be conducted without automated tool support, but experience has shown the amount of data to be captured during an assessment and the need to maintain detailed records for process improvement purposes, leads to a definite need for automated tool support for process assessments.

4 Overview of the case study

4.1 Automation of data capture and results presentation for software assessments performed using ISO/IEC 15504

The candidate project which provided the basis for the case study is that used to develop an automated tool to support ISO/IEC 15504 software process assessments. The process model of the emerging international ISO/IEC 15504 standard is used to evaluate these process instances of the software development life-cycle.

Developed in Powerbuilder, the SEAL software assessment tool executes under Microsoft Windows, with full data manipulation capabilities built into the program.

Some of the features of the tool include:

- Assessments are done in projects for each organisation. Each project can have multiple Process Instance assessments; details are maintained for each project and process instance.

- Project assessment data and ISO/IEC 15504 framework data is captured and maintained on interactive screens, allowing the user to assess multiple process instance categories simultaneously. Assessment inputs of process categories allow the user to flag warnings and enter comments on each practice achievement rating.

- Multiple reports on process instances are viewable and printable - with automatic achievement ratings calculation and bar graph profiling.

Details of the tool and its features are recorded elsewhere [16]

The tool is presently being used to support international field trials to of the ISO/IEC 15504 standard, with more that 45 registered users in 13 countries.

5 Assessment methodology

5.1 Applying SABS ARP 042

The dominant activities that emerged from the ISO 9001 audit were:

a. the choice of clause order

b. the required supporting documents

c. the compilation of the ISO 9001 audit report

d. the validation of the ISO 9001 audit results

The choice of the clause order was sequential. With hindsight, this is not to be recommended as 4.4 is significantly more demanding than the other clauses. Subclause 4.4 took as long to assess as all the other subclauses taken together.

The following documents were available during the audit:

a. ISO 9001 Audit Checklist, hardcopy

b. Relevant SOQ documents, hardcopy.

The use of hardcopy documents made cross-referencing of related clauses a straight-forward task.

The compilation of the assessment report required:

a. the Audit Checklist Results,

b. the Audit Checklist itself, and

c. a report template.

Each of these had to be open in a separate window in Word for Windows. This could not be achieved on a low performance computer (i.e. a 486DX2). All further activity was undertaken using a computer with a Pentium 120 processor. Interoperability (i.e. cut and paste) provided by Word for Windows, allowed for easy compilation of all significant results and related clauses.

5.2 Using the SEAL OQ Tool

The significant decisions associated with planning an ISO/IEC 15504 assessment include:

a. the choice of category order under which the assessment was to take place.

b. the extent to which the project documents are accessible, and

c. the choice of settings of the automated assessment tool

The categories were assessed in a sequential order, i.e. CUS, ENG, SUP and MAN. As this assessment focused mainly on the SEAL OQ Tool, the ORG category was excluded.

The assessment was conducted on the most fundamental level, i.e. the Process Attribute level. Five days were needed to perform the assessment.

Table 2: Results of an ISO 9001 assessment conducted on a software project using SABS ARP 042

Subclause	No of Applicable Compliance questions (A & B)	Compliance's achieved %	Applicable Good practice questions E - F)	Good practices present %
4.1	18	100	20	100%
4.2	8	100%	11	100%
4.3	11	100%	9	100%
4.4	66	100%	109	99%
4.5	16	100%	18	100%
4.6	11	100%	7	100%
4.7	6	100%	1	100%
4.8	3	100%	18	94%
4.9	25	100%	28	100%
4.10	26	96%	4	75%
4.11	8	100%	2	100%
4.12	3	100%	14	100%
4.13	10	100%	6	100%
4.14	13	100%	14	100%
4.15	11	100%	11	100%
4.16	9	100%	5	100%
4.17	14	100%	4	100%
4.18	5	100%	12	100%
4.19	10	100%	11	100%

6 Review of results

6.1 Review of ISO 9001 Audit

The results of the ISO 9001 audit are presented in Table 2.

One of the key problems in assessing a software project using the Checklist is determining the extent to which the recommended software engineering 'good practices' are appropriate for the project. A sample of such concerns are shown in Table 3.

