

QMIG
Quality Management
Implementation Guideline
for Consulting Engineers

November 2021



Consulting Engineers South Africa

QMIG

“Quality Management Implementation Guideline”

for

Consulting Engineers

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CONTENTS

REF	SECTION	PAGE
1	OVERVIEW	3
1.1	The Bigger Picture	3
1.2	Developing Perceptions of Quality	3
1.3	Drivers of Quality	4
1.4	Risk and Quality Management - Two Sides of the Same Coin	4
1.5	Purposes of QMIG	4
1.6	How to Ensure Quality in Your Practice	5
2	INTRODUCTION	5
Figure 1	Benefits of Implementing a Quality Management System	5
3	BASIS AND LAYOUT OF GUIDELINE	6
4	JUXTAPOSITION OF QUALITY & RISK MANAGEMENT	7
5	EIGHT PRINCIPLES OF QUALITY MANAGEMENT	7
6	ISO 9001:2015 REQUIREMENTS FOR QUALITY MANAGEMENT	10
Figure 2	Graphical summary of ISO 9001:2015	10
7	QUALITY MANAGEMENT SYSTEM DECLARATION (MSD)	15
8	REFERENCES	16
TABLE 1	THE CESA MANAGEMENT SYSTEM DECLARATIONS (MSDs) FOR A FIDIC QUALITY MANAGEMENT SYSTEM (QMS)	17

1 OVERVIEW

1.1 The Bigger Picture

Quality Management preemptively mitigates the factors that potentially detract during construction/manufacture from the intended performance of a product or that potentially detract during operation from the intended performance of an organization. Quality Management is strategic in that it explicitly identifies detracting factors and systematically minimizes their impact in terms of standard processes and distinct criteria.

Quality Management developed at an ever-increasing pace over the past hundred years in the wake of the industrial revolution. The need for Quality Management is driven by the relentless and increasing demand for products and services by the discerning populations of the world and by the associated depletion of natural resources and the devastating deterioration of the environment.

Quality Management is the wellspring of industrial progress and sustainability in the face of the exponentially escalating demands for goods and services and rapidly diminishing resources.

Quality Management has evolved from something nice-to-have to an enterprise management system that affects every functional aspect of an organization. More and more companies are now regarding Quality Management as imperative for the financial survival of the organization.

1.2 Developing Perceptions of Quality

The perception of quality has changed dramatically during the past hundred years. At the start of this period, quality was viewed mainly as *inspection to identify and sort* good products from bad products. Following World-War I up to the middle of the twentieth century, *quality control* techniques were introduced which included statistical techniques, sampling tables and process control charts. In the ensuing period towards the end of the twentieth century, quality control evolved into *quality assurance* with the emphasis on problem avoidance rather than detection. Quality assurance principles emerged such as the cost of quality, zero defect programs, reliability engineering and total quality control.

A revolution in the perception of quality has occurred during the past thirty years. Quality used to be viewed as the responsibility of blue-collar personnel. It is now considered to be everyone's responsibility throughout the organization. Defects in quality that used to be hidden from customers are now brought to the surface for corrective action. Quality problems that used to lead to blame and excuses now form the basis for cooperative solutions. Problems that were previously overcome with the minimal documentation are now documented as lessons learnt and are being used to ensure that mistakes are not repeated. It was believed that increased quality control would increase costs whereas it is now accepted that quality control reduces costs and improves business. Quality was an internal matter but is now focused on the customer. It was mistaken that quality would not occur without close supervision. Now people want to produce quality products of their own accord. Quality was believed to occur during project execution and now is known to start with project initiation and requires to be planned for within the project. Improvements have occurred multi-dimensionally in supply, equipment, ergonomic, training, organizational charter, attitude, leadership, management, and product quality.

1.3 Drivers of Quality

Quality is driven by customers and markets requiring higher performance, faster product development, higher technological sophistication, maximal exploitation of materials and processes, acceptable costs, matching of quality and cost, lower manufacturing profits, fewer defects and/or rejects, product and process social acceptability, high degree of safe product operability, high product availability to perform intended functions, high product reliability and assured performance under prescribed maintenance. Customer demands are addressed using Total Quality Management as an ever improving and continuous cyclic system for integrating organizational elements and customer satisfaction within the design, development, and product manufacturing/construction processes.

1.4 Risk and Quality Management - Two Sides of the Same Coin

Product/Project Quality Management implicitly ensures that the product/project can perform the intended task, on the intended delivery date and at the intended cost. Enterprise Quality Management implicitly ensures that the business is sufficiently robust and well enough cared for to continuously grow and stature and that it is financially sustainable in the long term. Quality Management pursues these objectives by explicitly structuring several set processes in terms of standard procedures and preeminent criteria. Quality Management focuses on the *capacity* of the product/project or the enterprise to withstand the effects of detracting factors.

Product/Project Risk Management ensures that the *demands* imposed on the product/project are not unduly onerous. Enterprise Risk Management likewise ensures that the *demands* imposed on the resources of an organization are not unduly onerous. Risk Management pursues these objectives by *a priori* and explicitly identifying the risks that are involved, evaluating their occurrence, and mitigating their impact in terms of structured procedures and accepted norms. Risk Management focuses on the *demands* that risks impose on the performance of products/projects or on the sustainability of enterprises.

It is evident that Quality Management and Risk Management are two sides of the same coin that cannot on their own assure the performance of a product/project or the sustainability of a business.

This distinction will assist you to understand that although Quality and Risk Management are separate processes, they are complimentary and inter-dependent and may even be inter-related. Knowing that they are separate processes will raise your awareness that they both need to be addressed in a structured manner and that both need to be systematically managed to maximize the performance of a product/project and the success of your business.

1.5 Purposes of QMIG

This document presents guidelines for the *implementation* of good Quality Management in engineering practice. It is not just another of so many references on Quality Management. The main purposes are to enable engineering practitioners to determine the *status* of Quality Management in their businesses and to confirm *compliance* with CESA's requirement that engineering consultancies pursue Quality Management at an appropriate level. Both purposes are pursued in terms of declarations on whether required management interventions are complied with or not. The declarations can be completed by principals based on their levels of familiarity with their businesses that are in any event expected of them.

