

Frameworks for IT Management

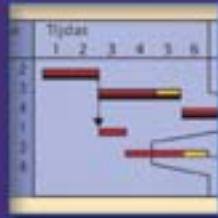


TQM
 ISO 9000
 TickIT
 ISO 27001
 ISO 20000



ITS-CMM
 Six Sigma
 eSCM
 IT BSC
 AS 8015

COBIT
 M_o_R®
 PrimaVera
 ASL, BiSL
 ISPL, ITIL®



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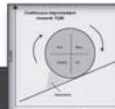


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Frameworks for IT Management

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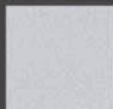


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About the ITSM Library

The publications in the ITSM Library cover best practice in IT Management and are published on behalf of itSMF Netherlands (itSMF-NL).

The IT Service Management Forum (itSMF) is the association for IT service organizations, and for customers of IT services. itSMF's goal is to promote innovation and support of IT management; suppliers and customers are equally represented within the itSMF. The Forum's main focus is exchange of peer knowledge and experience. Our authors are global experts.

The following publications are, or soon will be, available.

Introduction, Foundations and Practitioners books

- Foundations of IT Service Management based on ITIL® / IT Service Management – an introduction, based on ITIL® (Arabic, Chinese, Danish, German, English, French, Italian, Japanese, Korean, Dutch, Brazilian Portuguese, Russian, and Spanish)
- IT Services Procurement – an introduction based on ISPL (Dutch)
- Project Management based on PRINCE2™ 2005 Edition (Dutch, English, German)
- Practitioner Release & Control for IT Service Management, based on ITIL® (English)

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- IT Service Management – best practices, part 2 (Dutch)
- IT Service Management – best practices, part 3 (Dutch)

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- Six Sigma for IT Management (English)
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- Service Agreements – A Management Guide (English)
- Frameworks for IT Management (English)

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- IT Governance – a pocket guide based on COBIT (English, German)
- IT Service CMM – a pocket guide (English)
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Frameworks for IT Management



Colophon

| | |
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Foreword

Providing the best IT services at the lowest cost – this challenge is on most IT managers' agendas nowadays. The solution may be complex, but can't be achieved and sustained without the support of some kind of best-practice framework or quality management system. And, as most of you will have found out by now, in terms of frameworks there is not a single silver bullet for all situations.

However, as we've learned from discussions with our members, there is a huge number of management frameworks in the marketplace and this is confusing for most individual IT managers. Which framework could be – or should be – used in which situation? It's hard to make the right choice all the time. And it's quite impossible just to use all available frameworks, whether they are specially made for IT or IT Management or used as a general management framework, since many of them are overlapping or even conflicting.

So the big question is: how to select the right elements for your quality management system? I am pleased to say that we now have a book that makes it a lot easier for IT managers – who generally have little time to study – to find their way to the required information to make up their mind about the answer.

As for itSMF Netherlands, I am very proud to add this book to the ITSM Library. The book has been produced according to the high standards we apply for all ITSM Library books, written by well-known experts and severely reviewed by a number of enthusiastic and skilled itSMF members. On behalf of itSMF Netherlands, I wish to thank this review team for their efforts to support the quality of this book.

I know that you will find this guide informative and a valuable addition to your ITSM library in support of your journey toward service excellence.

Arjen Droog
CEO itSMF Netherlands

Endorsement Statement

For many reasons it has been very apparent that IT managers need frameworks to build their service management strategies. Seeing the vast number of management frameworks, it can be hard to choose the right one for IT Management in your own organization. Keeping up to the changes that occur to these frameworks is an added challenge.

I am pleased to say that this itSMF book makes it easy to get the necessary information to make the right decisions for your organization and serves our readers well. As the Chair for the itSMF International Publications Executive Sub Committee (IPESC), I am very proud to officially add our Committee's formal endorsement of this publication.

The IPESC, through its council of members, their efforts and dedication create added value to the community of ITSM professionals, by endorsing the development of a common global library which supports a uniform understanding of ITSM best practices and knowledge.

Our endorsement process is a rigorous one, with stringent criteria that any ITSM-related publication must meet before it can be endorsed by the IPESC.

On behalf of the itSMF global community, I wish to thank the IPESC for their efforts and endorsement of this book.

A handwritten signature in cursive script, appearing to read 'S. Taylor'.

Sharon Taylor
Chair, International Publications Executive Sub Committee
itSMF International

Acknowledgements

itSMF Netherlands would like to thank the great number of experts who have been involved in the development of this *Frameworks for IT Management* publication. With the help of 27 authors and a number of additional reviewers, we compiled this book to help IT managers find their way through the 'framework forest'. We owe all the team members our gratitude for supporting itSMF-NL in developing this management guide.

With the help of itSMF's International Publications Executive Sub Committee (IPESC) we established a list of the frameworks that were considered to be most relevant for IT managers. A uniform structure for all frameworks was defined, to support the interpretation of each framework from the same perspective. For each framework an author was selected, from the itSMF community. Authors have been found from all over the world. All authors are experts in the field of the management framework they describe, and in some cases they were the original authors of the framework itself.

We wish to thank them all for contributing to this book and participating in the thorough peer review process itSMF-NL applies to all its ITSM Library publications. The authors and reviewers together raised around 500 issues on the initial drafts. All these issues were taken into account by the different authors, revising and improving their chapters. The final results were presented to the Review Team and the Authors Team for a formal final sign-off.

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We also wish to thank Bert Hedeman for extending the cross-references of the various project management frameworks in this book.

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ISPL. He wrote Requests for Proposal for big and complex IT outsourcings in both the public and private sector and helped with vendor negotiations.

Additional reviewers

Besides the authors, who peer reviewed the chapters of their co-authors, the following people generously offered their time and knowledge to the reviewing process. We owe them our gratitude for giving us and the Authors Team the opportunity to improve the manuscript:

- **Signe-Marie Hernes Bjerke** - Det Norske Veritas, Norway
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- **Ricardo Mansur** - Empreendimentos Mansur, Brazil
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Editorial support

Tieneke Verheijen, the responsible editor for itSMF-NL, has done a great job, managing all the authors, supporting them in the authoring process, continuously improving the structure of the book on, making sure that no review issue escaped their attention, and that all issues were carefully processed. Without her dedication to the process and to the quality of the work, this book would have been impossible.

Given the desire for a broad consensus in the IT service management field, new developments, additional material and other contributions from IT service management professionals are welcomed to extend and further improve this publication. Any forwarded material will be discussed by the editorial team and where appropriate incorporated into new editions. Comments can be sent to the chief editor, email: jan.van.bon@itsmf.nl.

Jan van Bon
Chief editor itSMF Netherlands

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Introduction

IT management is one of the fastest growing fields of expertise in all management disciplines. High demands of customers, extremely short development cycles and huge costs have made this field one of the most important of all management domains. And in this field of IT management, awareness of the crucial role of IT services has been growing since the early 1990s.

This is the decade of IT service management, but the managers in this discipline have had little opportunity to obtain the training they need. Many managers in IT have learned on the job; some have been trained in one of the very few dedicated training programs available of which ITIL is at the top of the list. The lack of training, which puts a great deal of stress on managers in IT, and in IT related disciplines, needs to be addressed.

