

Software and Systems Quality Framework — A guide to the use of ISO/IEC and other standards for understanding quality in software and systems

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Foreword

This Published Document has been prepared by Technical Committee IST/15.

The guide is based on the group of emerging ISO/IEC standards on software and systems engineering and specifically those that have a significant impact on the quality of software and systems produced. Where appropriate, references are made to other material in the public domain; particularly where a “quality model” exists that is in common use in software and systems engineering. A list of other references is provided in the bibliography. Some of the identified standards are in the final stages of development and hence details might change after the publication of this document. The general principles described here, however, should remain applicable for the foreseeable future. The guide is informative in content and does not in general repeat wording from the standards referenced, but explains the scope and how the cited standards may be used for quality management in its broadest context.

Whereas, ISO/IEC 9000-3¹⁾ presents a software perspective and interpretation of BS EN ISO 9001 requirements, the Software and Systems Quality Framework (SSQF) presents a wider view including features not part of the BS EN ISO 9001 model but included in other standards, mainly those that are part of the SC7²⁾ product family.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 41 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

¹⁾ At the time of publication ISO/IEC 9000-3 was not yet published. Publication is expected in mid 2003.

²⁾ SC7 is the subcommittee of ISO/IEC JTC1 dealing with Systems and software engineering. JTC1 is a joint technical committee of ISO and IEC. IST/15 is the BSI technical committee aligned with SC7 in the UK.

Introduction

The purpose of this document is to provide guidelines for the achievement of quality in software and systems, through the development of a Software and Systems Quality Framework (SSQF). Both the SC7 product set and the ISO 9000 family provide good starting points as bases for establishing quality practices in software and systems. The need for further guidance is evidenced by those customers having high quality requirements, such as high levels of integrity or reliability, dependence of organizations on their critical software and systems, and the general immaturity and rate of change of software and software-intensive systems. These needs require a good understanding of quality and in particular its treatment in the many software and systems standards.

This guide is for use by organizations and individuals involved in acquiring, developing, operating or maintaining software and systems, including those providing services such as consultancy or training. The target audience includes software or system engineers, managers and project managers, as well as consultants, trainers and those wishing to gain a broad understanding of quality in software and systems.

The guide is intended as a reference text for any size of business. It provides a framework for understanding software and system quality.

1 Scope

This Published Document gives guidance on the use of ISO/IEC and other standards in the area of software and systems quality. It includes the following.

- a) Concepts of software and systems quality: describing the terminology and main concepts for software and systems quality.
- b) A discussion of identified related standards.
- c) A proposed Software and Systems Quality Framework (SSQF) of the relationships presented in two parts:
 - 1) organizational model, based on an BS EN ISO 9001 structure; and
 - 2) project model, based on an ISO/IEC 15288/ISO/IEC 12207 structure.
- d) Comparison of the SSQF with other industry quality models (e.g. EFQM excellence model³⁾).

The scope of SSQF enables ready identification of the component parts of standards that are useful to develop a good understanding of quality in software and systems.

2 Terms and definitions

For the purposes of this Published Document, the following terms and definitions apply.

NOTE 1 Some variation has been found in the definitions used for “quality” in the standards referenced in Clause 2.

NOTE 2 The source of the definition where possible is included in brackets.

NOTE 3 Where definitions are quoted from ISO 9000:2000 the bold text and references in brackets to Clause 3 apply to other definitions in that standard.

2.1

acquirer

organization that acquires or procures a system, software product or software service from a supplier [ISO/IEC 12207:1995, 3.1]

2.2

commercial-off-the-shelf software (COTS)

software defined by a market-driven need, commercially available, the fitness for use of which has been demonstrated by a broad spectrum of commercial users [BS ISO/IEC 14598-4:1999, 4.1]

NOTE COTS modified for use after purchase is no longer COTS.

³⁾ European Foundation for Quality Management excellence model.