The principles of Quality Management are briefly presented for the sake of completeness. Users who are familiar with these principles can go directly to the CESA QMS MSD – Management System Declarations in **Table 1**. These declarations are based on the FIDIC Guide to Quality Management in the Consulting Engineering Industry, 2001 and on the FIDIC Guide to the Interpretation and Application of the ISO9001:2015 Standard for the Consulting Engineering Industry (copyright 2017).

1.6 How to Ensure Quality in Your Practice

Quality Management in a consulting engineering practice can be achieved by ensuring that the management interventions raised in **Table 1** are proactively pursued and formally documented. CESA member firms are required to confirm that they have implemented Quality Management in their organizations by completing and submitting the CESA QMS MSD. The level to which member firms have implemented the required Quality Management Systems can be confirmed by CESA in random checks of the relevant quality documentation and records.

2 INTRODUCTION

This Guideline is based on the ISO 9001:2015 *Quality Management System – Requirements*, the FIDIC *Guide to Quality Management in the Consulting Engineering Industry, 2001* and on the FIDIC *Guide to the Interpretation and Application of the ISO9001:2015 Standard for the Consulting Engineering Industry 2017*. Guidance is given in *ISO 9001:2015 for Small Enterprises Advice from ISO/TC 176* on how the ISO 9001:2015 Quality Management System standard applies to the small business sector.

By implementing a quality system, businesses should be able to prevent things from going wrong, and when things do go wrong, the evidence produced by the quality system should protect the business. Other benefits of implementing a quality system include enhancement of reputation, winning more work, reducing errors and omissions which ultimately save money.

- ◆ **PREVENTS** THINGS FROM GOING WRONG
- ◆ **PROTECTS** YOU WHEN THINGS DO GO WRONG

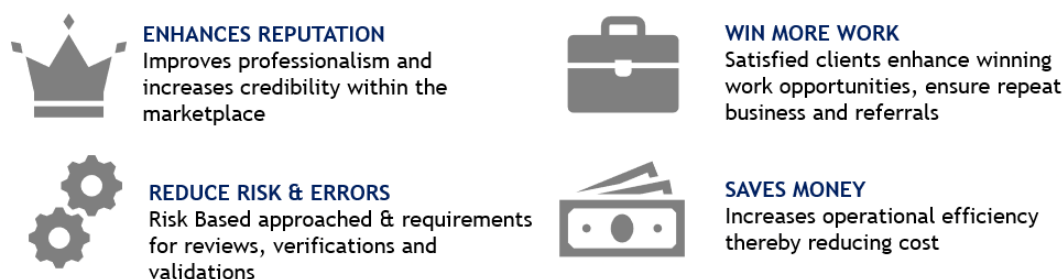


Figure 1 : Benefits of Implementing a Quality Management System

Most businesses find it difficult to implement a Quality Management System. In small businesses, these difficulties are exacerbated by limited resources, perceived cost, and difficulties in understanding and applying the standard, especially regarding continual improvement.

For a Quality Management System to be economically viable, the improvement in enterprise profit should justify the investment needed to implement and maintain the system.

The need for this Guideline arose directly from the difficulties that single practitioners and smaller emerging members of CESA encountered in implementing Quality Management Systems. When developing this guideline, it soon became apparent that a limited number of CESA members are ISO certified, secondly, it is likely that the number of members that will become ISO certified will always be limited and, thirdly, that CESA requires a process to standardize its requirements for Quality Management in its member organizations and to regulate compliance by its members with such requirements

This Guideline is therefore presented to all the CESA members that are not ISO certified for the purpose of readily facilitating compliance with CESA's requirements on Quality Management. It should be noted that CESA does not require its members to be ISO certified, but that they should at least implement a formal Quality Management System along the lines presented in this Guideline.

3 BASIS AND LAYOUT OF GUIDELINE

The standard documentation on Quality Management contains a considerable amount of very good and relevant information but owing to the volume thereof distracts from the main purpose of **implementing** Quality Management. This Guideline contains only the essential theory on the principles and requirements needed to implement Quality Management with the least effort. It does not contain any motivation on why Quality Management is required and what the benefits are.

It has been said that Risk and Quality Management are two sides of the same coin, Kirsten and Van Rensburg (2007). Risk and Quality cannot be pursued independently, they go hand in hand and only by dealing with them together can the success of a business be assured. The concepts of Risk and Quality Management are therefore briefly introduced and compared with each other in **Section 4**.

The Guideline is based in principle on the FIDIC *Guide to Quality Management in The Consulting Engineering Industry, 2001*, and on the FIDIC *Guide to the Interpretation and Application of the ISO9001:2015 Standard for the Consulting Engineering Industry 2017*. CESA requires this as the starting point because of its close liaison with FIDIC on an international level.

The eight principles of Quality Management in **Section 5** in this Guideline are an extract of **Section 2.3** in the FIDIC Guide to Quality Management in The Consulting Engineering Industry, 2001. A thorough understanding and appreciation of these principles is essential to Quality Management.

The requirements for Quality Management in **Section 6** of this Guideline are an extract in principle of the FIDIC *Guide to the Interpretation and Application of the ISO9001:2015 Standard for the Consulting Engineering Industry 2017*. The purpose of the extract is to enable persons who have not previously been involved with Quality Management to understand the underlying structure and concepts of the ISO 9000:2015 standard which are very difficult to comprehend at first sight.

The CESA Quality Management System Declaration (MSD) referred to in **Section 7** contains several primary management interventions which allow member firms to assess the level of development of their management system. The MSD is based on the requirements for

Quality Management in **Section 6**, on the FIDIC *Guide to Quality Management in The Consulting Engineering Industry, 2001*, and is expressed in the form of questions like in **Appendix B** in the FIDIC *Guide to Quality Management in The Consulting Engineering Industry, 2001*.

CESA members comprise single practitioners, emerging consultancies, small firms, specialist service providers, intermediate companies, and large inter-disciplinary enterprises. The members evidently differ in size, scope, style, and maturity and as a result maintain management systems at different levels which is catered for by allowing members to respond to several obligatory primary management interventions each within the context of its own status and level of development as provided for in **Section 7**.

4 JUXTAPOSITION OF QUALITY & RISK MANAGEMENT

Quality Management consists of several processes that are aimed at improving the effectiveness and efficiency of a business. Quality Management enhances the capacity of a business and assures its robustness against internal and external threats. A Quality Management System consists of documenting the processes as they apply to a business and regularly controlling, auditing, and improving the processes.