Learning on the job

The speed of development of the IT management domain has given public education programs little opportunity to cope with the demands of today's companies. They have not been able to develop curriculae that cover well embedded training in IT (service) management issues, let alone deliver students who have been trained properly as part of their regular educational program. Today higher education programs are starting to offer courses in IT service management. But it is still a long way from being a standard subject in higher education. This means that companies will continue to find a lack of knowledge in recent graduates: they too will have to learn on the job.

The 'framework forest'

This situation has stimulated the development, the import (from other disciplines) and the acceptance of managerial frameworks, methods and methodologies that support the modern IT manager. We have seen a large number of those frameworks in recent magazines and books, at conferences and seminars, and on the Web. No IT service provider can be taken seriously if they do not have a framework of their own. The problem is that there are now too many frameworks - the number has grown so fast that it has become hard to see the forest for the trees.

Gaps

itSMF, the IT Service Management Forum, is putting a great deal of effort into the development and dissemination of knowledge in the field of IT service management. With over thirty national chapters, a huge organization is acting in most corners of the world. Many publications of itSMF chapters are now finding their way to the practitioners in the field. itSMF has been greatly influential in developing the globally accepted best practice documentation of ITIL, and continues to do so. Conferences are showcasing the best practices and the latest developments. And websites make the latest information available for all to see.

This information is not just in English: many publications are being translated into ten or more languages. In translating these publications it has become clear that several publications contain material that is new to IT managers, especially in countries that are relatively new to the field of ITIL and IT service management.

More gaps

This is not the only gap that confronts us. We encounter similar problems in small and medium sized enterprises (SMEs). Management in these organizations is often quite unfamiliar with some of the core frameworks and methods (instruments).

Furthermore, we encounter problems in explaining our IT management instruments to business managers: although they frequently encounter the title of an instrument, they often know very little of its content.

Initiative

This situation has led to an initiative to create a publication that covers the most important frameworks we use, in such a way that readers can better understand the potential value of each of these instruments. The instruments are all described by well-known experts in that specific field, in a structured way, to emphasize the specific characteristics of each instrument, and explain how they could be used together:

- **Origin/history.** Where did the instrument come from? Who invented it? When? First publications? Ownership and copyright? Any well-known champions? Current status of development, any important revisions going on or planned?
- **Where is the instrument used?** Target groups or stakeholders? Any specific market sections? Restricted to any layer of management? Quantity details: number of adopting companies, number of certificates, 'installed base'? Acceptance as a standard? Qualification of standard (legal standard, industry standard, *de facto* best practice).
- **Description and core graphics.** Summary of the core characteristics of the instrument, supported by the core graphics. Structure, facts and figures. Objectives? Benefits? Process model? Any certification programs attached (person or company focus)?
- **Approach/how to.** Management guidance: How to apply the instrument? How to implement it? How to position it? Expected outcome? Specific costs? Business case? Frequent pitfalls?
- **Relevance to IT management.** Why is this instrument *specifically* relevant to IT management? What are the main IT management problems that can be solved with it?
- **Strengths and weaknesses.** Where does the instrument prove most of its value? Most successful application? Why consider using it? Established flaws in the instruments. Any acknowledged gaps? Where should/will the instrument be improved?
- **Cross-references/relationships.** Relationships with other frameworks or management instruments.
- **Links and literature.** Where can we find the core information and the most practical information on this instrument? Any user organizations or communities of practice?

Not all of these questions could be answered for each of the selected frameworks. In some cases the information on the number of adopting companies was simply not available, or the framework did not have a certification structure. For others the cross-reference to some of the other frameworks was not available. Each framework was described by an author who was very familiar with the subject, using it in their daily practice. This enabled them to write the chapter from the position of the framework domain, emphasizing the core elements from that very same practice. However, since these domains can vary widely, the resulting chapters will vary as well. The fact that a standard structure was used for each of the chapters will make them comparable.

Scoping

We have created a shortlist of the instruments that are described in this publication, using a number of criteria:

- recognized to be best practice in IT management
- core instrument for many IT managers
- vendor-neutral
- copyright arrangements must be in place
- written in an accessible and plain way.

The shortlist of frameworks in this first edition of the itSMF Management Frameworks guide contains (in alphabetical order):

- **AS 8015** – The Australian Standard for Governance of IT.
- **ASL** – the Application Services Library
- **BiSL** – the Business Information Services Library
- **COBIT** – Control Objectives in IT and related Technology
- **eSCM** - the eSourcing Capability Model of Carnegie Mellon University
- **eTOM** - the enhanced Telecom Operations Map; the most widely used and accepted standard for business process in the telecom industry
- **Generic Framework for Information Management** – the framework produced in PrimaVera: the Program for Research in Information Management at the University of Amsterdam
- **IPMA Competence Baseline** – a standard for managers of projects, programs and project portfolios
- **ISO/IEC 20000** (former BS15000) - Standard on IT service management
- **ISO 27001** (ISO 17799/BS7799) - Standard on Information Security
- **ISO 9000** (GB/T 19000) - Standard on Total Quality Management
- **ISPL** – the Information Services Procurement Library
- **IT Balanced Scorecard** – the management system for strategic performance and results
- **ITIL** – the IT Infrastructure Library
- **ITS-CMM** – the IT Service Capability Maturity Model
- **PMBok** – the Project Management Body of Knowledge
- **PRINCE2** – Projects in Changing Environments
- **M_o_R** – Management of Risk
- **MSP** – Managing Successful Programmes
- **Six Sigma** – the Six Sigma Model for Quality Management
- **TickIT** - Quality management for IT
- **TQM** – Total Quality Management: the Fourteen Points of Management of Dr. W. Edwards Deming

Some frameworks that were selected for this book could not be delivered within the development timeframe. These frameworks will be added in a second edition:

- **CMMI** – the Capability Maturity Model Integration (Staged and Continuous)
- **COPC2000** - Customer Operations Performance Center standard on call center operations
- **EFQM** – the European Foundation of Quality Management Model.

The editing team is open to suggestions to add any other core management frameworks that are relevant to the IT manager. Suggestions can be forwarded to the chief editor (jan.van.bon@itsmf.nl).

Procedure

All draft framework chapters have been peer-reviewed by the other co-authors, and by experts from itSMF. These reviews revealed further options for improvement of the various chapters, and assured that the chapters were well aligned. The content was managed by expert editors, making sure that the resulting text qualified as ‘easy reading’.

Presentation of the chapters

There are many ways to present twenty two management frameworks, but none would contain ‘the ultimate truth’. Therefore we do not present an umbrella structure where all presented frameworks fit together. If you are interested in an overall graphic that positions each of the frameworks, see Figure 13.5 in the chapter on the Generic Framework for Information Management.

