THE ASSOCIATION OF
CONSULTING ENGINEERS NEW ZEALAND INC

PRACTICE NOTE B33

DEVELOPING A QUALITY SYSTEM FOR A SMALL OFFICE

1 INTRODUCTION

1.1 This Practice Note

This Practice Note was requested by the ACENZ Board to assist members to comply with the ACENZ Policy on Quality (refer to Practice Note B31). This requires members to have a commitment to excellence including the implementation of a Quality Management System that is based on the principles of ISO 9001. The ISO Standard has been revised and updated in 2000 and can be less prescriptive than the previous (1994) version. Certification is an option that many Members have taken up, to their advantage (refer Practice Note B32).

The original version of this Practice Note was prepared in 1999, based on the then current ISO 9001:1994 Standard. This version [1] is based on the general outline of ISO 9001:2000 and on Guidelines to that Standard prepared by FIDIC [2]. Whereas the FIDIC documents cover principles and broad guidelines and cross reference to ISO 9001:2000, this Practice Note offers a "how to" approach. It is aimed at small offices.

ACENZ has based its own office Quality Management System on this format.

1.2 A Quality Management System for ACENZ Firms

In order to set up a Quality System, an ACENZ firm does need to familiarise itself with the principles of Quality Management, and be prepared to put some time into the process. There are costs, but the returns outweigh the costs.

A **Quality Management System** sets in place and documents the firm's policy regarding the commitment that the firm *management* makes to quality and to client satisfaction. Details are set down as the processes the firm intends to follow in carrying out work for clients in either **Procedures** or, if project specific, a **Project Quality Plan**. The system, and procedures within it, will generally be based on best practice known to the firm, and the firm will seek to continually improve its systems and processes.

It is recommended that the elements of Practice Note B26 on Health and Safety in a Small Office be incorporated into the firm's overall Quality Management System.

1.3 FIDIC Policy: Quality Means Business

The FIDIC Policy on Quality states:

"Member firms must have a commitment to excellence through the

[1] First prepared early 2002
[2] Refer Reference List Appendix 1

> implementation of a Quality Management System involving all levels of management and every employee, focusing on continuous improvement"
>
> *FIDIC 2001(a)*

The policy goes on to recommend that the Member Associations of FIDIC (of which ACENZ is one) assist members to develop such systems, taking account of the ISO Standard and ensuring independent evaluation. "FIDIC believes that an emphasis on the customer's satisfaction and continuous improvement through involvement of all employees, is essential for a successful organisation" (ibid).

This Practice Note seeks to give members that opportunity.

2 BENEFITS OF A QUALITY SYSTEM

A number of benefits of having a Quality System in place have been suggested [3] :

- better documented procedures in the office
- increased quality awareness
- increased awareness of procedures undertaken by other staff members
- enhanced communications (both internal and external)
- increased external perception of a quality service provided, is increased
- satisfied clients and repeat business
- improved productivity
- improved risk management
- reduced amount of rework
- saved time in training new staff
- increased value of intellectual property and hence value of the consulting firm
- enhanced reputation of the consulting engineering industry.

Small firms may consider a Quality Management System too much trouble and not worth the effort: "we know what we do". ACENZ considers a Quality Management System and a documented set of procedures *essential* for a small firm. We know – we are one!

3 STRUCTURE

3.1 The ISO 9001 System

This Practice Note sets out the basic outline of a Quality Management System based on ISO 9001: 2000, which identifies the purpose of a Quality Management System and commitment of top management to establish, operate and improve it.

3.2 Principles of Quality Management

There are eight principles of Quality Management offered in the international quality Standard ISO 9004:2000. These are listed below. The new (9004) Standard is supplementary to ISO 9001:2000 and is focussed more on the system and interaction of processes in a firm and an end point of client satisfaction.

The principal discussion is on the Quality Management System itself and key elements to manage quality procedures and outputs. Details of operation are covered in individual Procedures and/or Project Quality Plans, which form a lower "level" within the system. The

[3] FIDIC (1991) and FIDIC 2000 (a) and (b) document - see Appendix A1; also refer ACENZ Practice Note B32

Project Quality Plan needs to comply with the general requirements of the procedures within the Quality System.

Eight Principles of Quality Management

- Customer focussed
- Proactive Leadership and commitment of management
- Involvement of people at all levels, in a team situation
- A process approach – the orderly sequence of defined activities to achieve a desired outcome
- System approach to management – understanding the processes within the total system
- Continual improvement
- Fact-based decision making – measuring, auditing and reviewing before making the decisions
- Mutually beneficial relationships – with other parties

These are discussed in FIDIC 2000 (a)

For convenience of reference to other documents this Practice Note is structured in parallel to the ISO chapter headings, so that (for example) Section 4.2 "Documentation" is also "4.2 Documentation" in the ISO Standard.