Table 3 Some concerns raised in the audit

Checklist question	Finding and *response*
4.4.2.C.9: Are related plans such as integration plan; test plan; migration plan; training plan; maintenance plan; re-use plan included or identified in the project/development plan? [4.4.2.1]	There is no evidence of a re-use plan in the project. *This was not surprising since it was a new project with new technology.*

Table 3 Some concerns raised in the audit

Checklist question	Finding and *response*
4.4.2.D.9: Is use made of feedback in the originating organisation? [10006: DIS 1995 [5.3.1]	Yes, but this feedback does not filter down to the software developers. *Feedback is taking place but less visibly through the project manager.*
4.8.1.C.1: Can the product be identified from the requirement specification or documentation through all stages of and phases of the life-cycle? [4.8]	An important issue is the problem of life-cycle phase verification. Clear traceability could not be established through all stages of the lifecycle. *In modern software design full traceability is not possible. For example, the application statements of the spreadsheet will not bear any relationship to the software of the spreadsheet.*

In view of this careful judgement is needed in conducting an audit and in determining how applicable the checklist questions will be in a given project situation.

6.2 Review of ISO/IEC 15504 Assessment Results

6.2.1 Customer Supplier Process Capability

The assessment produces the following results:

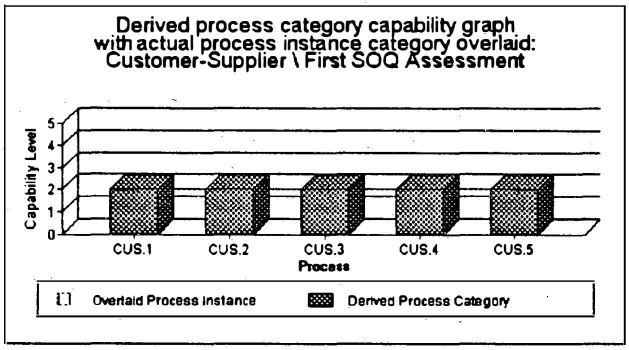

Figure 2 Customer - Supplier Process Category

The results presented in Figure 2 are show to be at Level 2 capability. These results may be interpreted as follows:

a. Acquiring Software (CUS 1).
All client needs are tracked and filter through to following revisions as requirements.

b. Managing Customer Needs (CUS 2).
All customer requirements are tracked in the feedback reports. This tracking and disposition is a formal process.

c. Supplying Software (CUS 3).
The supply of software is as formalised as it can be - every user is tracked and individually supported

d. Operate Software (CUS 4).
This clause deals mainly with testing software and SEAL is highly developed in this regard.

e. Providing Customer Service (CUS 5).
It is planned, tracked and documented

SEAL QMS procedures are designed primarily for research projects and focus on the process categories of ENG, SUP and MAN. The Level 2 capability should be interpreted as practices which apply only to the project of interest. All high performance commercial enterprises should feature high capability levels in the CUS categories.

6.2.2 Engineering Process Category

From the assessment, the following results are obtained:

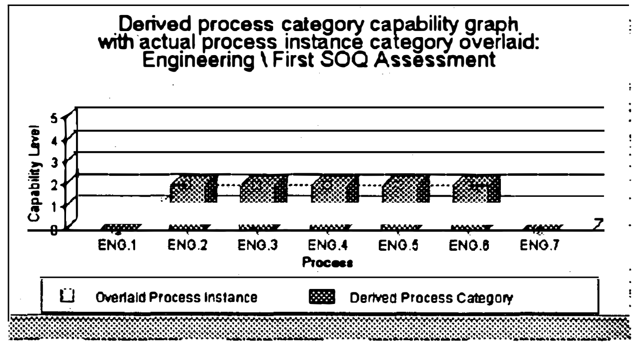

Figure 3 Engineering Process Category

a. Develop System Requirements and Design (ENG 1) and Maintain System and Software (ENG 7) both feature Level 0 capability for the reason that neither of these two processes are applicable to this project.

b. The remaining processes i.e. Develop Software Requirements (ENG 2), Develop Software Design (ENG 3), Implement Software Design (ENG 4), Integrate and Test Software (ENG 5), and Integrate and Test System (ENG 6) were all rated at Level 2.

