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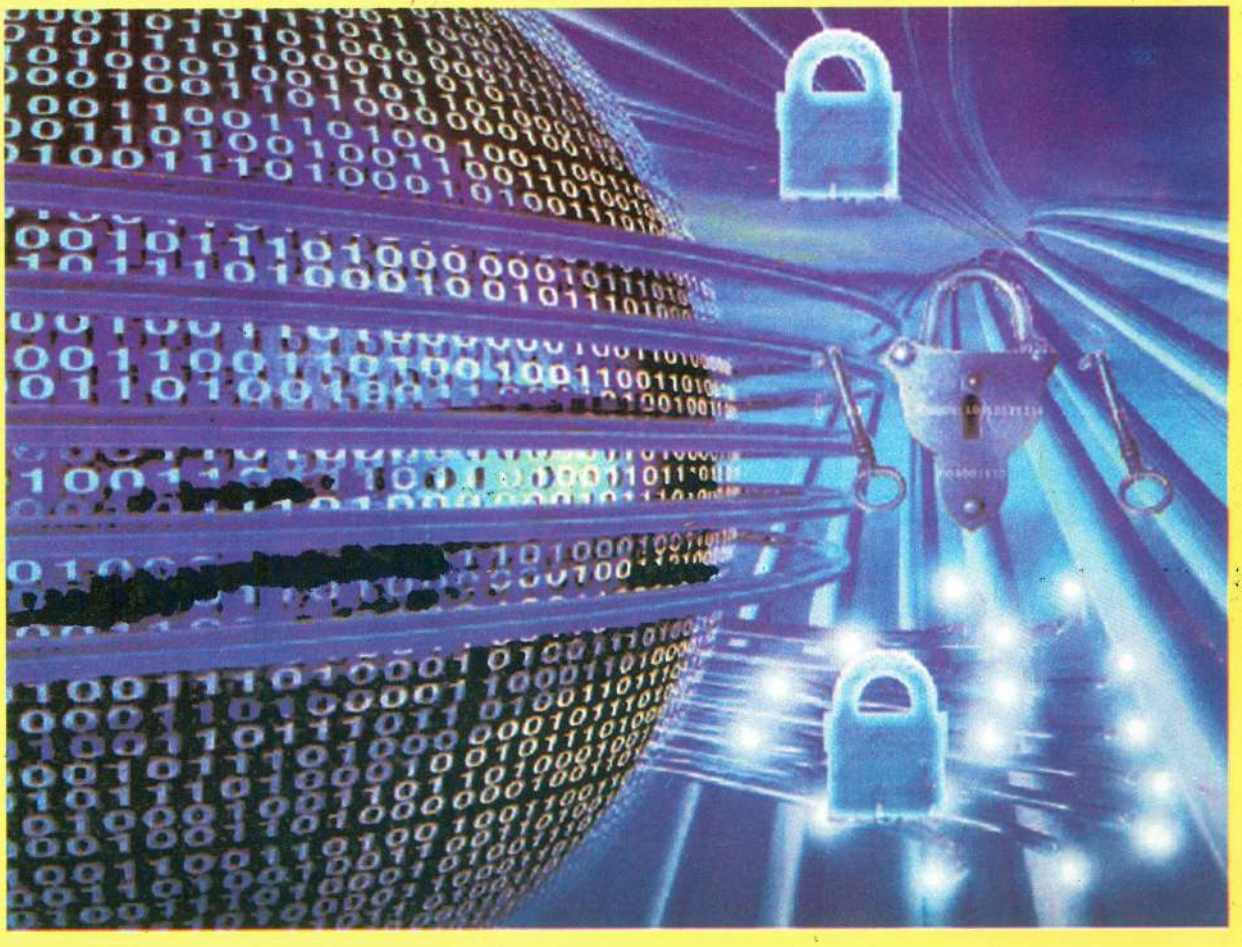

ISO Standards

2

"शिक्षा मानव को बन्धनों से मुक्त करती है और आज के युग में तो यह लोकतंत्रा की भावना का आधार भी है। जन्म तथा अन्य कारणों से उत्पन्न जाति एवं वर्गगत विषमताओं को दूर करते हुए मनुष्य को इन सबसे ऊपर उठाती है।"

- इन्दिरा गांधी

"Education is a liberating force, and in our age it is also a democratising force, cutting across the barriers of caste and class, smoothing out inequalities imposed by birth and other circumstances."