4 THE QUALITY SYSTEM

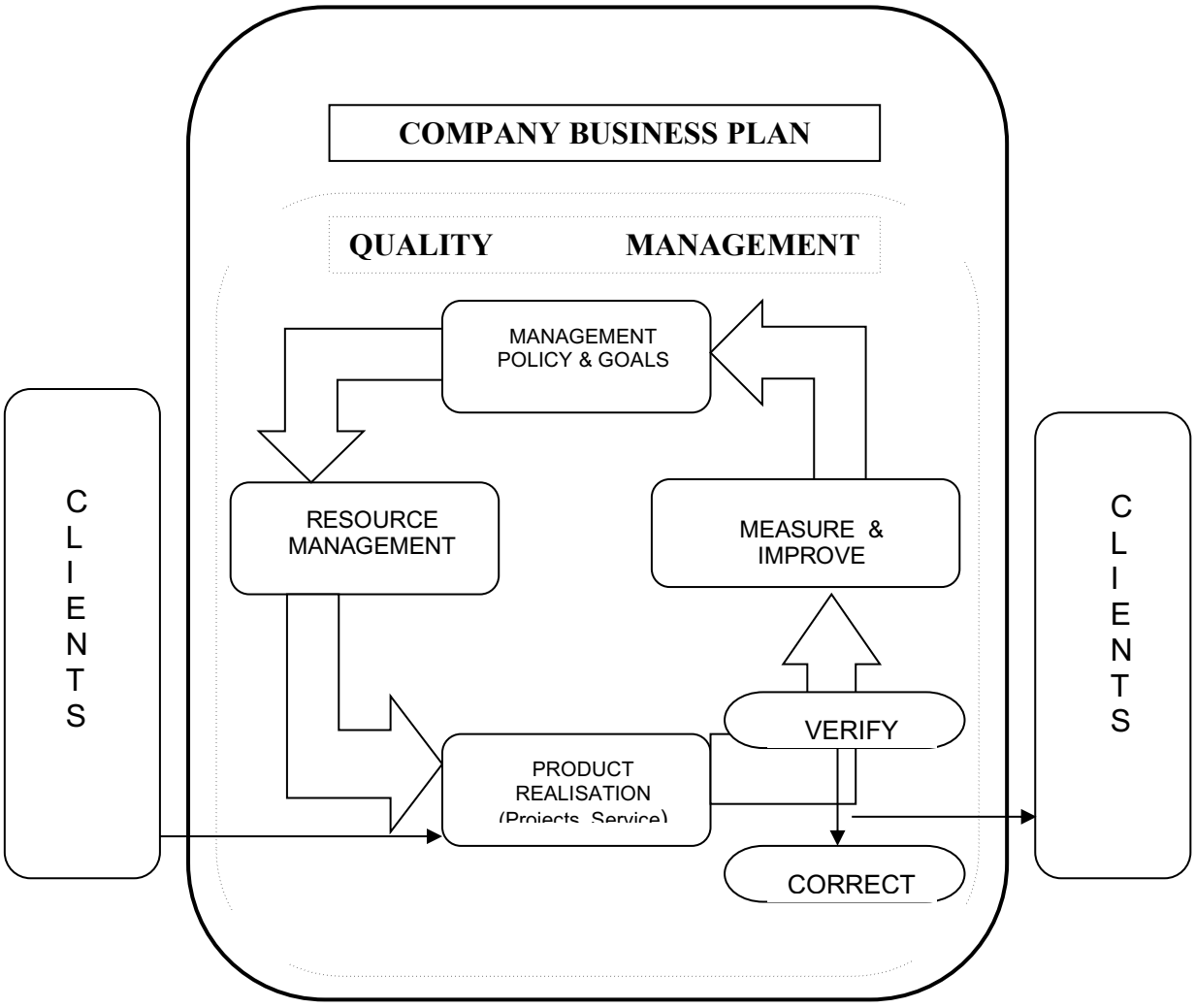

FIGURE 1: LINKAGES WITHIN THE QUALITY MANAGEMENT SYSTEM [4]

4.2 Documentation

Documents that make up the Quality Management System need to be defined. Various aspects need to be documented in order to form an audit trail. These need to be formalised if the firm is following closely to the ISO pattern. This document presumes at least sufficient documentation to **describe how the firm goes about its business** and can be used as an audit trail.

Documentation may be in two levels:

- generic (generally referred to as the **Quality Manual**)
- project-specific (generally referred to as a **Project Quality Plan**)

The **generic** are documents that reflect the operation of the firm; the **project** documents form a process for individual projects (or tasks).

If following the ISO model, the documentation should include:

a) **Statement of Policy and Objectives** – a general statement that applies to the firm as a whole. Specific objectives may be stated in a Project Quality Plan (refer 9.3).

FIDIC suggests that Policy and Objectives sections of the Quality Manual, which apply to the general running of the firm along Quality lines could be a separate section, and may be suitable for distributing to clients (e.g. in a proposal).

b) Quality Manual which describes the system (above) and how the elements of the system (or requirements when following ISO strictly) are addressed.

c) **Documented Procedures** (required by ISO 9001:2000). These will be discussed in following sections of this Practice Note, and are:

- Control of Documents (Sec 4.2.3)
- Control of Records (Sec 4.2.4)
- Internal Audit (Sec 8.2.2)
- Control of non-conforming product (Sec 8.3)
- Corrective Action (Sec 8.5.2)
- Preventive Action (Sec 8.5.3)

d) **Records** relating to the management of the Quality Management System [5]

The Quality Manual will define the generic processes that are documented. The level of detail will vary with the firm. Such documents form an invaluable training tool so should be self-explanatory. However cross-referencing will avoid unnecessary duplication.