The main reason why ENG 2 to ENG 6 did not reach Level 3 could not be rated at Level 3 is that there was no clear evidence of feedback from experience from this project back into improvement in SEAL QMS procedures.

6.2.3 Support Process Category

The assessment yields the results shown in Figure 4.

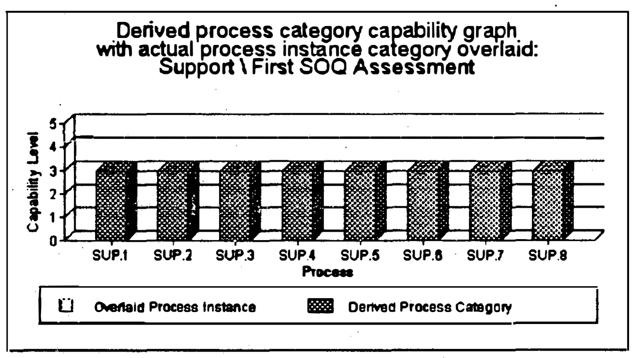

Figure 4 Support Process Category

The figure shows that each of the processes

a. Develop Documentation (SUP 1)

b. Perform Configuration Management (SUP 2)

c. Perform Quality Assurance (SUP 3)

d. Perform Work Product Verification (SUP 4

e. Perform Work Product Validation (SUP 5)

f. Perform Joint Reviews (SUP 6)

g. Perform Audits (SUP 7)

h. Perform Problem Resolution (SUP 8)

were rated as having reached Level 3 capability - indicative that the procedures applied across all projects in the enterprise.

6.2.4 Management Process Category

The assessment yields the following results shown in Figure 5.

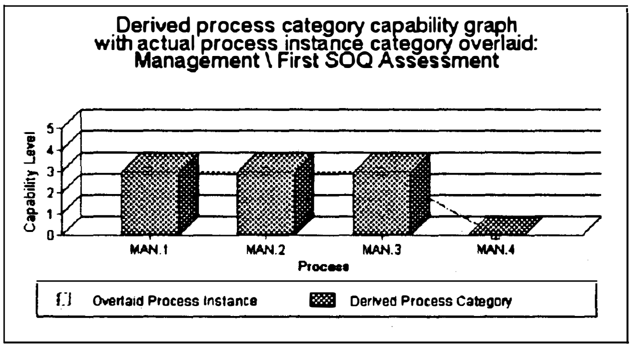

Figure 5 Management Process Category

One of the processes in the MAN category, (Manage Subcontractors (MAN 4), was rated as not applicable - since no subcontractors were used in the project. The remaining processes:

a. Manage the Project (MAN 1)

b. Manage Quality (MAN 2)

c. Manage Risks (MAN 3)

were all rated as having reached Level 3.

7 Applications of findings to the candidate project

The key difference between SABS ARP 042 and ISO/IEC 15504 is that while both standards examine work products (i.e. the tangible outputs of a projects as documents and records), ISO/IEC 15504 also examines how those work products have been implemented. ISO/IEC 15504 identifies that work products are performed (and rates this capability as Level 1), it goes further by exploring the extent to which the develop of work products are manage and documented (Level 2), the procedures supporting these processes are applied consistently across all projects in the enterprise (Level 3), key indicators are tracked and measured (Level 4) and the results applied to ongoing process optimisation (Level 5).

An analogy can be drawn between ISO 9001 and exam papers. If a student has access to the exam paper before the exam, then the student can attain excellent results, however, this is not to say that the student has understood the topic. Similarly, ISO 9001 certified companies may show instances of having produced all the applicable work products, but the purpose of those work products are only there to achieve ISO 9001 accreditation rather than provide added value to the customer.

The application of the Checklist to the candidate project indicates a high level of compliance to ISO 9001 requirements and evidence of the application of many good software engineering practices. A more profound picture is evident from the ISO/IEC 15504 capability profiles.

The significant issue is that a project or and enterprise can claim full compliance to ISO 9001 requirements will not precipitate process improvement action on its but not necessarily exhibit high capability or process maturity.