There is, however, one way of bringing a kind of order to the list, and that is by means of a simple categorization, based on how and where the frameworks are used. This is illustrated in Table 0.1. Several frameworks contain material that could be allocated to more than one category; the frameworks are categorized according to their *main* characteristics.

| Category | Type | Frameworks |
|-------------------------------|---|---|
| Quality management | Frameworks that focus on quality standards, applied to specific IT domains (services, security, development, general) | TQM ISO 9000 TickIT ISO 27001/BS17799 ISO/IEC 20000 |
| Quality improvement | Frameworks that focus on improvement of processes, performance or other, not focusing on how-to aspects of operating the IT | ITS-CMM Six Sigma eSCM-SP IT Balanced Scorecard |
| IT governance | Frameworks that focus on how to organize the IT function in terms of responsibilities, controls, organization | AS 8015 COBIT M_o_R |
| Information management | Frameworks that focus on how to perform and organize certain aspects of IT management, such as procurement, service delivery, requirements. | Generic Framework for Information Management BiSL ISPL ITIL eTOM ASL |
| Project management | frameworks that focus on project, program and portfolio management, not specifically IT | MSP PRINCE2 PMBOK IPMA Competence Baseline |

Table 0.1 Categorization of management frameworks

This is the structure that we have applied for this book. It groups the various frameworks into a number of categories that have some coherence, but the reader will still be able to determine which chapters to read first.

Responsible bodies

The frameworks are managed by bodies of various types. The nature of these bodies may be relevant in the selection of frameworks by a specific organization. Table 0.2 provides an overview of the responsible bodies.

| Framework | Responsible body | Characterization of the responsible body |
|---|--|---|
| AS 8015 | Standards Australia | Non-government Australian standards management body standards.org.au |
| BiSL | ASL Foundation | Public foundation with participants and knowledge partners www.aslfoundation.org |
| COBIT | ISACA's IT Governance Institute (ITGI) | Research think tank on IT-enabled business systems governance for the global business community, affiliated to ISACA www.itgi.org |
| eSCM | Carnegie Mellon University, through its IT Services Qualification Center (ITSqc) | University research center www.itsqc.cmu.edu |
| eTOM | TeleManagement Forum (TM Forum) | Forum for information and communications services, with an open membership of more than 500 companies www.tmforum.org |
| Generic Framework for Information Management | University of Amsterdam | University |
| IPMA Competence Baseline | International Project Management Association (IPMA) | International network of national project management societies www.ipma.ch |
| ISO/IEC 20000 (formerly BS15000) | International Standards Organization (ISO) | ISO is a network of the national standards institutes of 157 countries, on the basis of one member per country, with a central secretariat in Geneva, Switzerland, that coordinates the system. It manages international standards. www.iso.org |
| ISO 27001 (ISO 17799/BS7799) | International Standards Organization (ISO) | See text on ISO above |
| ISO 9000 (GB/T 19000) | International Standards Organization (ISO) | See text on ISO above |
| ISPL | ISPL Consortium, presided by EXIN | The European Committee has created the ISPL Consortium to develop ISPL to be a <i>de facto</i> standard. |
| IT Balanced Scorecard | None | Copyrights of publications on IT Balanced Scorecard are with the authors of the publications. |

Table 0.2 Frameworks and the responsible bodies

| Framework | Responsible body | Characterization of the responsible body |
|-----------|---|--|
| ITIL | Office of Government Commerce (OGC), United Kingdom | OGC is an independent office of the UK's HM Treasury and works with public sector organizations to help them improve their efficiency and gain better value for money from their commercial activities. www.ogc.gov.uk |
| ITS-CMM | -Vrije Universiteit Amsterdam -CIBIT | IT Service CMM is downloadable for free; the Vrije Universiteit Amsterdam and CIBIT contributed to IT Service CMM. |
| PMBok | Project Management Institute (PMI®) | The PMI is one of the principal professional non-profit organizations in the project management field. www.pmi.org |
| PRINCE2 | Office of Government Commerce (OGC), United Kingdom | See text on OGC above. |
| M_o_R | Office of Government Commerce (OGC), United Kingdom | See text on OGC above. |
| MSP | Office of Government Commerce (OGC), United Kingdom | See text on OGC above. |
| Six Sigma | None | Six Sigma has an active user community; its most important online community is www.isixsigma.com . |
| TickIT | Joint TickIT Industry Steering Committee (JTISC) | The Joint TickIT Industry Steering Committee (JTISC) has overall responsibility for the scheme Rules and Procedures (see ecommittees.bsi-global.com/bsi/controller?levelinkDataID=985990 for terms of reference) and is accountable to BSI's Standards Policy and Strategy Committee and each of the three parent bodies: <ul style="list-style-type: none"> • British Computer Society (BCS) – with prime responsibility for professional, educational and technological requirements • BSI Standards Development (in their role as TickIT Scheme Manager) with prime responsibility for standardization, international harmonization, certification, accreditation and general public interest requirements • Intellect (a trade body for the IT industry) – with prime responsibility for the IT industry commercial requirements. |
| TQM | None | - |

Table 0.2 Frameworks and the responsible bodies (continued)

Additional reading

This Frameworks Guide is intended to help you in finding your way to useful management frameworks that are not always easy to find. Each chapter contains references to additional information sources, to be used if you want to learn more about a specific framework. We hope that it will prove to be a valuable book in the unlocking and demystifying of a number of management frameworks that we consider to belong in our core management toolbox.

1 TQM - Total Quality Management

Total Quality Management (TQM) is a complete management vision in which everyone in the organization is continuously incentivized to fulfill the wishes of the internal and external customer, in order to reach a competitive advantage.

| | |
|--------------------------------|--|
| <i>Owner of the copyright:</i> | None |
| <i>Distribution:</i> | Worldwide |
| <i>Origin/history:</i> | Evolved from quality improvement philosophies from the early 20th century |
| <i>When:</i> | From the 1970s |
| <i>Founding fathers:</i> | A.V. Feigenbaum, W. Edwards Deming, Joseph M. Juran. |
| <i>Certification bodies?</i> | No certification possible - ISO 9000:2000 certification indicates that an organization is working according to TQM principles. EFQM, MBNQA and INK are evolved from TQM. |
| <i>Useful tools:</i> | Plan-Do-Check-Act, brainstorming, Pareto analysis, statistical process control, benchmarking, Just-in-time, among others. |

By Jacqueline van der Bent

1.1 Origin/history

1.1.1 A long history of quality management

Quality management has a long history. Evidence of the first sign of quality control dates as far back as the building of the pyramids. An example of quality control and inspection closer to home is the Dutch guilds. Rembrandt van Rijn's famous painting 'De Staalmeesters' (in English 'staalmeesters' means something like 'guild masters') is actually a portrait of quality inspectors, which takes its name from the steel pair of tongs used by the 'staalmeesters' to attach a piece of lead on the hallmarked textiles.

1.1.2 Inspection

Industrial development at the end of the 18th and at the beginning of the 19th centuries led to the demand for new methods and techniques to control the quality of the growing number of manufactured products. Tools, such as a rational jig, fixture and a gauging system ensured a certain amount of standardization. This standardization was mainly initiated by the US arms industry at the beginning of the 19th century. The function of quality inspector had begun. This specialist role strengthened the idea that the inspection of products could be done much more efficiently by one person; nowadays products are no longer assessed by the eye but by a more reliable gauging system.

1.1.3 Statistical quality control

When production processes grew more complex and mass production became of significance, the demand for uniformity and standardization grew as well. This gave the initial impetus to the development of statistical quality control.

In 1924 Bell Telephone Laboratories investigated how to manufacture products with a maximum of quality information against a minimum of inspection information.

This was the basis for today's knowledge about statistical quality control, especially on process control and sampling.