4.2.3 Control of Documents

The purpose of document control is that documents are available and up to date for those who need to use them.

Documents that require formal control under ISO

[4] Figure based on one in AS/NZS ISO 9004:2000

[5] "Documents" refers to written procedures and manuals; "Records" refer to writing down what has been done.

- Quality Manual, procedures and Project Quality Plans
- Contracts with clients etc
- Definition of Inputs
- Results – deliverables
- Software used to perform the activities

There needs to be a Procedure stating how copies are updated, by whom and what follow up action needs to take place, including identifying or removing superseded versions. A master list should record the location of all documents. Note that "document" includes electronic documents and software.

Example:

Document Control: Documents that comprise the Quality Management System are:
- Quality Manual (Pt 1: Policy; Pt 2: Procedures) – File F1
- Project Quality Plan Register – File F2
- Contract File – File F3
- Software Directory and Computer Policy Manual – File F4
- Quality Audit Policy and Records – File F5
Any changes to these must be authorised by the Quality Manager, who initials and dates the change, and issues copies as appropriate.

Checklist for preparation of Quality Manual:
- Quality manual prepared - File F1
- Objectives of document control included as procedure 4.2.3
- Any changes to Quality Manual to be authorised by Quality Manager
- Document to be reviewed at least annually
- Master Copy held in safe – File F1
- All staff advised of location on induction
- All staff advised of changes by email
- Superseded version marked and archived for 3 years
etc

4.2.4 Control of Records

Those that demonstrate the Quality System is functioning and that there is evidence that the quality was achieved. Some records are also required for verification (refer Sec 7.3)

- operation of Quality Management System – audits, non-conformance reports etc
- deliverables and verification reports
- purchasing procedure and records
- staff management records [6]
- health & safety accident reports

5 MANAGEMENT RESPONSIBILITY

5.1 Management Commitment

[6] The FIDIC 2000 reports states "skills and competence status of the employees" ACENZ cautions that NZ employment law and Privacy law may restrict what may be kept and how, and what access staff have to the information (refer Practice Note B24)

Quality is the way that ACENZ members do business. To this end, the principal or general manager's role is to make a Quality System part of their normal business.

Support by the management shows a commitment to the client and other stakeholders (see 5.2). It is an integral part of the business strategy and planning.

Ways that this can be demonstrated, that are mentioned in this Practice Note include:

- signoff on the Quality Policy (see 5.3)
- being the designated person to undertake key procedures (e.g. Document control, 4.2)
- being the designated person to undertake and/or signoff management review and audit (see Sec 8)

The AS/NZS ISO 9004:2000 which was used to compile this update, offers a discussion on this section. This is paraphrased in Appendix A2. Note the close resemblance to a business plan.

5.2 Customer Focus

Closely linked is a commitment to customer requirements. "Customer" is defined here as not only the "client" or person commissioning work from the firm, but also other stakeholders such as shareholders, other personnel (e.g. through reporting lines), regulatory agencies (who receive copies), contractors (who work with drawings), end users and the community. This implies a much closer link with environmental management [7] than previously.

There needs to be a statement to the effect that management addresses customer needs with the goal of customer satisfaction. This is also illustrated in Figure 1.

5.3 The Quality Policy

A Quality Policy Statement is an overarching statement about *why* the firm has a Quality Management System. It is personal to the firm and reflects the firm's goals and commitment to the client's needs.

This should not just be to comply with a membership requirement but to seek excellence in all work and methods of working (refer also to FIDIC Code of Ethics - Practice Note A32 (4)).

The intent is that the Quality Management System is an integral part of the firm's business management plan. Therefore a Quality Policy statement should tie in with the firm's Mission statement or Vision. It should mention a commitment to cover the eight principles, particularly, management commitment and customer satisfaction.

Example:

The Mission of the management and staff of [the firm] *is to provide client satisfaction through appropriate deliverables at competitive fee, while providing a satisfactory return to* [the firm]*.*

[We/the principals] *see the Quality Policy as to follow practices that ensure our long term capability to provide high standard, professional, engineering services for our clients, and to monitor and hence improve on these practices.*

[7] Also refer to ISO 14000. ACENZ has not prepared a Practice Note on this as at April 2002

[signed John Doe] *Chief Executive* [the firm]

A statement of Scope may follow:

Example:

The Quality System applies to all goods and services provided by [the firm] *for its clients.*

5.4 Planning

Defines management's role in quality objectives and Quality Management System planning. This ties in very closely with strategic and business planning (e.g. refer to Sec 8 and Appendix A2).

5.5 Responsibility, authority and communication

Define responsibility. This does have to be workable, and will by necessity be delegated sometimes. It applies to both Processes and Project Quality Plans.

Including:

- reporting lines
- management representative, where it is not the CEO or Principal
- communication – identifying feedback in both directions

A statement should be included as to who is responsible for Quality Assurance and for Health and Safety if appropriate.

Example:

The Quality Manager and Environmental Health and Safety Manager is the Accountant, who has overall responsibility for management of the Quality Management System. The Quality Manager may delegate tasks to staff members as appropriate to the project. No variation to the steps in the Quality Management Policy or of steps in the Office Health and Safety Management Manual shall take place without the written authority of the Quality Manager.