A Quality Management System is concerned with the quality of management and not with that of the product or service, albeit that they are complementary and that the latter flows from the former.

Risk Management on the other hand represents a process by which a business is protected against internal and external threats. The process can vary in complexity from a simple set of house rules on business ethics and conduct to an advanced system in which risks are systematically identified, quantified, evaluated, remedied/mitigated, and administered for sustainability.

Risk and Quality Management are two sides of the same coin, and neither can, on its own, ensure the successful outcome of a business. The intricate relationship between Quality Management and Risk Management is evident from the observation that Quality Management by and large comprises direct and indirect preemptive risk mitigation. As such Quality Management corresponds to the penultimate stage in Risk Management.

This distinction assists one to understand that Risk and Quality Management are separate processes. They are complimentary and inter-dependent, and they may even be inter-related. To know that they are separate processes will raise one's awareness that they both need to be addressed in a structured manner. This, however, does not mean that they should always be separately identified before dealing with them. The important aspect is that both risk and quality should be systematically managed to maximize the success of a business.

5 EIGHT PRINCIPLES OF QUALITY MANAGEMENT

The eight principles of Quality Management may be extracted as follows from **Section 2.3** in the FIDIC *Guide to Quality Management in The Consulting Engineering Industry, 2001*.

a) ***Customer-Focused Organisation***

i. ***Customer Satisfaction***

Quality Management adds value for the client. A proactive pursuit of customer satisfaction is therefore a critical element. Internal customers are the next person in line in generating the final product for the external

customer and their wants and needs should also be observed in delivering the required quality.

ii. *Client Relationship*

Understanding client needs, what the real project objectives are, who the real clients are, and what all the expectations are, is an essential step in achieving quality objectives related to the client. The activities before project inception are crucial to a close working relationship with the client and the development of mutual trust and confidence.

b) Leadership

i. *Top Management Commitment*

Top management should demonstrate clearly and visibly, in words, actions and initiatives, their full commitment to Quality Management. The CEO should demand that the Quality Management System is adhered to and should remove all barriers and obstacles to achieving this requirement.

ii. *Proactive Leadership*

Proactive leadership is a style of management that empowers staff and delegates responsibility and authority to the staff to act on a clear vision and on the principle-based values of the organization.

iii. *Plan to Achieve Purpose*

Leadership should plan to establish a quality policy, acquire knowledge of quality, effectively involve staff, improve communication and information systems, develop a service-oriented plan, and arrange a client-driven delivery system.

c) Involvement of People

i. *Employee Involvement*

Every member of staff is involved every day in the delivery of the professional services of the business and unless they are fully committed to quality, the benefits of Quality Management will not be realized.

ii. *Synergized System Implementation*

Synergy generates success of the whole that is greater than the sum of the individual staff contributions. Synergy can be developed by creating trust as underlying foundation to staff empowerment.

iii. *Communication*

Effective ongoing verbal and written communication on all aspects of a project is essential to the successful implementation of Quality Management in the organization.

iv. *Teamwork*

Mutually supportive, synergistic teamwork ensures project quality in all respects.

v. *Working Environment*

Working environment includes both the global environment of the organization and the environment in which the specific project work is performed. Adequate resources, adequate lighting, absence of noise, air, olfactory, sound, and visual pollution, and suitable ergonomics contribute to a quality working environment and associated quality performance.

vi. *Recognition*

What gets rewarded gets repeated. As an alternative to demanding quality work, management should strongly support staff training on the quality of their responsibilities in addition to their technical skills.

d) **Process Approach**

i. *Processes*

All processes should be identified and controlled for correctness and correct execution to ensure quality services and products. The requirements of employees on which the processes depend should be duly considered in this respect.

ii. *Planning*

To ensure that the desired quality is achieved requires that adequate time be spent on planning the work.

iii. *Document and Information Management*

The collection, storage, retrieval, sharing, processing, updating and ultimate presentation of data and information are at the core of delivering quality products and services. The systems to effectively facilitate all these actions are an essential part of Quality Management.

e) **System Approach to Management**

Identifying, understanding, and managing inter-related processes as a system contributes to the effectiveness and efficiency of the organization in achieving its objective.

f) **Continuous Improvement**

In the absence of continuous improvement, quality withers in time. Every process should be continuously reviewed for effectiveness and efficiency in a **Plan-Do-Check-Act** cycle, where:

- **P** – identify relevant factors and plan improvement process;
- **D** – implement and test process;
- **C** – analyze results;
- **A** – install process as standard

g) **Factual Approach to Decision Making**

i. *Measurements*

The expected results of Quality Management should be identified, and the quality achieved measured for improvement. Appropriate methods are required to monitor the Quality Management System.

ii. *Auditing*

The defined conditions in existing protocols for randomly selected aspects of project work in the Quality Management System should be examined in detail. The number of material departures from the norms should be recorded, described, counted, and reported to management for remedial action.

iii. *Management Review*

The Quality Management System should be analyzed and reviewed for suitability, effectiveness, and relevance. The review should focus on measurable aspects of services and products as direct indicators of poor adherence to procedures. The oversights analyzed should include changes in regulatory standards, increments in scope of services, achievement of quality objectives, audit results, non-conformance, customer complaints and corrective and preventive actions.

iv. *Client and or Other External Feedback*

External feedback is crucial for a Quality Management System and may include client evaluations (by direct inquiry, questionnaire or repeat appointment), benchmarking criteria of competitors, follow-up debriefings on proposals, independent external audit, and peer review.

v. *Prevention Focus*

The **process** should be checked rather than the **product**. Quality cannot be inspected into a product or service. It should be built or designed in at every step of every project phase as preventive intervention aimed at getting it right, first time, every time. **Product checking** cannot preempt lapses in quality that are much more costly to correct than to prevent. **Process checking** which is focused on error prevention at the very early stages leads to reduced project costs and avoids wasted resources.