2.3

customer

organization or person that receives a product
[BS EN ISO 9000:2000, 3.3.5]

2.4

evaluation method

procedure describing the action to be performed by the evaluator in order to obtain the result for the specified measurement or verification applied on the specified product components or on the product as a whole
[BS ISO/IEC 14598-5:1998, 4.1]

2.5

life cycle model

framework of processes and activities concerned with the life cycle, which also acts as a common reference for communication and understanding
[ISO/IEC 15288:2002, 4.8]

2.6

system

set of interrelated or interacting elements

2.7

management system

system (2.6) to establish policy and objectives and to achieve those objectives

2.8

organizational unit

that part of an organization that is the subject of measurement
[BS ISO/IEC TR 15504-9:1998, 3.21]

2.9

process

set of interrelated activities that transform inputs into outputs
[BS ISO/IEC TR 15504-9:1998, 3.23]

2.10

product

result of a process
[BS EN ISO 9000:2000, 3.4.2]

2.11

project

unique set of coordinated activities with definite start and finish points undertaken by an individual or organization to meet specific objectives within defined schedule, cost and performance parameters
[BS 6079-1:2002, 3.3]

2.12

quality

degree to which a set of inherent characteristics fulfils requirements
[BS EN ISO 9000:2000, 3.1.1]

NOTE 1 The term “quality” may be used with adjectives such as poor, good or excellent.

NOTE 2 “Inherent” as opposed to “assigned” means existing in something, especially as a permanent characteristic.

2.13

quality assurance

part of **quality management (3.15)**, focused on providing confidence that **quality requirements (3.17)** will be fulfilled
[BS EN ISO 9000:2000, 3.2.11]

2.14**quality control**

part of **quality management** (3.15), focused on fulfilling **quality requirements** (3.17)
[BS EN ISO 9000:2000, 3.2.10]

2.15**quality improvement**

part of **quality management** (3.15), focused on increasing the ability to fulfil **quality requirements** (3.17)
[BS EN ISO 9000:2000, 3.2.12]

2.16**quality in use**

extent to which a product used by specified users meets their needs to achieve specified goals with effectiveness, productivity and satisfaction in specified contexts of use
[BS ISO/IEC 14598-1:1999, 4.23]

NOTE This definition of quality in use is similar to the definition of usability in ISO 9241-11. In BS ISO/IEC 14598 the term “usability” is used to refer to the software quality characteristic described in ISO/IEC 9126-1.

2.17**quality management**

coordinated activities to direct and control an **organization** with regard to **quality** (3.10)
[BS EN ISO 9000:2000, 3.2.8]

NOTE Direction and control with regard to quality generally includes establishment of the **quality policy**, **quality objectives**, **quality planning**, **quality control**, **quality assurance**, and **quality improvement**.

2.18**quality model**

set of characteristics and the relationships between them which provide the basis for specifying quality requirements and evaluating quality
[PD 0028:2002, 2.65]

2.19**quality requirement**

any requirement relating to software quality as defined in ISO/IEC 9126
[BS ISO/IEC 14143-1:1998, 3.10]

2.20**software product evaluation**

technical operation that consists of producing an assessment of one or more characteristics of a software product according to a specified procedure
[BS ISO/IEC 14598-5:1998, 4.8]

NOTE 1 This definition can be compared to that of testing in ISO/IEC Guide 2. However, in BS ISO/IEC 14598-5:1998, the term “evaluation” is preferred in order to avoid confusion with the notion of testing widely accepted in the field of software engineering.

NOTE 2 Software product evaluation is not necessarily conformity testing (as defined in ISO/IEC Guide 2:1996, 13.3.2) in the context of a certification scheme. However, conformity testing can be part of an evaluation.

2.21**supplier**

organization that enters into a contract with the acquirer for the supply of a system, software product or software service under the terms of the contract
[ISO/IEC 12207:1995, 3.30]

2.22**validation**

confirmation through the provision of objective evidence that the requirements for a specific intended use or application have been fulfilled
[BS EN ISO 9000:2000, 3.8.5]

NOTE 1 The term “validated” is used to designate the corresponding status.

NOTE 2 The use conditions for validation can be real or simulated.

2.23

verification

confirmation through the provision of objective evidence that specified requirements have been fulfilled [BS EN ISO 9000:2000, 3.8.4]

NOTE 1 The term “verified” is used to designate the corresponding status.

NOTE 2 Confirmation may comprise activities such as:

- performing alternative calculations;
- comparing a new design with a similar proven design specification;
- undertaking tests and demonstrations;
- reviewing documents before release.

3 Software and systems quality concepts

3.1 General

This clause outlines basic quality concepts necessary to understand the guidance provided in this standard. These concepts are essential “building block” processes and as such are found described in the software and systems standards covered in this document in some degree of detail.