Details of tasks and reporting lines etc will be included in other Procedures or files (such as Employment Agreement of each role or individual).

5.6 Management Review

The purpose is to assess the effectiveness of the Quality Management System in relation to its objectives and the business objectives of the firm. This is a combination of ongoing assessment and periodic, more formal, review (as in Sec 8).

Management review documents include:

- how and when
- what is covered
- responsibilities
- what information is collected
- how review information is documented

- what follow up action is taken for action items (including a reference to personnel development).

6 RESOURCE MANAGEMENT

6.1 Provision of Resources

Resources include everything that is needed to meet the firm's objectives both at the generic level and at the Project level. This includes:

- personnel and Support services
- Equipment
- Information / software
- Facilities (including health and safety)

This is a good illustration of how business planning and Quality Management System planning link.

Example (for a Project):

***Personnel**: The Principal in charge of the project is J Doe. Design staff will be A Citizen and B Ware. Additional staff resources needed in CAD and typing.*

***Information**: As-built drawings from D Velop Ltd; Drainage plans from xxx City Council; Survey plans from T Puke Surveyors. Software: AutoCAD ver 6; Office ver 2000; Facilities Management ver 4 - managed as per Doe & Citizen QM Plan.*

***Facilities**: Health and Safety plan to comply with Doe & Citizen systems. No on-site facilities will be needed. All staff to hold Site Safe passports when visiting the site*

***Equipment**: xyz from Doe & Citizen storeroom. Calibration as per Quality Management System etc*

6.2 Personnel Resources

Information on personnel includes:

- job description and competencies required for the position
- personal CV – which should develop as the person acquires experience within the firm
- staff review reports and notes on training developed as a results of staff review

Involvement of all Personnel

People are the main resource of the firm and it is important that everyone should appreciate the value of the Quality Management System and their role in it. ISO (Web resource) suggest that involving all personnel and valuing their contribution has the following benefits:

- people understand the importance of their contribution and role in the organization.
- people identify constraints to their performance.
- people accept ownership of problems and their responsibility for solving them.
- people evaluate their performance against their personal goals and objectives.
- people actively seek opportunities to enhance their competence, knowledge and experience.
- people sharing knowledge and experience, and discuss problems and issues.

Communication with staff about the Quality Management System is essential for maintaining and enhancing the system. Raising staff awareness and commitment includes:

- introduce the Quality Manual and staff understanding of this at induction (refer Practice Note B24)
- team briefings on Project Quality Plan
- Recognising quality performance
- Reporting non-conformity and how it is resolved

6.3 Infrastructure and Work Environment

Infrastructure refers to the supporting **facilities** within the firm (e.g. computer resources, libraries etc). Work environment includes **workplace** health and safety, an office environment conducive to work etc.

The documents also need to identify infrastructure and the working environments. This includes specific for Project Quality Plan (e.g. allocation of support staff, drafting software needed, test equipment etc) and general principles. Health and safety procedures are very important here.

[These are 6.3 and 6.4 in the ISO Standard.]

7 PRODUCT [8] REALISATION

This is a key section within the ISO 9001:2000, essential for Engineering Consulting practices, to ensure that the consultant and client understand the objectives for all work (or individual projects) that the client's request can be met with resources available to the firm.

It defines and agrees the standards and what is expected.

We itemise elements of the ISO below, which can be either be followed rigorously or provide a checklist.

7.1 Planning

Specify how the firm is going to set up the processes for conducting its business. FIDIC suggests the two-level system of **generic processes** (e.g. general approach to project management commissions – contained within the Quality Manual) and **specific jobs** (e.g. *the* project management job for xyz – set out as a Project Quality Plan Appendix A3).

7.2 Customer Satisfaction

Determine the client needs. As many consultants will be only too aware, this includes not only the brief, but also the implicit needs, statutory and regulatory needs, and, where applicable, value added to the client. Keep records.

7.3 Design and Development Of The Product

A sequence of elements that translate the **customer requirement** to a specific **end product**. The use of the term "design" can be misleading in some instances. These sections refer to *all outputs* from the firm, not just design outputs.

[8] The use of the term "product" includes consulting services.

Independent review of critical design activities will ensure a robust Quality System.

There are seven areas to consider:

- planning
- inputs
- outputs
- review
- verification
- validation
- changes

7.3.1 Design and Development Planning

Planning focuses on client needs. The purpose is to describe the processes for offering consulting services (at the generic level in the Quality Manual, and the specific level in a Project Quality Plan). The objectives would be stated and responsibilities identified (e.g. statutory, ethical, risk management). These responsibilities may be either inside or outside the firm (e.g. obtaining data, sub-consultants). Lines of communication should also be documented. Stages within a process or project should be identified.

Standard forms or documents can be used, but any unusual conditions should be documented.

7.3.2 Design and Development Inputs

Identifying what input information is needed to perform the project, or the tasks within it. This includes statutory and regulatory requirements (e.g. resource consents), legal requirements and Standards. Health and Safety requirements would come in here, particularly where site work is involved. Other inputs include less tangible elements, such as experience of personnel, intellectual property, management policies.

7.3.3 Design and Development Outputs

This is defining the project outputs (again may or may not be actual “designs”, for example a feasibility report). It should also define the standards expected and verification of output before release, how and by whom. There should be a documented trail (verification) between final outputs and the design inputs.