8 Implications of the results for the non-software community

Several conclusions can be drawn which are applicable to the wider, non-software community:

a. The application of SABS ARP 042 leads to a thorough coverage of the compliance requirements of ISO 9001, providing confidence that all the requirements have in fact been addressed by the supplier.

b. The domain specific good practice questions probe the effectiveness of the QMS application in the application domain of interest.

c. The data captured into the Checklist tables provides a valuable baseline of degree of ISO 9001 compliance at the start of formal QMS monitoring and a basis for objective discussion between supplier and certification agency.

d. The use of ISO/IEC 15504 is complementary to ISO 9001. A company will be ill-equipped to progress beyond Level 1 capability unless ISO 9001 compliance requirements have been met. Experience has shown that an effectively applied ISO 9001 will enable a company to reach Level 3 once the QMS is being comprehensively applied to all projects.

e. Subclause 4.20 and Level 4 capability issues are closely allied. It will be difficult for a company to advance in capability in any process to Level 4 until all Level 1 - 3 capability issues have been addressed. Not surprising, Level 4 capability is rare, and provides an insight as to why certified companies appear to make slow progress in applying subclause 4.20.

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Appendix A ISO/IEC 15504 Process Categories and Processes

Table A1 Process categories and processes	
ID	**Process Title**
CUS	**Cutomer-Supplier Process Category**
CUS.1	Acquire software
CUS.2	Manage customer needs
CUS.3	Supply software
CUS.4	Operate software
CUS.5	Provide customer service
ENG	**Engineering Process Category**
ENG.1	Develop system requirements and design
ENG.2	Develop software requirements
ENG.3	Develop software design
ENG.4	Implement software design
ENG.5	Integrate and test software
ENG.6	Integrate and test system
ENG.7	Maintain system and software
SUP	**Support Process Category**
SUP.1	Develop documentation
SUP.2	Perform configuration management
SUP.3	Perform quality assurance
SUP.4	Perform work product verification
SUP.5	Perform work product validation
SUP.6	Perform joint reviews
SUP.7	Perform audits
SUP.8	Perform problem resolution
MAN	**Management Process Category**
MAN.1	Manage the project
MAN.2	Manage quality

Table A1 Process categories and processes	
ID	Process Title
MAN.3	Manage risks
MAN.4	Manage subcontractors
ORG	Organisation Process Category
ORG.1	Engineer the business
ORG.2	Define the process
ORG.3	Improve the process
ORG.4	Provide skilled human resources
ORG.5	Provide software engineering infrastructure

Appendix B: Product Information:

All details concerning product updates are distributed using the SEAL Mail List Server.

To subscribe to the mail list for this tool, send an e-mail note as follows:

E-mail address: mail-list@seal.ee.wits.ac.za

Subject: - <leave empty:

Copies to: <leave empty>

Message:

subscribe sealoq

(No other information must appear in the body of the message).

Appendix C: Acquiring the tool

The SEAL of Quality install disks can be downloaded from the SEAL Server via FTP at the following site:

seal.ee.wits.ac.za

The software resides in the ftp/pub/sealoq/install Directory, as the following files which must be downloaded:

soq082d1.zip - The SEAL of Quality Assessment Tool (Version 0.82)(Disk 1)

soq082d2.zip - The SEAL of Quality Assessment Tool (Version 0.82)(Disk 2)

405dk1.zip - Powerbuilder 4.0.5 Deployment Kit (Disk 1)

405dk2.zip - Powerbuilder 4.0.5 Deployment Kit (Disk 2)

405dk3.zip - Powerbuilder 4.0.5 Deployment Kit (Disk 3)

405dk4.zip - Powerbuilder 4.0.5 Deployment Kit (Disk 4)

405dk5.zip - Powerbuilder 4.0.5 Deployment Kit (Disk 5)

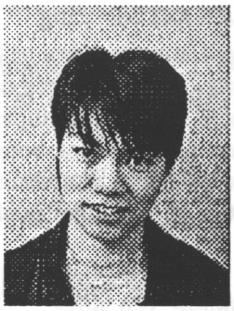
405dk6.zip - Powerbuilder 4.0.5 Deployment Kit (Disk 6)

install.txt - Installation instructions

problem.txt - Problem Reporting Form

pkunzip.exe - file unzip utility

Author Contact Details



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