3.2 Life cycles — Models and processes

A life cycle model describes the stages of a system or software development, such as requirements, design, coding, test and acceptance. However, in software and systems development there are various ways to implement a development (or maintenance) programme. These are often based on industry wide models of development. Common models described in BS ISO/IEC TR 15271 include Waterfall, Iterative and Incremental types. Rapid application development is popular for simple developments, usually with reduced documentation and incremental cycles.

The definition of processes for an organization is described (in ISO/IEC 15288 and ISO/IEC 12207) as independent of the selected life cycle model, where an organization implements development by applying process definitions to a selected model or models, managing the sequence and interfacing of processes for the selected model.

Both ISO/IEC 15288 and ISO/IEC 12207 include the concept of tailoring a set of processes to suit an agreement, whereas BS EN ISO 9001 defines only exclusion of processes where it can be demonstrated that a requirement is not applicable.

The model chosen for software or systems development will have an impact on quality if the processes to implement the model miss key quality activities in the “plan”, “do”, “check” and “act” cycle. These are described in 3.3, 3.4, 3.5, 3.6 and 3.7.

3.3 Management

3.3.1 General

In broad terms management is about setting policy and then making it happen.

Management is responsible for the coordination, planning, monitoring and control of an organization’s business and aimed at the achievement of the goals and objectives of the business. Management implements this through a management system including mechanisms to initiate, support and control projects (or services or product developments). Management provides the resources and infrastructure necessary for projects and ensures the satisfaction of organizational objectives and established agreements.

3.3.2 *Management system*

Whether documented or not, a management system is used as the mechanism to run a business. In software and systems development, business is conducted through projects with services such as human resources and finance applied across projects. Typically, a management system, as described in BS EN ISO 9001:2000, 4.1, will:

- a) identify the processes needed for the management system and their application throughout the organization;
- b) determine the sequence and interaction of these processes;
- c) determine criteria, models and methods to ensure that both the operation and control of processes are effective;
- d) ensure availability of resources including information necessary to support the operation and monitoring of these processes;
- e) monitor, measure and analyse these processes; and
- f) implement actions necessary to achieve planned results and continual improvement of these processes.

BS EN ISO 9001 uses the term quality management system for the above process based definition of a management system with the requirement that it should be documented. However, it is widely recognized that this basic list of items applies to a management system, whether the term “quality” is included, or not. For example BS EN ISO 14001 covers environmental management, which still requires a “management system” to implement it. Where organizations are combining management systems to cover, e.g. quality, environment, health and safety, and security management, the term “Integrated Management System” is becoming popular.

ISO/IEC 15288, in relating systems project to organization, uses the term “enterprise” rather than organization, limiting itself to “that part of an organization with responsibility to acquire and to supply products and/or services according to agreements”.

3.3.3 *Project management*

Project management (managing the projects of a business), consists of planning, resourcing, control, monitoring and closure of a project, as follows.

- a) Planning will identify the costs, timing and quality requirements based on agreements (contract or internal) for a project. Plans can be used to monitor progress throughout the project.
- b) Resources (human and infrastructure) are arranged by project management to suit the timing of project activities and any quality requirements and cost criteria.
- c) Mechanisms for control include, issue, risk, problem and change management, together with adjustment of project plans to suit changes and the outcome of problem and risk management.
- d) Monitoring and control of a project will usually include establishing and reporting progress and determining, through project meetings, how the project is to progress. Meetings may or may not include customer representation.
- e) Closure of a project will usually include hand-over to the user organization and should lead to identification of lessons learned.

ISO/IEC 15288 identifies project (management) processes as planning, assessment and control, together with decision-making, risk management, configuration management and information management. This is a wider view than used in ISO/IEC 12207, where project management is limited to identify, establish, coordinate and monitor the activities, tasks and resources necessary for a project to produce a product or service, in the context of the project’s requirements and constraints.

BS EN ISO 9001 does not recognize project management as such, since it aims to be a generic set of requirements independent of software, hardware, process or services. However, it does recognize the management of an agreement through planning of product realization and the role of resource management.

BS 6079 (all parts) provides a detailed standard for project management, while BS ISO/IEC 16326 interprets project management from an ISO/IEC 12207 perspective. BS ISO 10006 provides guidance for quality assurance in projects.

There are also good public domain project management materials provided as part of PMBOK⁴⁾ and Prince 2⁵⁾ initiatives.