The techniques used to control the quality of products were fairly static and focused on tracking problems within the manufacturing process. At the end of the 1950s a new development was announced: quality assurance.

1.1.4 Quality assurance

Tracking problems and inspecting and controlling manufacturing processes is no longer sufficient to guarantee the quality of a product. Other disciplines and management have to play a role. Although quality assurance is mainly concerned with the quality standard ISO 9000, some other elements deserve attention.

- **Costs of quality** - The main exponent of costs of quality is Joseph M. Juran. In 1951 he wrote that one should make a distinction between quality costs that are avoidable and quality costs that are unavoidable. For the first time, managers realized that decisions taken at the beginning of the manufacturing process have far-reaching implications for the level of quality costs that may appear later in the manufacturing process and in the service process. These ideas resulted in the concept of Total Quality Control.
- **Total Quality Control** - A.V. Feigenbaum developed this concept and stated that these products that need to comply with high quality requirements should not be produced in an isolated manufacturing situation. Quality starts with design and ends with service to the customer. Strong co-operation is essential to prevent mistakes in the future. Feigenbaum as well as W. Edwards Deming¹ and Juran was convinced that management is responsible for the system functioning properly.
- **Reliability Engineering** - The arrival of aerospace technology and electronics led the US Department of Defense to draw up a reliability program, which focuses on a product's performance over time.

1.1.5 The introduction of quality awards

In 1945, at the end of World War Two, Japanese industry had been reduced to ashes. Products still being produced were cheap and of low quality. The Japanese therefore decided to take on as much as possible of the successful production techniques and management methods of the Allied

¹ Edwards Deming has been inspired by Walter Shewhart, one of his teachers already advocating a 'Learning and Improvement cycle'. The PDCA-cycle of Edwards Deming is also known as the PDSA-cycle, which stands for 'Plan-Do-Study-Act'. In this case, the results are studied instead of checked.

Powers. McArthur encouraged them in this effort and invited experts such as Deming to Japan. Deming visited Japan in 1947 and in 1950 as an advisor in sampling techniques. He trained Japanese managers in statistical quality control. While Deming's ideas on quality were accepted only to a limited extent in his home country, Japanese companies immediately accepted them and adapted them to their own way of working.

To encourage organizations to achieve excellent research in the theory or application of statistical quality control, the Union of Japanese Scientists and Engineers (JUSE) instituted the Deming Prize in 1951. It is named after Deming to honor him for his contribution to the introduction and development of statistical control in Japan. He introduced a new concept to an existing simple diagram of a cycle for quality improvement (see Figure 1.1).

Today the cycle is known as the Plan-Do-Check-Act cycle (in short, the P-D-C-A cycle), also known as the Deming cycle, Deming himself always referred to it as the Shewhart cycle after its originator Shewhart, Deming's former colleague at Bell Laboratories. The cycle proposes a thorough planning of the production of a product (Plan), the production itself (Do), checking whether the production of the product still matches the plan (Check) and taking action when there is a need to adapt the product if the check shows that production is not according to plan and to improve the product (Act). It is a continuous improvement process that is still used in manufacturing companies; it is also applicable to non-profit companies where it is used for the improvement of project outcomes.

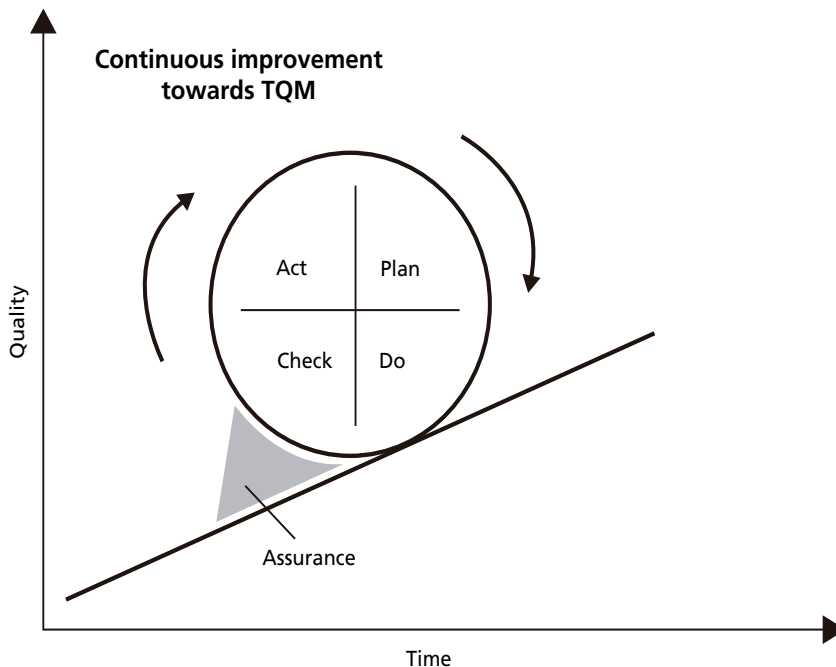


Figure 1.1 The P-D-C-A cycle

1.2 Where is TQM used?

Starting in the European and American industries in order to catch up with Japanese competition in the 1970s and 1980s, Total Quality Management (TQM) is now a world-wide recognized organizational change vision based on quality management. It is used in large and small profit and non-profit organizations.

TQM is not used as a single instrument. It is a collection of views and approaches on organizational change with related methodologies and techniques, all leading to a profound change in the way the organization is managed.

It is possible to use a selection of TQM methodologies and techniques as a company-wide approach or to apply a single technique in a department (e.g. statistical process control in manufacturing).

1.3 Description

Since Taylor², TQM is one of the business theories with the most impact on business management. Starting as a new view on product quality in the 1970s and 1980s, it soon became a management tool for gaining a strategic lead on competitors and organizational change. From that time on, many methodologies and techniques were developed to support management.

In general, management strives for a balance between high productivity, low cost and maximum profit. TQM is based upon this fundamental principle. To achieve this, TQM focuses on:

- statistical process control
- process management
- continuous improvement
- zero defects
- education and training
- the role of management
- teamwork.

To keep the improvement process alive, customer and employee satisfaction, communication, deployment and cultural change are essential to achieve business excellence.

Today, quality is no longer an issue for the central quality department manager alone, but for line management in particular. Quality can no longer be delegated. All aspects important to running a business from mission, vision and strategy involvement of employees, entrepreneurship, process management, customer focus, working together with suppliers, continuous learning and business results are part of TQM. These elements are the fundamentals of the management models of EFQM and MBNQA.³

2 Frederick Winslow Taylor, *Scientific Management - Comprising Shop Management, The principles of Scientific Management and Testimony before the Special House Committee* (New York 1964). Taylor (1856-1917) was an American engineer who introduced scientific methods (time and motion studies) to optimize the way tasks were performed by craftsmen. The results of his studies positively influenced the efficiency of the production process.

3 The European Foundation for Quality Management (EFQM) Excellence Model and the Malcolm Baldrige National Quality Award (MBNQA, USA) and their links to TQM are explained in the cross-reference section 1.7.

At the same time TQM provides management with a set of tools and techniques to support the organization in the change process.