- Indira Gandhi

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Block

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ISO STANDARDS

Programme Expert/Design Committee of Post Graduate Diploma in Information Security (PGDIS)

Prof. K.R. Srivathsan
Pro Vice-Chancellor, IGNOU

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Ms. Mansi Sharma, Assistant Professor, School of Law, IGNOU

Ms. Urshla Kant
Assistant Professor, School of Vocational Education & Training, IGNOU
Programme Coordinator

Block Preparation

Unit Writer

Dr. Sunil Kumar Khatri
Head, Department of Computer Applications
Lingaya's University
Nachauli, Old Faridabad
(Unit 1)

Block Editors

Adv. Vaishali Kant
B.A.LL.B, LLM
National Law School of India University, Bangalore

Ms. Urshla Kant
Assistant Professor, School of Vocational Education & Training, IGNOU

Proof Reading

Ms. Urshla Kant
Assistant Professor
School of Vocational Education & Training
IGNOU

Production

Mr. B. Natrajan
Dy. Registrar (Pub.)
MPDD, IGNOU, New Delhi

Mr. Jitender Sethi
Asstt. Registrar (Pub.)
MPDD, IGNOU, New Delhi

Mr. Hemant Parida
Proof Reader
MPDD, IGNOU, New Delhi

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BLOCK INTRODUCTION

Standards make an enormous and positive contribution to most aspects of our lives. Standards ensure desirable characteristics of products and services such as quality, environmental friendliness, safety, reliability, efficiency and interchangeability – and at an economical cost.

When products and services meet our expectations, we tend to take this for granted and be unaware of the role of standards. However, when standards are absent, we soon notice. We soon care when products turn out to be of poor quality, do not fit, are incompatible with equipment that we already have, are unreliable or dangerous. When products, systems, machinery and devices work well and safely, it is often because they meet standards. And the organization responsible for many thousands of the standards which benefit the world is ISO.

The vast majority of ISO standards are highly specific to a particular product, material, or process. However, ISO 9001 (quality) and ISO 14001 (environment) are "generic management system standards". "Generic" means that the same standard can be applied to any organization, large or small, whatever its product or service, in any sector of activity, and whether it is a business enterprise, a public administration, or a government department. ISO 9001 contains a generic set of requirements for implementing a quality management system and ISO 14001 for an environmental management system. Generic standards can be applied to any organization. This block comprises of one unit and is designed in the following way;

The **Unit one** is a complete case study of ISO Standards. ISO is the world's leading developer of International Standards. ISO standards specify the requirements for state-of-the-art products, services, processes, materials and systems, and for good conformity assessment, managerial and organizational practice. ISO standards make a positive contribution to the world we live in. They ensure vital features such as quality, ecology, safety, economy, reliability, compatibility, interoperability, efficiency and effectiveness. They facilitate trade, spread knowledge, and share technological advances and good management practices.

ISO (International Organization for Standardization) is a global network that identifies what International Standards are required by business, government and society, develops them in partnership with the sectors that will put them to use, adopts them by transparent procedures based on national input and delivers them to be implemented worldwide. ISO standards distil an international consensus from the broadest possible base of stakeholder groups. Expert input comes from those closest to the needs for the standards and also to the results of implementing them. In this way, although voluntary, ISO standards are widely respected and accepted by public and private sectors internationally.

ISO-a non-governmental organization-is a federation of the national standards bodies of 165 countries, one per country, from all regions of the world, including developed, developing and transitional economies. Each ISO member is the principal standards organization in its country. The members propose the new standards, participate in their development and provide support in collaboration with ISO Central Secretariat for the 3 000 technical groups that actually develop the standards.

ISO collaborates with its partners in international standardization, the IEC (International Electrotechnical Commission) and the ITU-T (International Telecommunication Union), particularly in the field of information and communication technology. They have established the World Standards Cooperation (WSC) as the focus for their combined strategic activity.

ISO has a strategic partnership with the World Trade Organization (WTO) aiming to promote a free and fair global trading system. Signatories to the WTO Agreement on Technical Barriers to Trade (TBT) commit themselves to promoting and using international standards of the type developed by ISO.

ISO cooperates closely with most of the specialized agencies and bodies of the United Nations that are involved in technical harmonization and assistance to developing countries.

ISO also maintains close working relations with regional standards organizations, many of whose members also belong to ISO. In addition, several hundred specialized organizations representing trade or regulatory sectors participate in developing ISO standards.