7.3.4 Design and Development Review

The purpose is to monitor that the project is achieving the client needs, to identify any problems and solutions to these. This is an on-going, and formal, process *during* the project, particularly so for larger projects. This may involve other members of the project team Records must be kept of all review work (and any actions).

7.3.5 Design and Development Verification

Verification is used to discern if the project results are not only *complete* (above) but actually meet the standards set at the commencement of the project. This addresses all documents (e.g. calculations, drawings, specifications, reports etc) and must be performed by authorised personnel with the required competence.

It should be noted that the verification of individual elements is not necessarily sufficient to verify the project as a whole. It is an essential step in any project to separately review and verify the project as a whole. Again records should be kept.

7.3.6 Design and Development Validation

Validation confirms that the project *results* actually met the client's expectation. The standard requires that validation should be carried out before delivery or implementation. The FIDIC document (2001 (b)) warns that validation should specify the use for which the design is intended. Records of the validation process should be kept for future reference.

7.3.7 Design and Development Change

This section involves documentation of any changes in the project (as opposed to corrections). Records must be kept of the changes, why they were made, reviews performed, who authorised them etc. Formal procedures for change control will assist (e.g. as a standard document).

The procedure does not have to be lengthy, but, by referring to each of the above, covers all eventualities. An example from the ACENZ office is included in Appendix A4.

7.4 Purchasing - Goods & Services

Goods and services should comply with established standards that will allow the overall Quality Management System or a Project Quality Plan to be achieved . The scope of goods and services that affect quality standards should be defined The firm should have a process description for purchasing goods and services. For example:

Services: (e.g. contractors, sub-consultants) how the firm selects service providers. For example all sub-consultant firms to provide references, to have a Quality Management System, to be a member of ACENZ etc. Lists of approved suppliers that meet the criteria are convenient, with the criteria should be spelled out in the Quality Manual (or Project Quality Plan as appropriate), and should be reviewed periodically.

Information or Data: to ensure purchased data (or data imported from any external source [9]) can be relied upon to meet the project standards.

Verification: a process to check that the goods or services as supplied. Records need to be kept.

7.5 Production And Service Provision

This clause goes beyond the "product" to associated support services, such as administration, computer services etc. It addresses not only the client satisfaction (direct output) but also stakeholder satisfaction (shareholders, society etc). It is for this purpose that ACENZ has implemented a Quality Management System. It is about adding value.

Validation is applied as for design where there is a definable output/outcome (e.g. assessment of tenders). However tasks that are complete in themselves (the example given in FIDIC is inspection) also need some verification measures for the client to have confidence in the procedure (the example given is that of using only qualified and competent personnel).

Control of Customer Property

Of note in this section is management of intellectual property. ACENZ provides some guidance in Practice Note B45 and in the contract documents.

[9] Refer also to Practice Note B42 for transfer of digital data

7.6 Control Of Inspection, Measuring And Test Equipment

This applies to firms using measuring equipment for design inputs or in order to demonstrate compliance with legal requirements or specified conditions in the contract. Firms operating testing laboratories will be particularly aware of this section. Procedures should state requirements for equipment control, methods of calibration [10] and records of equipment use.

For example certain categories of equipment (e.g. tape measures) can be calibrated when they are purchased and checked occasionally after that; more sensitive equipment (e.g. dumpy level) will need tighter controls.

If using such equipment from a supplier, calibration should be verified by the supplier.

8 MEASUREMENT, ANALYSIS AND IMPROVEMENT

8.1 Discussion

In order for a Quality Management System to be useful, it should comprise living documents reflecting the ongoing commitment to quality. Existing practices should not just be written down and adhered to without question. This can merely reinforce poor practice unless those practices are reviewed at the time of setting up the Quality System *and* reviewed on an on-going basis. This is particularly important in its early stages or if a new procedure is introduced, because new methods of working may improve efficiency and the quality of the operation.

The 2000 version of ISO 9001 has a greater (stated) emphasis on client satisfaction and introduces specific reference to "success" by measuring it against the objectives and deliberately seeking client (and other stakeholder) feedback.

Note that in order to be able to measure the effectiveness and improvement of the Quality Management System, the base state should be described before you start.

A review clause indicates the *maximum* interval for review, and methods of changing the system. The first example below also gives reasons for reviews, and is rather formal. Simpler statements could be just as effective, as in the second example below.

Example:
A review of the Quality System is to be carried out annually by the Quality Manager, with the following objectives:

a) ensure the Quality System is working according to the pre-defined standards of performance and that any areas where the standards are not being met are addressed and procedures amended in order to meet the standards, or if the standards are un-realistic this be noted and the standards adjusted to a more realistic level;

[10] Refer to ISO 9000 requirements. Also summarised in NZOQ Guide (1999) - refer Appendix A1.

b) set targets and objectives for the future development of the Quality Management System;

c) check reports of non-conforming product and determine that actions have been taken to remedy the product and address the procedure.

d) check the Quality System is easy to run and that staff are aware of quality objectives. Amend the System if improvements could be made;

e) evaluate audit reports and records to identify need or opportunities for improvement. Circulate a summary report to staff seeking feedback and encouraging suggestions for improvement.