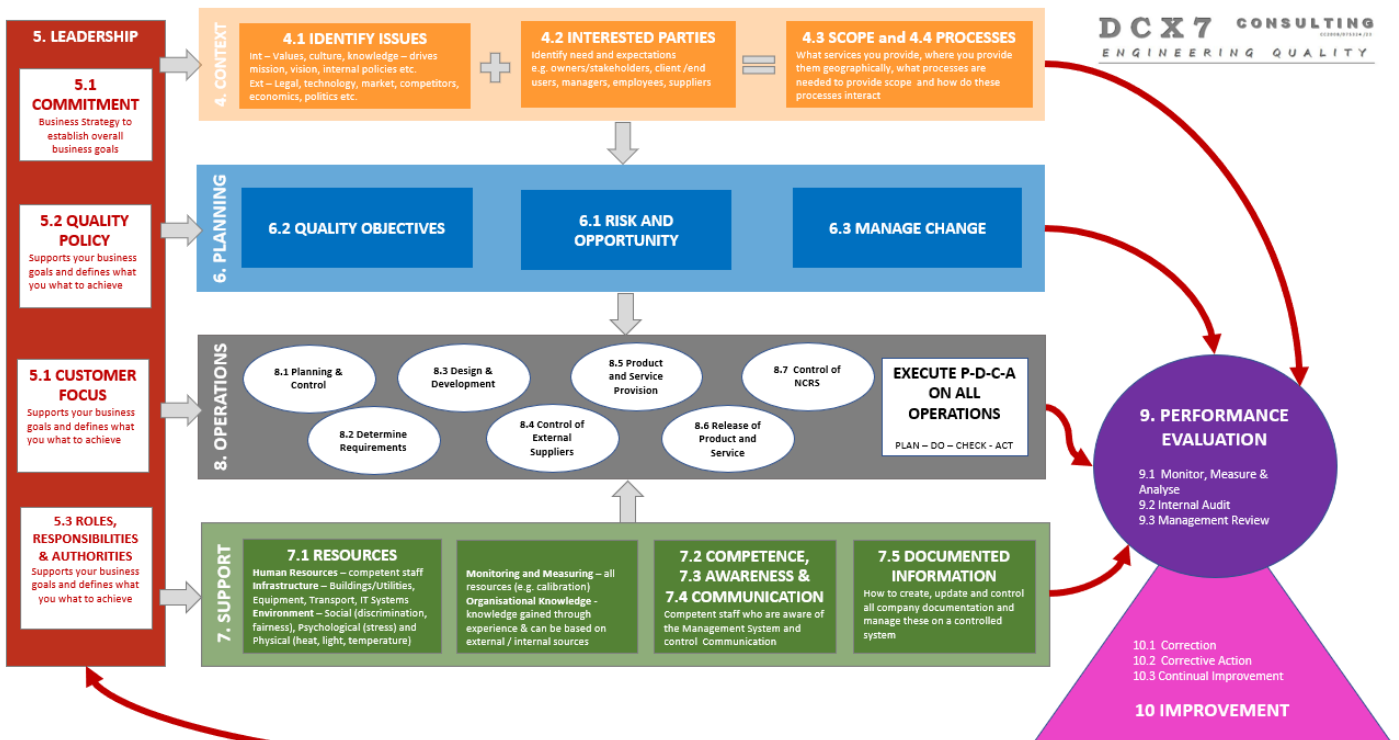
h) **Mutually Beneficial Supplier Relationships**

Mutually beneficial relationships with sub-consultants, contracted organizations and long-term suppliers require trust, knowledge of personnel capabilities and understanding of each other’s quality cultures that are developed over time. Such relationships are crucial to the quality of projects that almost always rely to some extent on external inputs.

6 ISO 9001:2015 REQUIREMENTS FOR QUALITY MANAGEMENT

The ISO 9001:2015 requirements for Quality Management are quite difficult for the uninitiated to comprehend and have therefore been summarized below to enable newcomers to understand the underlying structure and concepts of the standard. This summary should not be used in lieu of the standard. It is reiterated that CESA does not require its members to be ISO certified. A graphical summary of ISO 9001:2015 is given below.

Figure 2 : Graphical summary of ISO 9001:2015



- a) **Context of the Organisation**
 - i. *Understanding the Organisation*

The organisation should consider internal and external issues and the impacts these have in the form of risks and opportunities on the strategic direction of the organisation.

- ii. *Understanding the Needs and Expectations of Interested Parties*
The organisation should identify all interested parties together with their needs and expectations and how these may present risks and opportunities to the organisation.
- iii. *Determining the Scope of the Quality Management System*
The scope should identify what services and/or products the organisation delivers and should define the geographical locations where these services and/or product can be delivered.
- iv. *Determining the Quality Management System and its Processes*
The organisation should determine all processes within the organisation and the interaction of these processes. The organization should establish, document, implement and maintain a Quality Management System and continually improve its effectiveness in terms of these processes. The organization should exercise control over any outsourced process that affects service and/or product conformity.

b) Leadership

- i. *Leadership, Commitment and Customer Focus*
Top management should provide evidence of its commitment to the development and implementation of the Quality Management system and continually improve its effectiveness. Top management should ensure that customer requirements are determined, and that the organization aims to enhance customer satisfaction.
- ii. *Quality Policy*
Top management should ensure that the quality policy suits the organization, includes commitment to comply with requirements and to continual improvement, provides for review of the policy, provides a framework for the establishment of objectives, is communicated, and understood both internally and externally and is reviewed for continued suitability.
- iii. *Organisational Roles, Responsibility and Authority*
Top management should ensure that responsibilities and authorities are defined and communicated in the organization. Top management should assign responsibility and authority to ensure that Quality Management processes are in place, reporting on the performance of the Quality Management System occurs and to ensure that the awareness of customer requirements are promoted throughout the organization. Top management should ensure that appropriate communication processes are in place and that communication on the effectiveness of the Quality Management System takes place.

c) Planning

- i. *Actions to address Risk and Opportunity*
The organisation should ensure that risks and opportunities identified when considering internal and external issues as well as the needs and expectations of interested parties, are addressed to enhance opportunities, prevent, or reduce risks and to ensure improvement is achieved. The organisation should plan for mitigating actions to address these risk and opportunities and evaluate the effectiveness of actions taken.
- ii. *Quality Objectives and planning to achieve them*
Top management should ensure that quality objectives are established at relevant functions and levels in the organization and are measurable and consistent with the quality policy. Top management should ensure that the

Quality Management System is planned and that its integrity is maintained when changes are contemplated.

iii. *Planning of Changes*

The organisation should ensure that when changes are identified that these changes are planned, risks associated with the change and potential consequences are identified, appropriate resources are allocated, and the responsibilities and authorities are redefined if required.

d) Support

i. *Provision of Resources*

The organization should determine and provide the resources needed to implement and maintain the Quality Management System, continually improve its effectiveness and to enhance customer satisfaction.