Top management is considered to be the driving force behind the change process, dealing with questions such as the following:

- is our management team ready for this new way of working/thinking?
- is the organization ready for this (cultural) change?
- is competition driving us for a change (survival scenario) or is it something that we, as the management team believe in?
- do we have a vision of the future and is there a clear strategy?
- how do we cope with resistance?
- how do we set up an implementation network?
- do we have funding for education and training?
- how do we reward our employees for their efforts?

When a clear business plan based on TQM is formulated and ready to implement in the organization, a range of methodologies and techniques are available to support the implementation process.

These techniques can be categorized as:

- leading change techniques, such as:
 - policy deployment
 - benchmarking
 - customer satisfaction surveys
 - employee motivation survey
 - managerial audits and self assessments (EFQM/MBNQA)
- process management techniques specifically for:
 - development, for example Taguchi, Shainin
 - manufacturing, e.g. SPC, process capability, Six Sigma
 - logistics and supply management, e.g. Just-in-time, Kan ban
- group dynamics, such as:
 - brainstorming
 - force field analysis
- problem solving:
 - Pareto diagram
 - cause and effect diagram.

1.4 Approach/how to

If the organization is not ready yet for the EFQM or MBNQA approach (see cross- reference section 1.7), it is possible to start on a smaller scale. Whatever improvement program an organization starts with it will always have to work on its mission, vision and strategy, its processes, its customer focus, internally as well as externally, and teamwork to create organizational change. The following five step approach can be applied. The approach is based on the actors gradually become involved in the change process.

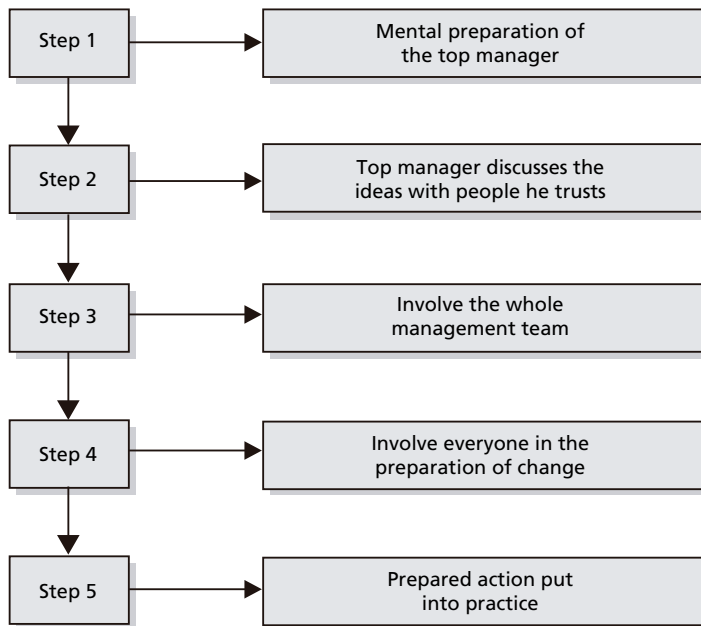


Figure 1.2 The five step approach for change

- **Step 1** - Not everything is clearly developed in the beginning. It is not only the question of whether the top manager has the right skills to act as the champion of change, but also whether his/her ideas will lead to the expected change. Using peers to try out the ideas is very useful. This step is all about mental preparation, knowing what has to be accomplished and how.
- **Step 2** - The still rough ideas are discussed with people who the top manager fully trusts. Feedback is received on how to communicate the new ideas and arguments for pros and cons are discussed. The vision and approach becomes clearer. The framework is ready to be presented to the management team.
- **Step 3** - To involve the management team in the desired changes, the top manager has to explain, argue, convince and motivate his/her colleagues. Honesty, openness and patience are essential values. Pushing to get the ideas across is useless and will lead to resistance. The aim of this step is to prepare a clear image of the changes and a first framework of the implementation plan together with the management team.
- **Step 4** - Once the management team owns the change it is now the task of every individual to act as a champion of change in his/her own department and translate the vision to elements important for this particular department. At the end of this step everyone should be involved in the change process.
- **Step 5** - The central aim of this step is to keep the change process going while stimulating the new initiatives of people who are really driving the change, keeping track of those staying behind and balancing the speed of change. Successes should be communicated and celebrated.

Note that the steps 1 to 5 are not a linear process; unexpected turns will happen.

1.5 Relevance to IT management

The specific TQM methods and techniques based on technical engineering principles were adopted by software engineers in the 1980s. The fast growing importance of software, software development and information technology in industry resulted in a need for software and IT dedicated models, methods and tools. In particular, the efficiency and effectiveness of the software development processes needed to be improved. This was because for an increasing number of products the product development lead-time was determined by the lead-time of the software development (e.g. product in the consumer electronics industry). The TQM principles of ‘step-by-step’ and continuous improvement were adopted by CMM, for example.

IT policy is never a stand-alone policy, but is part of the policy of the organization. This sets the context for the IT policy, but new developments in IT can lead to other directions in the policy of the organization. They influence each other. When getting the best out of both they add value to the organization by improving efficiency, effectiveness and quality of processes: basic TQM principles.

Improving processes in an organization is impossible when the information on which decisions and subsequent initiatives are based lack accuracy and completeness. The first product whose quality should be ensured is the management information: it serves all the other products and processes. This is why TQM is important for IT: it should ensure that information is reliable and safe.

1.6 Strengths and weaknesses

The management models of EFQM and MBNQA have provided management with a clear structure, supporting material and best practices, but TQM remains disputable. As long as TQM exists there will be supporters and non-believers.

1.6.1 Strengths

Whatever an individual’s point of view, TQM has brought the discussion on quality to the agenda of the management board; it is sometimes even seen as a competitive edge. But there are more positive elements to observe:

- it is now widely understood that profound changes take time and that everyone in the organization plays an essential role
- thinking in terms of (business) processes and cross-functional teams is generally accepted
- focus on the customer and gaining business results are very much related,
- employees are a valuable asset with a lot of knowledge about all kinds of processes. They play a key role in improving these processes
- P-D-C-A is a widespread and easy-to-use model (see Figure 1.1)
- continuous learning is a means for survival.

1.6.2 Weaknesses

The abundance of methodologies and techniques makes it difficult to find the best way and it takes some experience to choose the right elements. Some pitfalls include:

- too much focus on internal processes and less on external results
- the idea that standards are not essential

- the development of its own bureaucracy: steering group, working groups, process teams, all with their meeting reports, action plans and lacking focus
- separate plans for business strategy and quality
- 'me too' syndrome starting just because the competition is doing so
- starting too quickly with insufficient thought spent on the implications, preparations and consequences
- once started the organization needs to have the discipline to continue and to put time and effort in the implementation process. If this cannot be managed, it should not start to implement TQM

1.7 Cross-references/relationships

Depending on how the scope of TQM is defined in a particular organization, a number of references can be identified for this subject.

When management is interested in a business-wide general improvement process, it is very likely that they will start with programs that have the basics in place such as ISO 9000:2000.

As well as ISO 9000, TQM strived for overall business improvement. ISO 9000 is seen as the fundamental cornerstone to assure that the organization has the capability to meet its customers' requirements.

Gaining experience on how to organize changes, define and measure process outputs and how to bring the requirements and satisfaction of customers to the fore in the organization will gradually migrate to the EFQM or Malcolm Baldrige models.