A record of this report and audit will be signed off by the Chief Executive

Example:
In January each year we will look at how the Quality Management System has worked over the past year, seek suggestions from all staff members and discuss where amendments could be made to improve procedures. A note of the results of this review will be initialled by the Principal.

Involvement of Personnel

It is intended that all staff members are aware of the Quality Management System and follow its Procedures (refer section 3.2.3). ACENZ suggests that a clause to this effect be included in all Employment Agreements.

Staff should be encouraged to identify inefficiencies or short-falls in the Quality System and bring them to the attention of the Quality Manager, at any time. Quality management should regularly be an agenda item at staff meetings.

8.2 Monitoring and Measurement

Effective decision making is based on having accurate and timely information on current and past performance. The purpose is three-fold

- determining conformity of the product (outcome)
- determining conformity of the Quality Management System itself
- to continually improve the effectiveness of the Quality Management System

The aim is to identify the areas for improvement. This is not just a quality management exercise but an important input to management planning. Therefore the manager or principal should establish the most effective methods to assess performance.

8.2.1 Customer (Client) Satisfaction

Client satisfaction [11] is an indicator of both the performance of the Quality Management System and business effectiveness. The information gained from client feedback can be very valuable. It may lead to client loyalty and repeat business.

[11] Note that other stakeholder satisfaction is covered under 8.2

Firms may conduct surveys of client satisfaction (e.g. at the end of each project) or at intermittent intervals for long-term client relationships. This needs to be more than recording (any) client complaints. "Client" satisfaction may also extend to the wider client market and market analysis also comes into the exercise.

Example: ACENZ Sponsorship
To assess the success of sponsorship programmes, the measurement will be:

- *degree to which the sponsorship is taken up (financial return)*
- *all sponsors consider they had satisfactory exposure (by discussion or questionnaire)*
- *all sponsors consider their requests were responded to promptly and satisfactorily (as above)*
- *sponsors repeat in following years (return business)*

results to be recorded on file xx; refer to file when planning next project

8.2.2 Internal Audits

Internal audits refer to self (or independent) audit of the internal *procedures*. These will draw on client surveys and feedback notes. They determine whether the Quality Management System is effective and suitable for achieving the policy and objectives. The results provide valuable information for effective management review and decisions on the future direction of the firm.

Audits should be a relatively formal and documented procedure. They should be conducted at both the firm's operation (e.g. annual review) and project level (e.g. on completion or at a set interval for longer projects).

Responsibilities should be assigned in the Quality Management System or Project Quality Plan. The principal or manager should ensure that follow up action is taken.

An audit comprises the following phases:

- planning – what is to be audited, how and expected reporting
- conducting – evidence of each item in the plan
- reporting – review the results and report to management
- follow up – after actions have been taken, verify they are in place, are effective and recorded

Note that an audit should ideally be independent.

8.2.3 Monitoring and Measurement of Processes and Products

Processes

Monitoring of Processes takes place on a regular and ongoing basis. It monitors that processes are performing as planned and offers an opportunity to fix an identified problem early. See 8.5.

Products

Monitoring of Product takes place at the completion of the "product realisation" to verify the product against the requirements (see above 7.3). Evidence of this should be recorded. Any shortcomings should be made good before delivery.

8.3 Non-Conforming Product

For consulting engineering firms, "Product" here also refers to services performed. Non-conforming product should be identified in the process of monitoring processes and product (7.3 and above 8.2).

In-progress work that is yet to be submitted for release/issue is *not* "non-conforming product". Correcting deficiencies prior to release is part of the normal work process. However, drafts should be marked as such.

A procedure to mark/identify and take action on non-complying product needs to be included as part of the Quality Management System. The principle of continual improvement within the Quality Management System aims to refine the system to the extent that non-conforming product or services are minimised.

8.4 Analysis

Analysis of the data and information collected from clients and in internal audits should be done using valid data analysis methods (e.g. ensuring a complete or representative sample etc). The data should be made available to those who will be using it, so that actions and decisions can be based on factual analysis balanced with experience and intuition.

8.5 Improvement

8.5.1 Continual Improvement

Continual improvement of the firm's overall performance should be a permanent objective of all ACENZ member firms. This section refers to the ability of the Quality Management System to do this.

It is more than correcting any shortfalls. It includes:

- a consistent, firm-wide approach to improvement
- providing people with training so that the firm is at the leading edge of consulting engineering practices (i.e. Professional Development)
- making continual improvement of products, processes and systems throughout the firm
- establishing goals to guide, and measures to track, continual improvement.
- recognizing and acknowledging improvements
- providing people with training in methods of improvement of the Quality Management System.

8.5.2 Corrective Action

Whenever an incident occurs that requires alteration of completed work, an incident report should be documented. These will be analysed in the audit to determine if there are any patterns emerging that indicate a weakness in the Quality System and how to remedy it. A suitably qualified person is needed to confirm that appropriate action has been taken to correct the work or situation.

A Procedure defining this process might be:

Example:

For any non-conforming output a Corrective report will be completed. This will detail cause, action to be taken to bring the output up to the stated standard, and a note as to whether any review or amendment to the process is needed. The report will be signed by the project manager when filled in, and by the Quality Manager as being corrected. A copy of the report will be filed on the Quality System file as well as the Project file.