3.3.4 Acquisition and supply

Part of management includes the activities associated with setting up agreements either with external customers or other parts of its own organization (internal customers), and the decision-making about whether to “make or buy” items for use by the organization. Agreements once set up are managed as project management above. The monitoring will include reporting to, and authorization of change by, the customer (“acquirer” in ISO/IEC 15288 and ISO/IEC 12207 vocabulary). Where items are to be procured, management will typically include purchasing controls for cost, quality and time to deliver. When procuring items attention should be paid to procuring (or at least considering) ongoing support and maintenance, where this is relevant, e.g., software tools and software packages.

3.4 Assessment and evaluation

3.4.1 General

An essential element of quality is checking at various points in the life cycle that you are achieving what is intended. This can be carried out in a number of ways usually described as “assessment” or “evaluation” (see also 3.4.3).

3.4.2 Key attributes

Various terms are used to describe processes, activities and tasks associated with “checking” the quality of product and process within software and systems acquisition, development, operation and maintenance. The key attributes of any of these “checks” are as follows.

- a) Degree of independence: whether an item (product or process) is checked by the originator, peer or someone outside of the development organization (either from another part of the organization, from a customer organization or by an independent third party organization).
- b) Degree of formality: this can be ascertained from a casual read of the information about the item, through checking of the item using a prepared checklist, through a team based inspection or walk-through of the item, or through dynamic testing.
- c) Experience: the skills and experience of the person or persons performing the checks are key to its success.
- d) Rigour: the degree to which the check is performed, including time to pre-check the item, documentation of the checks and attention to closure of any problems found.
- e) Objective evidence: the need to find objective evidence to support the claims of the product being checked.

⁴⁾ PMBOK is the project management body of knowledge, see www.pmbok.com.

⁵⁾ Prince 2 is a UK government derived project management method in common use, see www.prince.co.uk.

3.4.3 *Types of assessment and evaluation*

The term “assessment” in ISO/IEC JTC1/SC7 standards for software and systems is used for **process** checking, whereas “evaluation” is used for **product** checking. Types of assessment and evaluation include.

a) Verification and validation: these terms are used as follows in many organizations to identify review processes, activities and tasks.

1) Verification: does the product do what was intended, i.e. when compared to the previous definition of requirements from the previous phase/stage of development? (see definition 2.18).

2) Validation: does the product do what was originally specified as an end requirement (intended use)? (see definition 2.17).

NOTE Often the simplest definition of these terms is verification: “doing it right” and validation: “doing the right thing”.

b) Reviews and tests: some organizations prefer to use the term “review” for verification and “testing” for validation.

c) Audit: performed on processes and plans to check conformance to management system and agreement requirements (ISO 10011 or its new version BS EN ISO 19011).

d) Assessment: performed on **processes** to determine either capability of an organization to carry out an agreement, or to establish a baseline for process improvement (BS ISO/IEC TR 15504).

e) Evaluation: performed on a **product** as a check that it would perform as intended, i.e. meet its stated requirements. In ISO/IEC 12207 evaluation is verification performed by the developer, i.e. not independent.

3.5 Incident and issue management

3.5.1 *General*

During monitoring, measurement, assessment and evaluation activities within a management system, including improvement [see 3.3.2e) and 3.3.2f)], mechanisms or processes are required to handle “things going wrong” or required changes.

Various terms are used in software and systems development that relate to “things going wrong” or required changes. They usually address two aspects:

- a) environmental factors; and
- b) deliverables’ attributes.

3.5.2 *Environmental factors*

Common terms relating to environmental factors are as follows.

a) Risk: the probability that something will happen unless action is taken to pre-empt/prevent it or at least minimize its impact (action includes monitoring but not necessarily physical action). E.g. a risk that new technology will not give expected quality of developed product.

b) Issue: a risk that has become manifest, something that happens in an organization or project environment that needs resolution but is not preventing progress. E.g. not enough storage space on a hard disk.

c) Incident (or sometimes fault): something going wrong that needs (usually) urgent resolution. E.g. a hard disk crash during software development.

3.5.3 *Deliverables’ attributes*

Common terms relating to deliverables’ attributes are as follows.

a) Defect: a problem found with an item that needs resolution to meet defined requirements (even if the agreed resolution is to do nothing), representing a failure to perform as intended (which may trigger change control).

b) Problem: something identified during conduct of a process or development of a product (usually during an assessment or evaluation) within a project that needs resolution (even if the resolution is to do nothing). E.g. an item failing test.