The European Foundation for Quality Management Excellence model (Europe) and the Malcolm Baldrige National Quality Award (US, MBNQA) support management teams with an approach that gives structure to the journey to business excellence. They are based upon the TQM concepts and principles.

The EFQM Excellence Model (also referred to as the Business Excellence Model) is the European Foundation for Quality Management's model for TQM. It was introduced as a framework for assessing and improving organizations.

With the importance of IT in modern businesses it is clear that an excellent organization needs robust IT (management) systems. Within the umbrella concept of TQM, IT models such as TickIT, ITS-CMM, CMMI, ITIL and ASL play a part in the ability of an organization to respond to change.

The objective of CMM is measuring and optimizing a software development organization. The methods and techniques used are based on the quality principles of TQM.

TQM, as well as ITIL, focused on the customer and the processes in an organization. The difference is that ITIL is mainly concerned with the IT processes of an organization.

Table 1.1 gives an overview of TQM related models.

| | Basics | Advanced |
|--------------------|--|---|
| General | ISO 9000:2000 | EFQM Malcolm Baldrige Award Six Sigma |
| IT specific | TickIT ISO 27001 ISO 20000 ISPL | ITS-CMM CMMI COBIT ITIL ASL |

Table 1.1 TQM related models

1.8 Links and literature

1.8.1 Books on quality

- Bent, B.J. van der (Rotterdam 1999), “Organisatieleren: een zoektocht naar de geheugendragers en de rol van organisatiegeheugen in veranderingsprocessen”. Van der Bent.
- Conti, T. (1993), “Building Total Quality. A guide for management”. Chapman and Hall.
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- GOAL/QPC publisher of pocket guides:
 - Memory jogger (tools for continuous improvement)
 - The creative tools memory jogger (creative thinking)
 - Memory jogger 9000/2000 (implementing ISO 9001)
 - Project Management Memory jogger

1.8.2 Articles on quality

- MacLeod, A. and L. Baxter (2001), “The Contribution of Business Excellence Models in Restoring Failed Improvement Initiatives”, *European Management Journal*, 4, p.392-403.
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- March, A., “A Note on Quality: The Views of Deming”, Juran, and Crosby, *IEEE Engineering Management Review*, Vol. 24, No. 1, Spring 1996, pp. 6-14.

1.8.3 Website references

- **www.deming.org** - Deming Institute
- **www.efqm.com** - European Foundation for Quality Management
- **www.ink.nl** - Quality Institute for the Netherlands
- **www.iso.org** - International Organization for Standardization
- **www.juran.com** - Juran Institute
- **www.kaizen-institute.com** - Kaizen Institute
- **www.kdi.nl** - Dutch Foundation for Quality
- **www.olkk.nl** - On line kwaliteitskring, Dutch quality circle
- **www.vck.be** - Flemish Quality Management Centre

2 ISO 9000 - Quality Management Systems

International Organization for Standardization 9000; 2000 (ISO 9000:2000) is a generic name given to a series of standards that have been developed to address the Quality Management Systems (QMS) within an organization to demonstrate its capability to meet its customers' requirements.

| | |
|---|--|
| <i>Owner of the copyright:</i> | International Standards Organization (ISO), www.iso.org |
| <i>Distribution:</i> | Widely used in the international service sector and manufacturing |
| <i>Origin/history:</i> | Developed from the British Standards Institution's BS 5750 |
| <i>When:</i> | Initial version ISO 9000 released 1987; latest version released 2000 |
| <i>Certification bodies?</i> | Various national accreditation bodies such as UKAS (United Kingdom Accreditation Service) audit the auditors and certify that the registrars are competent and authorized to issue certificates in specified business sectors. They have agreements with each other ensuring that certificates issued by any one of them are accepted worldwide. |
| <i>Number of certified organizations:</i> | 760,900 implementations in 154 countries; the service sector accounts for 31 per cent of the 9001:2000 certificates |

By Samantha Alford

2.1 Origin/history

The ISO 9000 standard is maintained by ISO and administered by international accreditation and certification bodies. The standard is widely used in the service sector and manufacturing. However the high costs associated with adopting the Standard and difficulties with implementation have led many companies to use alternatives (e.g. IC 9700, or IC 9200 or an in-house standard). The Standard has evolved over several revisions as detailed below.

ISO 9000 was developed from the British Standards Institution's BS 5750, whose purpose was to provide a common contractual document which demonstrates that industrial production is controlled. Once BS 5750 was produced, key industry bodies adopted this standard in preference to their own. The initial 1987 version of ISO 9000 followed the same structure as BS 5750. This document, while structured like the British Standard, drew heavily from a number of international documents. Even though the Standard has been revised twice since 1987 it retains the core, prevention-oriented, quality assurance requirements.

The 1994 version emphasized quality assurance via preventive actions, and continued to require evidence of compliance with documented procedures. Unfortunately this was implemented

within companies through the creation of procedure manuals; companies became burdened with an ISO bureaucracy. Adapting and improving processes could be particularly difficult in this kind of environment.

The 2000 version, ISO 9000:2000, sought to change thinking by putting the concept of process management in the forefront of the Standard. Documents produced by the ISO Technical Committee which drafted the third edition make it clear that they did not see any change in the essential goals of the Standard, which had always been about 'a documented system' not a 'system of documents'. The goal was always to have management system effectiveness via process performance metrics. The third edition makes this more visible and reduces the emphasis on having documented procedures if clear evidence can be presented to show that the process is working well.

Expectations of continual process improvement and tracking customer satisfaction were made explicit at this revision. Unfortunately too many organizations continue to produce unnecessary documents and to write quality systems around the paragraph structures of ISO 9001 rather than analyzing their business processes and building systems around the process flow of the organization.

2.2 Where is ISO 9000 used?

The International Organization for Standardization (ISO) is an international network which identifies and develops International Standards for business, government and society. A broad base of stakeholder groups is involved, from which an international consensus is achieved. The ISO 9000 family of standards is one of ISO's most widely used standards. Through this Standard ISO has sought to become a point of reference for quality management requirements in business-to-business activities. Although ISO standards are voluntary they are widely respected and accepted in both the public and private sectors. ISO 9000 has been implemented on a worldwide basis in 760,900 organizations in 154 countries. The service sector accounts for 31 per cent of the 9001:2000 certificates.

ISO 9000 is made up of three sections:

- ISO 9000:2000 - Quality Management Systems - Fundamentals and Vocabulary.
- ISO 9001:2000 - Quality Management Systems - Requirements.
- ISO 9004:2000 - Quality Management Systems - Guidelines for Performance Improvement.