1) *People*

The organisation should ensure that adequate personnel are provided to ensure that capabilities and constraints on existing personnel are considered and where required, outsourcing of services to external suppliers is provided.

2) *Infrastructure*

The organization should determine, provide, and maintain the infrastructure needed to achieve conformity to service and/or product requirements including buildings and associated facilities, equipment (including hardware and software), transportation resources, information technology etc.

3) *Environment for the operation of the processes*

The organization should determine and manage the work environment needed to achieve conformity to service and/or product requirements including social factors, psychological factors, and physical factors.

4) *Monitoring and Measuring Resources*

The organization should determine the required monitoring and measurement and associated devices needed to provide evidence of conformity of service and/or product to requirements. The organization should put in place processes to ensure that monitoring and measurement can be and are being carried out consistent with requirements.

5) *Organisational Knowledge*

The organisation should ensure that organisational knowledge specific to the industry is made available to personnel and is maintained to ensure that the knowledge is relevant and current. Organisational knowledge can be based on internal sources and external sources.

ii. *Competence and Awareness*

The competence of personnel performing work affecting quality should be assured by appropriate education, training, skill, and experience. The organization should evaluate personnel competence, provide the necessary remedial action, evaluate the effectiveness of the remedial action, ensure that personnel are aware of the importance of their contribution to quality, and maintain records of the remedial actions taken

iii. *Communication*

The organisation is required to control communication both internally and externally regarding what is communicated, when it is communicated, with whom to communicate, how to communicate and who can communicate.

iv. *Documented Information*

1) *General*

The extent of documented information for the Quality Management System should be determined by the organisation in relation to the size, complexity, and competence of personnel. When determining the extent of documentation, the organisation should take into consideration the need to comply to any statutory and regulatory requirements as well as any other required standards. Documented information can refer to policies, procedures, manuals, guidance notes, records, work instructions etc.

2) *Creating and Updating Documented Information*

When creating documented information, the organisation should consider the format and type of media to be implemented by the organisation. All documented information should have appropriate identification, description and should be traceable.

3) *Control of Documented Information*

Documented information should be controlled to ensure availability to staff when needed and should be stored correctly and protected. Documented information should be controlled when distributed to external parties, and any changes to information should be identified. All documented information should be retained for the required period as defined by statutory and regulatory bodies and should be disposed of at the end of the retention period in a controlled manner.

e) **Operation**

i. *Operational Planning and Control*

The organization should plan and develop the processes needed for operations and ensure that these are consistent with the requirements of other processes of the Quality Management System.

ii. *Requirements for Product and Services*

The organization should determine customer requirements, requirements necessary for intended use, and statutory and regulatory requirements. The organization should review the requirements prior to commitment to supply a service and/or product and should record the results of the review. The organization should put in place effective arrangements for customer communication.

iii. *Design and Development of Products and Services*

The organization should plan and control the design and development of services and/or products and should review and update the planning output as the process progresses. Process input requirements should be determined, reviewed for adequacy, and recorded. The form of design and development outputs should enable verification against inputs. Records of the results of verification should be maintained. Validation of design and development should be performed to ensure that the resulting service and/or product is capable of meeting requirements. Records of the results of validation should be maintained. Design and development changes should be identified, and records maintained.

iv. *Control of externally provided processes, products, and services*

The organisation should ensure that all external service providers are evaluated, selected, monitored, and re-evaluated on criteria as set up by the organisation. Information regarding the purchased process, product and/or service should be documented and agreed up front. The organization should ensure that purchased process, product and/or service conforms to these purchase requirements.

v. *Production and Service Provision*

The organization should plan and carry out production and service provision under controlled conditions. The organization should validate any process for production and service provision where the output cannot be verified by monitoring and measurement. The organization should identify the product throughout operations and should exercise care with customer property under its control. The organization should preserve the conformity of product during internal processing and handling.

vi. *Release of Products and Services*

The organisation should ensure that all products and/or services release to a third party demonstrate conformance with acceptance criteria and that there is traceability back to the person authorizing release.

vii. *Control of Nonconforming Product*

The organization should ensure that service and/or product that does not conform to requirements is identified and prevented from unintended use or delivery. The organization should deal with nonconformity in an appropriate way. Records of nonconformities and subsequent actions taken should be maintained.

f) **Performance Evaluation**

i. *Monitoring, Measurement, Analysis and Evaluation*

The organization should plan and implement the monitoring, measurement, analysis, and improvement processes needed to demonstrate conformity of the service and/or product, ensure conformity of the Quality Management System and continually improve its effectiveness. The organization should monitor information relating to customer perception on meeting its requirements. The organization should apply suitable methods for monitoring and measurement of the processes of the Quality Management System against planned results. The organization should monitor and measure the characteristics of the service and/or product to verify that requirements have been met in accordance with planned arrangements. The organization should determine, collect, and analyze relevant data to demonstrate the suitability and effectiveness of the Quality Management System and to evaluate where continual improvement of the system can be made.

ii. *Internal Audit*

The organization should conduct internal audits to determine whether the Quality Management System conforms to planned arrangements and requirements and is effectively implemented and maintained.

iii. *Management Review*

Top management should review the Quality Management System for continuing suitability, adequacy, effectiveness, opportunity for improvement and the need for changes. The relevant input and output requirements should be duly regarded in the review.

g) **Improvement**

i. *Non-conformity and Corrective Action*

To ensure that the Quality Management System is improved, non-conformances identified should be documented and the organisation should react to these non-conformances to correct and deal with the consequences. Where required, the organisation should identify additional actions in the form of corrective action to ensure the nonconformity does not reoccur. Effectiveness of actions taken should be analyzed by the organisation and any risk, opportunities and/or changes arising from the action should be identified and controlled.

ii. *Improvement*

The organization should continually improve the effectiveness of the Quality Management System using the quality policy, quality objectives, audit results, analysis of data, corrective actions, and management review.

7 QUALITY MANAGEMENT SYSTEM DECLARATION (MSD)

CESA requires its members to maintain their own Quality Management System. To give effect to its own requirements and to assure the profession and the industry that member firms are maintaining effective management systems, CESA has identified several primary management interventions which are included as the Management System Declarations in Table 1.