3.6 Configuration management

3.6.1 General

To manage any set of processes and products, the elements that form a complete set (for a project or organizational group), should be identified and controlled. This is referred to as configuration management in most software and system standards.

3.6.2 Configuration management activities

Configuration management includes the identification of items within a product (development) by name and version number, the control of items through change and the description of items forming a release of a product. Configuration management should be planned and usually will involve software tool support. The more complex a software and system development, the greater is the need for formal configuration management, perhaps with an identified individual to manage the configuration management process.

3.6.3 Configuration management in standards

Configuration management in software and systems development covers what BS EN ISO 9001 refers to as “identification and traceability” requirements (7.5.3), together with (usually) “control of documents” (4.2.3). In ISO/IEC 15288 configuration management is part of quality management, whereas in ISO/IEC 12207 it is a supporting process in its own right. Separate standards for configuration management include, BS EN ISO 10007 (generic configuration management), and BS ISO/IEC TR 15846 (an amplification of software configuration management from ISO/IEC 12207).

Configuration management is also part of BS 15000 (IT service management) and is given “textbook” treatment in the IT Infrastructure Library (ITIL) publication [1].

3.7 Documentation

3.7.1 General

Documentation and recording is a key process for quality management system implementation, involving both paper and/or electronic formats.

Documentation also plays a key role in the quality of a software or system development, acting as a means of defining policies, processes, activities and tasks within a project, and a communication about items under development, operation or maintenance. Some software and systems development is carried out using computer tools in an interactive way with minimal discrete documentation (code generation). Where software or systems are being re-used, the documentation of key attributes is important in the ability to effectively re-use an item. Documenting tests, errors, defects and problems is key to the reworking of items to improve their quality and as a lasting record of the status of an item at a particular time.

3.7.2 Documentation standards

Basic rules on design layout are contained in ISO/IEC FCD 18019⁶⁾, while all the main standards with a management element (BS EN ISO 9001, BS ISO 17799, ISO/IEC 15288 and ISO/IEC 12207) also have clauses on documentation. Specific documentation standards (see also 4.10) include:

- a) BS ISO/IEC 15910, *Information technology — Software user documentation*;
- b) ISO/IEC 9127 (BS 7137), *Specification for user documentation and cover information for consumer software packages*;
- c) BS ISO/IEC TR 9294, *Information technology — Guidelines for the management of software documentation*;
- d) ISO/IEC WD 15289⁷⁾, *Software engineering — Guide to the application of ISO/IEC 12207 to the documentation process*; and
- e) ISO/IEC FCD 18019⁶⁾, *Software engineering — Guidelines for the design and presentation of user documentation for application software*.

⁶⁾ At the time of publication ISO/IEC FCD 18019 was in development.

⁷⁾ At the time of publication ISO/IEC WD 15289 was in development.

4 Software and Systems Quality in Standards

4.1 General

This clause discusses the coverage of quality related information in the various referenced (see Bibliography) software and systems standards and technical reports. There are two main types of standard in ISO/IEC JTC1⁸⁾ “standards” and “technical reports”.

An International Standard is a document that has been accepted and approved for use internationally. The content may be normative (usually called a standard) or informative (usually called a guide).

When, despite repeated efforts, the substantial support or approval cannot be obtained to publish a standard, the standards development committee, JTC1, might decide to request publication of the document in the form of a Technical Report (TR) Type 1.

When the subject in question is still under technical development or where for any other reason there is the possibility of an agreement at some time in the future, JTC1 might decide that the publication of a TR Type 2 would be more appropriate.

When a document containing information of a different kind from that which is normally published as an IS (e.g. a model/framework, technical requirements and planning information, a testing criteria methodology), JTC 1 might propose to publish the document as a TR Type 3.

NOTE The British Standards Institution also uses the prefix PD (Published Document) as an alternative to Technical Report.

The discussion in 4.2 provides an **interpretation** of use of the term quality in the referenced standards and technical reports, and the **contribution** that the standards make to understanding and implementing quality in software and systems. Standards are listed in numerical order, implying no preference.

Some of the standards are applicable to software and systems and others just to either software or systems. The applicability of each standard is stated in an applicability subclause.

Clause 5 provides a framework for the use of the various standards and technical reports when considering quality in software and systems.