ISO 9000:2000 is a single quality management requirements standard that is applicable to all organizations, products and services. It is not restricted to any particular layer of management and clearly defines the roles of each business area with regard to quality management. Tables 2.1 and 2.2 indicate the responsibilities (as defined in the Standard) of senior management and others within the business for quality management:

Under the ISO international agreement all international standards have to be re-inspected five years after publication. In the case of ISO 9001:2000 a new version should be published during 2008 (i.e. five years after ISO 9001:2000 became the mandatory standard for quality management).

| Position | Responsibility |
|---------------------------|--|
| Managing Director | <ul style="list-style-type: none"> • Establish, document and define organizational policy and objectives • Approve the QMS • Management review • Design control |
| Quality Manager | <ul style="list-style-type: none"> • Internal audit • Resolution of QMS discrepancies • Control and maintenance of the QMS • Quality documentation and (quality) change control procedures • Quality training |
| Financial Director | <ul style="list-style-type: none"> • Control of budget and finance • Supplier selection and purchasing • Contract management, control and review • Management and co-ordination of sales and support functions |

Table 2.1 Organizational responsibilities – senior management

| Position | Responsibility |
|-------------------------------------|---|
| General Managing | <ul style="list-style-type: none"> • Planning and co-ordination • Design control • Estimating • Project management • Control of contract documentation • Supplier selection and purchasing • Definition of installation, inspection, test and maintenance requirements • Training |
| Business Development Manager | <ul style="list-style-type: none"> • Sales • Estimating • New product identification and evaluation • System design |
| Sales Managers | <ul style="list-style-type: none"> • Quotations • Contract review and order processing • Sales order processing |
| Support Manager | <ul style="list-style-type: none"> • Control of production and measuring equipment • Maintenance of support stores • Processing of sales orders • Purchasing |
| Engineers | <ul style="list-style-type: none"> • Installation, repairs, testing and maintenance activities • Control of equipment and materials allocated |
| Warehouse | <ul style="list-style-type: none"> • Stock control • Stock replenishment • Protection and preservation of stock • Receiving inspection • Packaging and dispatch |
| Administration | <ul style="list-style-type: none"> • Sales database administration • Checking of sales orders • Allocation of order reference numbers |

Table 2.2 Organizational responsibilities – others

2.3 Description and core graphics

ISO 9000:2000 certifies that an organization has carried out the correct processes. It does not, however, provide a guarantee of the quality of the end product. Throughout the Standard the need for continuous improvement is heavily emphasized.



Figure 2.1 ISO logo (source: International Organization for Standardization)

ISO 9000:2000 has four major generic business processes covering:

- the management of resources
- the quality of the product
- the maintenance of quality records
- the requirement for continual improvement.

The aim of ISO 9000:2000 is to assist users in producing a Quality Management System that is flexible, structured and customer-orientated. ISO is the only standard that can be used for the certification of a QMS and its generic requirements can be used by any organization to:

- address customer satisfaction
- meet customer and applicable regulatory requirements
- enable internal and external parties (including certification bodies) to assess the organization's ability to meet these customer and regulatory requirements.

ISO 9001:2000 and ISO 9004:2000 have been developed as a consistent pair of QMS standards, based on eight quality management principles with a common process-oriented structure and harmonized terminology. They are designed to be used together, or may be used as standalone documents. These eight principles are of primary concern to any organization, as they will affect that organization's overall approach to quality. These principles:

- reflect best practice
- are designed to enable a continual improvement of the business and its overall efficiency
- are capable of responding to customer needs and expectations.

Figure 2.2 shows the eight quality management principles.

ISO 9000:2000 is compatible with other internationally recognized management system standards, for example those dealing with environmental management, occupational health and safety. ISO 9000:2000 does not include any requirements that are specific to these other management systems. However, it does allow an organization to align and integrate its QMS

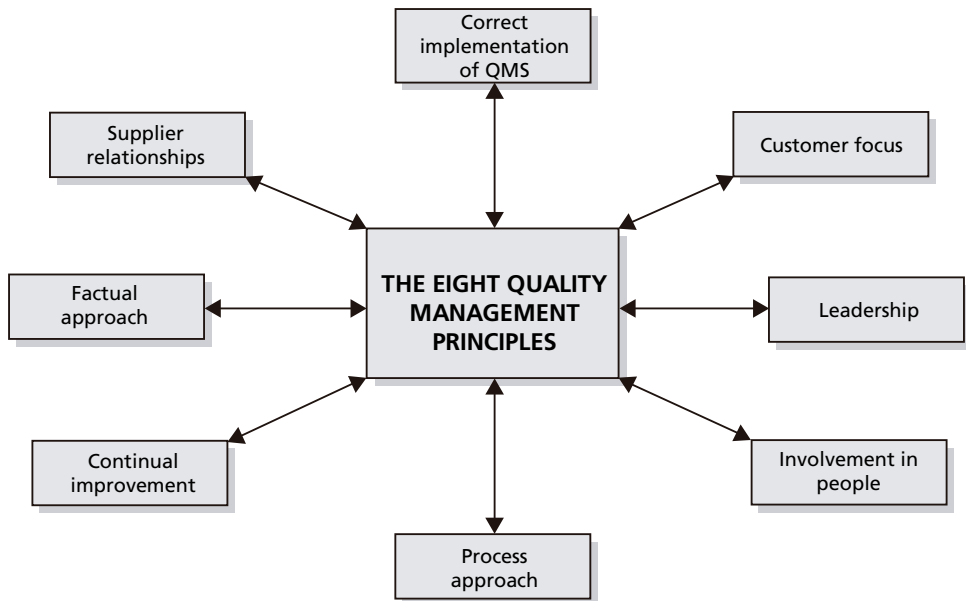


Figure 2.2 The eight quality management principles

with other management system requirements. It may therefore be possible for an organization to adapt its existing health and safety or environmental management system in order to produce a QMS that complies with ISO 9000:2000.

It is intended that by using this Standard, organizations can save time, effort and money by:

- avoiding confusion about the objectives of the audit program
- conducting a combined environmental/quality audit
- ensuring audit reports follow the best format and contain all the relevant information
- evaluating the competence of audit team members against the appropriate criteria.

In terms of the ISO Standard the phrases quality system and quality management system mean one and the same thing. A quality system, however, is neither a manual (i.e. a document) nor a computer program; it is a system that contains all the things that are used to regulate, control, and improve the quality of a product and/or service. It is a network of interrelated processes with each process made up of the people, activities, records, and resources that are required to transform inputs into outputs.

2.4 Approach/how to

The structure of the Standard is as follows:

- Section 1 - Scope
- Section 2 - Normative reference
- Section 3 - Terms and definitions
- Section 4 - Quality Management System

- Section 5 - Management responsibility
- Section 6 - Resource management
- Section 7 - Product realisation
- Section 8 - Measurement, analysis and improvement.

For certification purposes, an organization will have to possess a documented management system that takes the inputs and transforms them into targeted outputs. This is something that (in an effective manner):

- says what is to be done
- does what it was said should be done
- keeps a record of everything that was done (especially if things go wrong).

The basic process to achieve these targeted outputs will encompass:

- the customer requirements
- the inputs from management and staff
- documented controls for any activities that are required to produce the finished article
- delivering a product or service that satisfies the customer's original requirements.

It is important to recognize that it is not possible to be certified to ISO 9000. Although the certification is usually referred to as an ISO 9000:2000 certification, the actual standard to which an organization's quality management can be certified is ISO 9001:2000. For an organization to become registered to the Standard, audit by both an external certification body and by internal staff are required. The aim of this is to demonstrate that a continuous process of review and assessment has been carried out and to show that the system is working as intended, to identify areas for improvement and to correct any problems. There is no difference between being certified and being registered. In some countries organizations will say that they are certified while in others they will say that they are registered. An ISO certificate must be renewed at regular intervals as recommended by the certification body (usually after three years).