The Management System Declarations in Table 1 assess the quality of management, project delivery, support services and systems performance of member practices in terms of several primary management interventions. The Declarations in the table are based on the requirements for Quality Management in **Section 5**, on the *FIDIC Guide to Quality Management in The Consulting Engineering Industry, 2001*, and is expressed in the form of questions like in **Appendix B** in the *FIDIC Guide to Quality Management in The Consulting Engineering Industry, 2001*.

The Management System Declarations recognize that member practices differ in size, scope, style, and maturity and allow members to separately identify which interventions that apply to their businesses, and which do not. This allows single practitioners, emerging consultancies, small firms, specialist service providers, intermediate companies, and large multi-disciplinary enterprises to be scored in terms of a common system.

The Management System Declarations also enable members to track their level of development in terms of the interventions that do apply to their businesses in terms of the following categories.

<u>Level of development</u>	<u>Score</u>
a) Commencement of systems development	< 20%
b) Actively engaged in systems development	20 to 39%
c) Substantially engaged in systems development	40 to 59%
d) Nearly completed systems development	60 to 79%
e) Fully developed systems development	80 to 100%
f) Certified by external accredited body	
g) Leader in systems development, e.g., engaged on developing other members	

Every one of the interventions require one of three responses from members, viz, comply, do not comply, or do not apply. 1 is scored for interventions complied with and 0 for interventions not complied with. Every action that does not apply reduces the overall score by 1.

The score for a member who complies with all interventions is 100%, i.e., fully developed systems development. Likewise, the score for a member who complies with all a lesser number of applicable interventions in Table 1 is also 100%.

Scoring compliance enables members to determine their comparative levels of development and to formally inform CESA of their pursuit of the primary interventions.

This puts management in a good position to take the necessary steps to further develop its Quality Management Systems. It should be noted in this regard that CESA provides short courses for members who require assistance to implement Quality Management Systems as well as referring them to competent consultants who have experience in developing and implementing systems within the consulting engineering environment. Regular annual confirmation of the completion and level of implementation of the MSDs ensures that members on an ongoing basis observe the Quality Management Protocols in their businesses.

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- i) Liebenberg, D. ISO 9001:2015 Training Material. DCX7 Consulting, 2021.

TABLE 1 : The CESA Management System Declarations (MSDs) for a FIDIC Quality Management System (QMS)

TABLE 1 : The CESA Management System Declarations (MSDs) for a FIDIC Quality Management System (QMS)								
Ref:	GENERAL NOTES							
	The declaration below consists of several questions used to evaluate the level of system development of a member firm's Quality Management System and is based on the following guidelines:							
1	FIDIC Guide to Quality Management in the Consulting Engineering Industry (copyright 2001)							
2	FIDIC Guide to the Interpretation and Application of the ISO9001:2015 Standard for the Consulting Engineering Industry (copyright 2017)							
No.	Ref1	Ref2	DECLARATION	LEVEL OF SYSTEM DEVELOPMENT				
Please consult the 'Procedure: CESA Management System Declarations (MSDs)' for guidance on how to complete the Management System Declaration. Click here to view the Procedure.				YES	NO	NA	If yes, have evidence for verification	If NA, give justification
QUALITY MANAGEMENT IN BUSINESS STRATEGY, PLANNING AND LEADERSHIP								
1	2.2, 2.3	4.1, 4.2	<p>Does the company have a management plan in place which identifies the overall objectives of the organisation to reduce enterprise and project risks and to which the requirements of the Quality Management System are aligned?</p> <p><i>The plan should consider both the internal and external factors and the needs and expectations of interested parties and their respective impact on the overall achievement of the objectives of the organisation.</i></p> <p><i>Internal factors – Vision, mission, culture, governance, knowledge & performance etc.</i></p> <p><i>External Factors – Legal, technological, competitive market, social & economic environment etc.</i></p> <p><i>Interested parties – Clients, shareholders, employees, suppliers, regulatory bodies, society etc.</i></p>				(e.g. strategic management plan, business plan)	
2	3.3	4.3	<p>Has the company scope been documented?</p> <p><i>The scope should identify what services and / or product the organisation delivers and should define the geographical locations where these services and /or product can be delivered.</i></p>				(e.g. documented scope)	
3	2.3, 3.3	4.4	<p>Are the requirements of the company's processes documented?</p> <p><i>Company processes should include (but are not limited to) project delivery, financial and supply chain management, human resource management, performance management etc. The who does what, when and where should be addressed in the documented processes.</i></p>				(e.g. workflows, procedures, manuals, work instructions)	
4	3.4	4.4,	<p>Have all staff been inducted / trained on the requirements of these processes?</p>				(e.g. induction / internal training records)	

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		5.1	<i>Staff should be trained on the requirements of the company processes when joining with refresher sessions at pre-determined intervals.</i>					
5	2.2, 2.3, 3.2, 3.3	5.2	Has top management documented a quality policy statement / written mission statement on quality which is aligned to the strategic direction of the company? <i>The Quality Policy should guide the organisation as to what it wants to achieve through its Quality Management System. The policy should form a framework for the setting of quality objectives, identify the requirements of relevant statutory and regulatory bodies and should contain a commitment to excellence by continually improving the quality system.</i>				(e.g. documented Quality Policy)	
6		6.2	Has top management established measurable, quality objectives at relevant functions, levels, and processes throughout the organisation? <i>The quality policy statement should provide a framework for the setting of quality objectives. Objectives should be set for each process / function and at each level throughout the organisation. These can include (but are not limited to) business objectives, project objectives, staff objectives etc.</i>				(e.g. documented objectives / targets, KPIs)	
7	2.3, 3.3	5.1, 7.3	Does top management communicate the importance of the Quality Management System to its staff? <i>Communication should include the contents of the Quality Policy, the status of the Quality Objectives, consequences if quality requirements are not followed etc. and can be performed during staff meetings, training etc. The company should also consider incentive schemes for staff embracing the quality system.</i>				(e.g. Minutes of staff meetings, training records)	
8	2.3, 3.2, 3.3	5.3	Has top management defined roles, responsibilities, and authorities (specifically relating to quality)? <i>Roles, responsibilities, and authorities should be established by top management and communicated to staff through job descriptions, organisational structures, matrices etc. There should be a clear indication of a person / team responsible to act on quality issues and who will analyse and evaluate the performance of the system as well to drive improvement throughout the organisation.</i>				(e.g. job descriptions, organisational structure, authorisation matrix)	