4.2 BS EN ISO 9001:2000, *Quality management systems — Requirements*

4.2.1 General

BS EN ISO 9001 covers the requirements for setting up a quality management system for organizations looking for an industry independent model, or pursuing third party certification to BS EN ISO 9001.

4.2.2 Applicability

Applicable to software and systems.

4.2.3 Scope

BS EN ISO 9001 specifies requirements for a quality management system where an organization needs:

- a) to demonstrate its ability to consistently provide a product that meets customer and applicable regulatory requirements; and
- b) to address customer satisfaction through the effective application of the system, including processes for continual improvement and the prevention of nonconformity.

NOTE Monitoring of customer satisfaction, as stated in b), requires the evaluation of information relating to customer perceptions of whether or not the organization has met the customer requirements.

The requirements specified in BS EN ISO 9001 are generic and applicable to all organizations, regardless of type, size and product or services provided.

It is intended that all requirements of BS EN ISO 9001 be applied. However, certain requirements may be explicitly excluded in particular situations.

⁸⁾ ISO/IEC JTC1: International Standards Organization/International Electro-technical Committee/Joint Technical Committee 1.

4.2.4 Interpretation

BS EN ISO 9001 provides an industry wide model for a quality management system that is used through the world by all sizes of organization, independent of their focus on hardware, software, services or processed materials. BS EN ISO 9001 takes a process approach (see BS EN ISO 9001:2000, Clause 4), where it is up to an organization implementing BS EN ISO 9001 to define the processes that are relevant to “product realization” and those that need control. Common use of BS EN ISO 9001 is found in third party assessment, where an organization that has defined a quality management system to the requirements of BS EN ISO 9001 can seek assessment and formal registration. Although BS EN ISO 9001 has an open approach to documentation of processes, including those for product realization, it requires formal documentation of the quality management system and certain quality related processes.

Product realization is a powerful concept for implementing a quality management system that is particularly relevant to software and systems, however many requirements in BS EN ISO 9001 constrain the openness of the approach. This has led to the updating of ISO/IEC 9000-3⁹⁾ to provide an interpretation of BS EN ISO 9001 in a software context. There are further guidelines for performance improvement provided in BS EN ISO 9004, which follows the format and numbering of BS EN ISO 9001. Some industries have also identified additional elements of BS EN ISO 9001 appropriate to their industries, such as TL 9000 (Telecommunications) - which also has developed a metrics manual, and QS 9000 (Automotive).

A software sector certification scheme has been in place for some years based on BS EN ISO 9001 called TickIT [2]. NATO have produced AQAP¹⁰⁾ 160 (PD 6677) covering a defence perspective, merging BS EN ISO 9001 and ISO/IEC 12207 together. These variations of BS EN ISO 9001 are discussed further in Clause 6.

4.2.5 Related standards

The following standards are related to BS EN ISO 9001.

- a) BS EN ISO 9000, which provides the vocabulary for use in the ISO 9000 series of documents. This is useful as a starting point for most quality related definitions.
- b) ISO/IEC 9000-3⁹⁾, which provides guidelines for the application of ISO 9001 to software.
- c) BS EN ISO 9004, which was developed as a consistent product in parallel with BS EN ISO 9001 to provide a wider quality management perspective than BS EN ISO 9001 and is targeted at guidelines for performance improvement. The term “customer” is replaced by “stakeholder” for this wider perspective.
- d) BS ISO 10005, which provides guidelines for the development of quality plans.
- e) BS ISO 10006, which provides guidelines for quality management in projects.
- f) BS EN ISO 10007, which provides guidelines for configuration management.
- g) BS EN ISO 19011, which provides guidelines for auditing.

4.2.6 Contribution

BS EN ISO 9001 makes a valuable impact on quality in software and systems by:

- a) defining fundamental concepts that are useful in developing, operating or maintaining software and systems (e.g. customer satisfaction, auditing, reviewing, and quality improvement);
- b) defining a model that an organization can use to develop a quality management system;
- c) defining quality related terminology that is used in industry (see BS EN ISO 9000, which is a companion standard).

It therefore plays an important role in defining a software and systems quality framework (see Clause 5).

⁹⁾ At the time of publication ISO/IEC 9000-3 was not yet published. Publication is expected in mid 2003.

¹⁰⁾ AQAP: Allied Quality Assurance Publication.