8.5.3 Preventive Action

Preventive action procedures refer to a possible problem (a problem waiting to happen). It is similar to risk management. It applies at both the generic and project levels. Again staff should be aware of the objectives of the Quality Management System and contribute feedback that to prevent potential problems.

A similar process to that for Corrective Actions can be set up.

Note ISO 9004:2000 refers to "Loss Prevention" which gives a good indication of the importance of Corrective and Preventive Action to overall business management.

9 THE MANUALS

Content of the Manuals and Procedures

This section is given as a summary of how a small firm might structure its own Manuals. This is a suggestion and option only, but does provide a starting place. It is intended for use for a small office. Larger firms and multi-office firms will need a more formal structure.

9.1 Quality Manual

Contains:

- Scope
- Quality Policy (incorporating Mission statement and strategic goals)
- Quality Objectives (why you are doing it – SMART; note that you should benchmark what you are doing now)
- Management Responsibilities (and delegations)
- Documentation and Records
- Standard Procedures: a) for the Quality Management System; b) within the firm

FIDIC (2000 (a)) has a checklist which is useful to determine if you have covered everything.

9.2 Procedures

Procedures form part of a Quality Manual. They may be a separate volume(s) to facilitate updating. This may also allow different staff who are responsible for certain tasks to take responsibility for the documented Procedures.

A master list of Procedures is part of, or recorded in, the Quality Manual.

Quality Procedures set out how each activity is performed; who does what, where, when and how. These are generic (as above) or specific to a project.

They include:

- scope of procedure
- person responsible and lines of responsibility
- timing - frequency of task and of revision of task - any milestones
- record management - file numbers - where auditable record of actions taken for each procedure is stored
- procedures - stepwise description - includes procedure sheets for some tasks - verification steps
- measurement
- corrective action steps.

An example is given in Appendix A4.

Documenting Procedures should involve input from those most directly involved with using the procedure, that is, the staff.

9.3 Project Quality Plans

A given project will have a Project Quality Plan. Depending on the formality of the system, and size of the project, this identifies what is done, by whom, when and how. It should include the specific Quality Management activities, standards or procedures, and assignment of resources. It will be begun at the pre-award phase and developed during the course of the project.

Many consultants use Project or Job planning sheets with the key quality and planning elements listed. It can include references to other documents (e.g. Quality Manual). For a list of considerations refer to Appendix A3, taken from FIDIC 2000(a).

For Individual Projects it will *usually* include, and document:

- requirements of the client – the brief
- any variation from tender documents
- resources needed (e.g. staff, sub-consultants)
- basis for performance
- scope and expected results
- fee and disbursements
- procedures for changes
- conditions of engagement
- documentation

ACENZ has standard contract documents [12] that assist in this procedure. ACENZ recommends that all projects have written records of this stage [13].

10 OTHER ELEMENTS

Although not a specific ISO 9001 “Element”, ACENZ has recommended that the Office Health and Safety Manual and any Practices that relate to management of the workplace environment (e.g. storage of dangerous goods) for which the firm is responsible, form part of the overall Quality System. For Health and Safety refer to Practice Note B26.

[12] ACENZ / IPENZ Conditions of Engagement (1997); ACENZ (*et al*) Standard Conditions of Contract (2000) and others; refer to Appendix A1

[13] Conflict over client expectations is the most common complaint about members received at ACENZ. Adherence to a procedure would greatly improve understanding.

11 ACTION

This outline can provide a starting point for members to structure their own Quality Management Policy and Quality System. There are specialist consultants in Quality Management (including some ACENZ members), should members wish to formalise their systems.

12 ACKNOWLEDGEMENTS

ACENZ thanks Trevor Anders, John Bryant and Adam Thornton and others for their comments on the drafts to this Practice Note. ACENZ also acknowledges the FIDIC and ISO documents cited in the reference list.

APPENDICES

A1 REFERENCE LIST

FIDIC 2001 (a) - Guide to Quality Management in the Consulting Engineering Industry

FIDIC 2001 (b) - Guide to the Interpretation and Application of the ISO 9001:2000 Standard for the Consulting Engineering Industry.

(ACENZ holds a stock of these or can order them from FIDIC at a discounted rate – check the ACENZ Website publications page for current price)

FIDIC (1997) - A Guide to the Interpretation and Application of the ISO 9001: 1994 Standard for the Engineering Consulting Sector.

ACENZ (1991) - Quality Management Procedure Manual (Grey Book) - contains some examples of flow diagrams and check sheets that may be of use for a starting point.

ACENZ/IPENZ/Transit NZ/ALGENZ 2000 – Conditions of Contract for Consultancy Services

Also "**Short Forms**" for Commercial Clients and Domestic Clients (for jobs with smaller fees)

(These ACENZ documents are available at no charge in PDF from the ACENZ Website)

FIDIC Contracts - most up to date are:

- Short Form of Contract (1999)
- Conditions of Contract for Construction (1999)
- Conditions of Contract for Plant and Design-Build (1999)
- Conditions of Contract for EPC Turnkey Projects (1999)

ACENZ Office Quality Management Plan (2002) - Internal document, not for general distribution but members may refer to it if they so wish.