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9	2.3, 3.3	6.1	<p>Does the company identify overall business risk and opportunity together with mitigating action plans?</p> <p><i>Overall business risk and opportunity relates to all aspects and processes within the business e.g. finances, resources, supply chain risk etc.</i></p> <p><i>For additional guidance on company Risk Management refer to the CESA Risk Management Implementation Guideline (RMIG).</i></p>				<i>(e.g. business risk register, risk assessment)</i>	
QUALITY MANAGEMENT IN PROJECT DELIVERY (according to the ECSA Project Stages)								
Stage 1 – Inception								
10		8.2	<p>Does the company formally communicate project requirements (scope, fee, time etc.) to the client / similar authority?</p> <p><i>Project requirements should also include statutory and regulatory requirements applicable to the project, risks and opportunities relating to the project etc. and the company should ensure that it has the capabilities of meeting the project requirements prior to communicating these to the client / similar authority.</i></p>				<i>(e.g. written proposal, brief, tender, quotation)</i>	
11		8.2	<p>Does the company retain signed written agreements with the client / similar authority confirming all agreed project requirements?</p> <p><i>Requirements should be well defined (especially scope of work and services and associated fee) to allow for tracking of changes / variances to prevent scope creep as the project progresses. The terms and conditions should also be well defined in the event of a dispute, claim or litigation.</i></p>				<i>(e.g. client agreements / contracts)</i>	
Stage 2 & 3 – Concept, Viability and Design Development								
12	2.3, 3.3	8.3	<p>Does the company implement a project plan or similar defining project requirements, project risk, required resources, verification and validation criteria, co-ordination, controls etc.?</p> <p><i>Project requirements can be as per the submitted proposal. Alternatively, a separate project plan / report can be compiled which is advisable on larger, more complex projects. Project requirements should be tracked on an ongoing basis and updated should the need arise.</i></p>				<i>(e.g. project quality plan, project report)</i>	

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			<i>For additional guidance on project Risk Management refer to the CESA Risk Management Implementation Guideline (RMIG).</i>					
13		8.3	Does the company ensure all project inputs are adequate prior to implementation in design? <i>Project inputs such as reports, investigations, surveys etc. that will be incorporated into the design, should be reviewed for adequacy prior to adopting the requirements into the project design.</i>				<i>(e.g. review of project inputs, marked up comments on received information)</i>	
14		8.3	Does the company control the design by reviewing, verifying, and validating the designs to ensure project requirements are met? <i>Reviews of design should be documented, and the frequency and intensity of the review is a function of the complexity and level of risk of the project. Reviews need to consider client requirements, environmental aspects, sequence of design activities, compliance with design brief, identification and control of interfaces, constructability, safety, maintenance, operational aspects etc.</i>				<i>(e.g. documented design reviews)</i>	
15		8.3	Does the company review all deliverables to ensure that the design intent is correctly reflected on the deliverable? <i>Deliverables can include drawings, reports, specifications, schedules etc. and the company should retain evidence of these reviews. Evidence of reviews should indicate the name of reviewer, date, and status of review.</i>				<i>(e.g. red lining deliverables, inserting comments onto deliverables)</i>	
16	App B		Does the company communicate specific requirements to the project team to ensure disciplines are coordinated and requirements of each discipline are taken into consideration in the design of the project? <i>The company should actively engage with the rest of the professional team to ensure design co-ordination does occur and that records of this engagement are retained.</i>				<i>(e.g. minutes of project meetings)</i>	
17		8.3	Does the company manage change by ensuring that changes to scope are identified, approved,				<i>(e.g. Change</i>	

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			and communicated? <i>Change which has a direct impact on time and cost should be approved by the client / similar body prior to implementation and evidence of this approval should be retained. The company should ensure that changes to deliverables are communicated to the relevant bodies.</i>				<i>registers / approvals, version control, tracking of changes)</i>	
Stage 4 – Documentation and Procurement								
18		8.6	Does the Company ensure that all deliverables issued to external bodies have traceability back to the person authorising the release of the deliverable? <i>Evidence of conformity to acceptance criteria and approval for release should be traceable for all deliverables. This is commonly done by ensuring that a competent person, according to the authorisation matrix signs off the deliverable. This person should have good knowledge of the project requirements and design stages involved.</i>				<i>(e.g. signatures on issued deliverables)</i>	
19		7.5, 8.5.4	Does the company keep documented evidence that all issued deliverables are received by the relevant external parties and that superseded deliverables are identified? Use the company's transmittal system as evidence of issuing of documentation as well as identifying latest documentation on a documentation register / similar.				<i>(e.g. signed transmittals and document registers)</i>	
Stage 5 – Contract Administration and Construction								
20		8.5.1	Does the Company provide and document suitable monitoring and measuring activities to ensure the requirements contained within the issued deliverables are achieved on site? <i>Records of site monitoring should be retained and available in the project office. This should extend to all records generated on site such as test results, contractor progress reports etc.</i>				<i>(e.g. site inspections, site monitoring records, site diaries)</i>	
21		8.5.1	If the company uses monitoring and measuring equipment, is this equipment controlled to ensure that accurate results are achieved during the measuring and monitoring process? <i>Equipment used to monitor, and measure should be identified by a serial number or similar, safeguarded when stored and transported and if required, should have valid calibration certificates.</i>				<i>(e.g. equipment registers with calibration records)</i>	

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Stage 6 - Close Out								
22		8.5.5	Does the company ensure that all project requirements including statutory and regulatory, risk management etc. have been met in a Project Close Out report / similar? <i>Refer to the project proposal or project plan to ensure that all requirements have been met.</i>				(e.g. project close out report)	
23	2.3	8.5.5	Does the company proactively obtain feedback from the client and other interested stakeholders to assess if project requirements have been met? <i>The company should be proactively requesting feedback throughout project delivery and should not only rely on stage 6 for feedback. This ensures that all areas of project delivery are meeting the project requirements including communication, value engineering, deliverables, and content thereof, scheduling, budgeting, ethics, and integrity of the team etc. Feedback received should be analysed and acted on when evaluating the performance of the management system.</i>				(e.g. client feedback, reference letter)	
QUALITY MANAGEMENT IN SUPPORT SERVICES								
24	2.3	7.1, 7.2	HUMAN RESOURCES – Does the company continually assess staff competency to ensure service conformity? <i>Evidence of staff competency can include but is not limited to highest qualification, professional registrations, work experience, training records, career / performance reviews etc.</i>				(e.g. evidence of competency in staff files)	
25	2.3	7.1, 7.2	HUMAN RESOURCES – Does the company develop an employee's skills and knowledge in needed areas through continuing education, conference, seminars, professional societies, on-the-job training, self-study etc.? <i>Coming out of the competence assessment, the company should identify areas where skills need to be improved and continually expanded and should assist the individual in gaining these skills and personal development.</i>				(e.g. training records)	
26	App B		FINANCIAL MANAGEMENT – Does the company compile financial reporting to ensure the financial success of the organisation?				(e.g. financial reports)	