In order for an organization to be ISO 9000 certified or registered, an independent registrar will audit the QMS, certify that it meets the requirements of ISO 9001:2000 and provide written assurance that ISO's quality management system standard has been met and that the organization has been registered as certified. On the other hand, for an organization to be ISO 9000 compliant, it must meet ISO's quality system requirements but does not have to be formally certified by an independent registrar (i.e. it self-certifies compliance). While compliance is perfectly acceptable for many organizations, especially smaller ones, an official certificate issued by an independent register tends to carry more weight in the marketplace.

ISO does not itself certify organizations. In many countries accreditation bodies such as UKAS (United Kingdom Accreditation Service), audit the auditors and certify that the registrars are competent and authorized to issue certificates in specified business sectors. These various national accreditation bodies have agreements with each other, ensuring that certificates issued by one of them are accepted worldwide. Both the accreditation bodies and certification bodies require payment for their services.

Under the 2000 Standard auditors are expected to go beyond mere auditing for ‘compliance’ and to focus on risk, status and importance. They make judgements on what is effective rather than concentrating on what has been formally prescribed. This is to answer the questions; ‘Will this process help you achieve your stated objectives? Is it a good process or is there a better one/way to do it better?’.

2.5 Relevance to IT management

ISO 9000:2000 is relevant to all organizations, products and services. It is therefore not specifically relevant to IT management. However, if there is a problem with the quality of the system, work will often need to be redone. This leads to a loss of productivity and wasted resources. Incorporation of a quality management system can mitigate against this. Through a focus on customer service and continuous improvement it is possible to ensure that the organization is not perceived to be neglectful or overselling a product. Customer service can also be enhanced by providing support and training and by overcoming errors within systems.

ISO has a set of guidelines to assist in the implementation of ISO 9001:2000 in the software sector (ISO/IEC 90003:2004 Software engineering, Guidelines for the application of ISO 9001:2000 to computer software). These guidelines provide support for organizations in the application of ISO 9001:2000 to the acquisition, supply, development, operation and maintenance of computer software and related support services. ISO/IEC 90003:2004 does not change the requirements of ISO 9001:2000 and its guidelines are not intended to be used as assessment criteria for registration/ certification.

ISO/IEC 90003:2004 is appropriate to software in the following situations:

- part of a commercial contract with another organization
- a product available for a specific market sector
- a product used to support an organization’s processes
- a product embedded in a hardware product or related to software services.

Some organizations may be involved in all the above activities; others may specialize in one area. Whatever the situation, the organization’s QMS should cover all aspects (software related and non-software related) of the business. ISO/IEC 90003:2004 identifies the issues which should be addressed and is independent of the technology, lifecycle models, development processes, sequence of activities and organizational structure used by an organization.

2.6 Strengths and weaknesses

The greatest strength of ISO 9001:2000 is that it provides a single quality management ‘requirements’ standard that is applicable to all organizations, products and services. It is the only standard that can be used for the certification of a QMS and its generic requirements can be used by any organization to:

- address customer satisfaction
- meet customer and applicable regulatory requirements

- enable internal and external parties (including certification bodies) to assess the organization's ability to meet these customer and regulatory requirements.

Many companies have found the transition to conforming to ISO 9000 difficult. This has raised many criticisms. The main disadvantages are:

- the process is costly
- there is a lot of administration
- gaining accreditation is time-consuming
- adhering to ISO 9000 makes processes more consistent; however, it also makes it more difficult to improve and adapt processes
- it may not be appropriate to apply a process such as ISO 9000 to a field requiring creativity, such as software engineering
- ISO 9000 can reinforce bad management behavior as audits can become confrontational rather than an opportunity to improve things
- many companies only register to ISO 9000 because they are forced to do so by the marketplace - irrespective of whether the Standard is appropriate to their business
- ISO 9000:2000 does not give much practical advice but instead focuses on general principles.

ISO 9000 is, however, particularly useful as a point of reference in business to business activities. Shantanu Narayen, President and Chief Operating Officer of Adobe claims that 'standards are the engine enabling our industry to develop software in a low risk, cost-effective manner' in an interview in the March 2006 issue of ISO Focus.

2.7 Cross-references/relationships

ISO 9000:2000 is compatible with the ISO 14000 series of Standards (environmental management) as well as national/international health and safety management standards and forms the cornerstone for the integrated management of quality, environment, health and safety. While ISO 9000 family is primarily concerned with quality management the ISO 14000 family is an Environmental Management System (EMS) that is aimed at continually reducing pollution through the more efficient and responsible use of raw materials and the minimization of energy usage and waste.

ISO/IEC 90003:2004 (*Software engineering -- Guidelines for the application of ISO 9001:2000 to computer software*) provides guidance for organizations using ISO 9001:2000 to purchase, supply, develop, operate and maintain computer software and related support services.

Cross-reference to other sections of this book:

- **TQM** ISO 9000:2000 is aimed at improving an organization's overall quality performance and provides a stepping stone to Total Quality Management
- **TickIT** procedures relate directly to the requirements set out in ISO 9001:2000 and similarly to this Standard, certification is conducted by an independent third party certification body using specialist auditors trained by the International Register of Certificated Auditors (IRCA) with the support of the British Computer Society

- **ISO 27001** (ISO 17799/BS7799) - Standard on Information Security ISO/IEC 27001:2005 is designed to ensure the selection of adequate and proportionate security controls that protect information assets and give confidence to interested parties
- **ISO/IEC 20000** promotes the adoption of an integrated process approach to effectively deliver managed services to meet the business and customer requirements. ISO/IEC 20000-2 is a code of practice, and describes the best practices for service management. These can both link in to the ISO 9000:2000 customer service mandate
- **Six Sigma** – the Model for Quality Management Six Sigma is a process-focused methodology designed to improve business performance through improving specific areas of strategic business processes
- **ITIL** - if an organization has intentions to become ISO 9000 certified, the ITIL processes can speed up the process to reach the desired and mandatory levels of quality
- **ASL** - when ASL processes (at maturity level 2 to 3) are implemented within an application management organization, this organization should be close to being able to achieve ISO 9000 certification
- **PRINCE2** has a section covering quality. Although ISO 9000:2000 is not specifically mentioned it is implied that a project management system must have a quality bias as the industry standard ISO 9000:2000 would be the method to achieve this quality
- **PMBoK** fits into the process philosophy of modern quality management in project-oriented companies
- **IPMA** Competence Baseline is based on the EFQM Model and fits better into the process philosophy of modern quality management in project-oriented companies.

2.8 Links and literature

More detailed information on ISO 9000:2000 and its sector specific guidance documents can be obtained from national ISO member bodies. Other standards in the *ISO Catalogue* associated with the software lifecycle can be found in the ISO online catalogue classified under ICS 35.080 *Software* (e.g. ISO/IEC 14598 - software product evaluation).

The following books and websites may also be useful:

- Ray Tricker and Bruce Sherring-Lucas, “ISO 9001:2000 in Brief” (Oxford 2001).
- Ray Tricker, “ISO 9001: 2000 Audit Procedures” (Oxford 2002).
- Ray Tricker, “ISO 9001:2000 The Quality Management Process” (VHP, Zaltbommel 2006).
- www.iso.org
- en.wikipedia.org
- emea.bsi-global.com
- www.aslfdoundation.org