Standards NZ: Website **www.standards.co.nz**

- **(a) Quality Management Systems – Requirements:** Standard Code: AS/NZS ISO 9001:2000
- **(b) Quality Management Systems - Guidelines For Performance Improvements**: Standard Code: AS/NZS ISO 9004:2000
- **(c) The ISO 9001 Comparison - 2000 Vs 1994:** Standard Code: SAA/SNZ HB 90.0:2000

(Available from Standards NZ – website address above or phone 04 498 5991)

International Standards Organisation: Website **www.iso.ch**
Contains some useful information sheets free to read. Can also order booklets and standards

ACENZ Website: **www.acenz.org.nz**

A2: MANAGEMENT RESPONSIBILITIES

This page is based on NZ Standard ISO 9004:2000. ACENZ comments or comparisons are given in square brackets [x].

1 In order for the Quality Management System to achieve benefits, it is necessary to establish and increase client (and stakeholder) satisfaction. The 9004 suggests:

- consistent with the management plan/strategic plan [e.g. including the mission statement & goals in the Quality Management System objective];
- lead by example;
- link firm values to the Quality Management System [e.g. at staff meetings];
- implement improvement methods [technical, leading edge business processes];
- obtain feedback – networking with clients/stakeholders [ACENZ adds here – and tell your staff];
- include processes within the project delivery that add value to the firm;
- ensure the support processes are included in Quality Management [taking pride in the work]
- involve staff [e.g. have a suggestion box], and develop people [e.g. have a CPD plan, have a performance review programme];
- provide the resources that staff need [i.e. take heed of the suggestion box].

[All these are elements of business planning – make the Quality Management System part of the business plan.]

2 When developing the Quality Management System, demonstrate leadership in and commitment to:

- understanding current and future client needs and expectations (over and above stated needs)
- promoting awareness, motivation and involvement of staff in the quality objectives
- seeking continual improvement
- planning for the future of the firm
- setting a framework for achieving client and stakeholder satisfaction

[Again all elements of: marketing; strategic planning or public relations]

3 It is important that the Quality Management System is integrated (refer Figure 1)

- the sequence of processes is designed efficiently;
- input / action / output is clear and controlled;
- monitor individual projects to ensure they are linked efficiently [job planning];
- manage risk;
- analyse activities to ensure continual improvement;
- delegate responsibility to ensure efficiency;
- manage to achieve objectives;
- at all times keep the needs and expectations of all clients and stakeholders in mind.

[Thus done, you may see an improvement in your bottom line.]

4 Measuring the performance of the firm, in terms of Quality Management System processes:

- financial management;
- every aspect of the firm [internal stakeholders and external];
- benchmark [how are you performing?];

- client satisfaction surveys;
- client (and stakeholder) perception [i.e. your place in the market?]

A3 PROJECT QUALITY PLANS

The following is quoted from FIDIC 2000 (a) and reproduced with permission.

In setting up a Project Quality Plan the following items needs to be considered:

- scope of services provided to the client;
- schedule for completion and a list of the project deliverables;
- division of work and work interfaces;
- identification of services to be performed outside the firm;
- allocation of staff, responsibilities and authority for each phase of the project;
- communications, procedures and client/staff liaison;
- identification and clarification of standards of services to be performed, including those which also have a subjective element;
- specific procedures, methods and task instructions;
- document and data control procedures;
- methods to change the Project Quality Plan as work proceeds;
- identification of verification and approval requirements at appropriate stages in the project;
- verification of the services to be performed out side the firm;
- identification of quality records.

… and other measures necessary to meet objectives as defined and requirements of the Quality Manual.

A4 EXAMPLE OF PROCEDURE

PROCEDURE FOR PRINTING ANNUAL REPORT

Scope of procedure: Production of Annual Report

Objective: Fulfil statutory requirement for financial reporting; Produce a report for member information and to double as a promotional tool.

Person responsible & lines of responsibility: Executive officer for organising editorial, print run and timing; Office assistant for distribution. Any comments or feedback to be noted and considered for next edition.

Timing: Annual, to be completed by mid June each year

Stakeholders: Members of ACENZ; legislative requirement of Incorporated Society; major client groups and national publicity.

Document & Record management: File Axxx; Library copy of finished document kept in safe. Management of records for work in progress: current editorial kept on PC file. All illustrations held in box file etc.

Control of Customer Product: Members provide illustrations – to be managed as per Procedure in Quality Management for Control of Customer product.

Documented Procedure:

Document Title: _____

Reviewer(s) : _____

Key Dates : _____

ITEM	DATE DUE	WHO DOES IT	DONE ✓
Cover design – proof			
Title page : Contains logo, date, title, address			
Proof-read for typos Checked by reviewer			
ANNUAL REPORT INPUTS • Board information • General information on the Industry • Annual Accounts & auditor's report - checked • Annual statistics & lists of contributors - check • Photos			
PROOFS [Review] • Check as above • Check completeness			
Alterations done			
ANNUAL REPORT OUTPUT Quality satisfactory **[Verification]** Verify quote - check print run Verify colours and photos costs			
Receive documents - copy in safe **[Doc mngmt]** Original disk filed in safe 3 Copies to National Archive 1 copy to Registrar of Inc Societies			

Document complete _____