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			<i>Financial reporting should include analysis of cashflow, profit / losses, work in progress, debtors' days etc. and this reporting should be shared with the authorised personnel within the organisation.</i>					
27	2.3	7.1, 8.4	SUPPLY CHAIN MANAGEMENT - When resources are outsourced, does the company manage these outsourced activities in line with a written agreement / contract / similar? <i>Management of outsourced activities should include the evaluation of suppliers prior to engagement, documented requirements in an agreement / similar and ensure that delivery is in line with the requirements in the agreement.</i>				<i>(e.g. Service Level Agreement / Sub-consultancy agreement)</i>	
28	2.3 App B	8.4	SUPPLY CHAIN MANAGEMENT – Are outsourced resources evaluated, selected, and re-evaluated on their ability to meet contractual requirements including quality? <i>Prior to engaging with an external resource, the organisation should evaluate the resource based on certain predetermined criteria (e.g. quality management, BBBEE status etc.). On completion the level of service delivery should be re-evaluated and centralised for future reference.</i>				<i>(e.g. pre-qualification scoring criteria, post-delivery evaluations)</i>	
29		7.1	ORGANISATIONAL KNOWLEDGE - Does the company make organisational knowledge readily available to staff? <i>Organisational knowledge can include internal and external sources such as standards, academia, lessons learnt etc. These can either be collated in hardcopy or in electronic libraries.</i>				<i>(e.g. electronic / hardcopy libraries)</i>	
30		7.1	INFRASTRUCTURE MANAGEMENT – Does the company provide a controlled and maintained infrastructure that supports the project delivery process as well as the staff The infrastructure can be associated with the fixed office premises or a remote working site. The company should ensure that the following is addressed in infrastructure management: <ul style="list-style-type: none"> ○ buildings and associated facilities – consider security, cleanliness, safety ○ equipment, including furniture, hardware, software, PPE, on-site equipment including maintenance ○ transportation resources – public and/or private, hired / pool cars ○ information and communication technology, in the office and remote connectivity for off-site work 				<i>(e.g. infrastructure maintenance registers / schedules, equipment registers, logbooks)</i>	
31	2.3	7.5	DOCUMENTED INFORMATION - Has the company implemented standardised electronic and /				<i>(e.g. formalised</i>	

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			<p>or hardcopy filing structures and file naming conventions for all the identified processes?</p> <p><i>A filing structure should be implemented for project delivery as well as all the other identified processes such as financial and supply chain management, human resource management, performance management etc.</i></p>				<i>filing structures, file naming convention)</i>	
32		7.5	<p>DOCUMENTED INFORMATION – Are company documents relating to all the company processes controlled and easily accessible to staff?</p> <p><i>The company should be able to easily access any quality documentation or any documentation relating to the company processes such as projects, financial and supply chain management, human resource management, performance management etc.</i></p>				<i>(e.g. random selection and review of any evidence stated in this declaration)</i>	
33		7.5	<p>DOCUMENTED INFORMATION - Has the company implemented standardised format for templates (e.g. procedures, records, reports, specifications, letters, drawings etc.)?</p> <p><i>These templates should make allowance for the identification of the author, reviewer and approver as well as allow for version / revision control.</i></p>				<i>(e.g. standardised company templates)</i>	
34		7.5	<p>DOCUMENTED INFORMATION – Does the company protect all documented information so that it can be retained for the required retention periods as prescribed by the applicable statutory and regulatory bodies?</p> <p><i>Hardcopy storage systems – protected against water, fire, rodents etc.</i> <i>Electronic storage systems – data to be backed up and protected against cyber attacks</i></p>				<i>(e.g. storage systems for data)</i>	
QUALITY MANAGEMENT IN SYSTEM PERFORMANCE EVALUATION								
35	2.3, 3.4	9.1	<p>Does the company collect, analyse, and evaluate data pertaining to the performance of its Quality Management System?</p> <p><i>Examples of performance data can include the following: Extent to which objectives are achieved, performance of external suppliers, competency of employees, client satisfaction, other interested party feedback, non-conformances, audit results etc.</i></p>				<i>(e.g. centralised databases for analysis and evaluation of data)</i>	
36	2.3	9.2	Does the company execute independent, internal checks on all its processes to ensure				<i>(e.g. internal</i>	

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			<p>compliance to the company requirements, statutory and regulatory requirements etc.?</p> <p><i>Checks can be executed and documented as internal audits and should demonstrate compliance to specified requirements.</i></p>				<i>audit report)</i>	
37		8.7, 10.2	<p>When non-conformities are identified during these checks, does the company take action to correct the non-conformity and apply corrective action to prevent the non-conformity from re-occurring?</p> <p><i>Non-conformities can be identified in all business processes including project delivery and, in some cases, it can be required to issue a non-conformance report to an external party which is non-compliant.</i></p>				<i>(e.g. non-conformance reports, corrective action reports)</i>	
38	2.3, 3.2, 3.4	9.1.3, 9.3, 10.1	<p>Does Top Management take an active role in recommending improvements to the Quality Management System based on the results of the data collected, analysed, and evaluated?</p> <p><i>Top management should meet on a regular basis to review the results of analysed data to document recommendations for improvements which can be made to the Quality Management System.</i></p>				<i>(e.g. management minutes)</i>	
QUALITY MANAGEMENT SYSTEM DECLARATION								
<p>Member firms should ensure that the quality declaration is completed by the relevant functional head / manager for quality or similar competent person. Member firms should ensure that this competent person, is available at the verification review, if such is requested by CESA. During the verification review, the competent person will be asked to present evidence or justification to verify each declaration made on the MSD.</p>				<p><i>Enter name of competent person completing the MSD</i></p>				