New growth areas for ISO standards in the coming years include:

- The environment – with standards for meeting new requirements such as greenhouse gas verification (climate change mitigation) and for other aspects of sustainable development;
- The service sectors – with standards already being developed for personal financial services, market opinion, social research and tourism;
- Security – among aspects already addressed are maritime port security, freight transport and countering illegal trafficking of radioactive materials;
- Good managerial and organizational practice – such as the guidelines ISO is developing on societal responsibility.

In addition, ISO is well placed to provide voluntary standards for formerly regulated areas such as energy, water supply or transportation.

Hope you benefit from this block.

ACKNOWLEDGEMENT

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UNIT 1 STUDY OF ISO STANDARDS: A COMPLETE CASE STUDY

Structure

1.0 INTRODUCTION

Standards make an enormous and positive contribution to most aspects of our lives. Standards ensure desirable characteristics of products and services such as quality, environmental friendliness, safety, reliability, efficiency and interchangeability – and at an economical cost.

When products and services meet our expectations, we tend to take this for granted and be unaware of the role of standards. However, when standards are absent, we soon notice. We soon care when products turn out to be of poor quality, do not fit, are incompatible with equipment that we already have, are unreliable or dangerous.

When products, systems, machinery and devices work well and safely, it is often because they meet standards. And the organization responsible for many thousands of the standards which benefit the world is ISO.

The vast majority of ISO standards are highly specific to a particular product, material, or process. However, ISO 9001 (quality) and ISO 14001 (environment) are "generic management system standards". "Generic" means that the same standard can be applied to any organization, large or small, whatever its product or service, in any sector of activity, and whether it is a business enterprise, a public administration, or a government department. ISO 9001 contains a generic set of requirements for implementing a quality management system and ISO 14001 for an environmental management system.

Generic standards can be applied to any organization.

1.1 OBJECTIVES

After studying this unit, you should be able to understand:

- origin and need of ISO Standards;
- how ISO System is managed;
- how ISO Standards are developed;
- partners and Members of ISO;
- ISO Certification Process;
- about ISO 9000;
- about ISO 14000;

- about ISO/IEC 27001; and
- gone through some case studies on ISO Standards Implementation.

1.2 ISO OVERVIEW

1.2.1 Origin

When the large majority of products or services in a particular business or industry sector conform to International Standards, a state of industry-wide standardization exists. The economic stakeholders concerned agree on specifications and criteria to be applied consistently in the classification of materials, in the manufacture and supply of products, in testing and analysis, in terminology and in the provision of services. In this way, International Standards provide a reference framework, or a common technological language, between suppliers and their customers. This facilitates trade and the transfer of technology.

In 1946, delegates from 25 countries met in London and decided to create a new international organization, of which the object would be "to facilitate the international coordination and unification of industrial standards". The new organization, ISO, officially began operations on 23 February 1947, in Geneva, Switzerland. The name is derived from the Greek isos, meaning "equal". Whatever the country, whatever the language, the short form of the organization's name is always ISO.

1.2.2 What ISO Standards do?

ISO standards:

- make the development, manufacturing and supply of products and services more efficient, safer and cleaner
- facilitate trade between countries and make it fairer
- provide governments with a technical base for health, safety and environmental legislation, and conformity assessment
- share technological advances and good management practice
- disseminate innovation
- safeguard consumers, and users in general, of products and services
- make life simpler by providing solutions to common problems

1.2.3 Who Benefits from ISO?

ISO standards provide technological, economic and societal benefits.

For **businesses**, the widespread adoption of International Standards means that suppliers can develop and offer products and services meeting specifications that have wide international acceptance in their sectors. Therefore, businesses using International Standards can compete on many more markets around the world.

For **innovators** of new technologies, International Standards on aspects like terminology, compatibility and safety speed up the dissemination of innovations and their development into manufacturability and marketable products.

For **customers**, the worldwide compatibility of technology which is achieved when products and services are based on International Standards gives them a broad choice of offers. They also benefit from the effects of competition among suppliers.

For **governments**, International Standards provide the technological and scientific bases underpinning health, safety and environmental legislation.

For **trade officials**, International Standards create "a level playing field" for all competitors on those markets. The existence of divergent national or regional standards can create technical barriers to trade. International Standards are the technical means by which political trade agreements can be put into practice.

For **developing countries**, International Standards that represent an international consensus on the state of the art are an important source of technological know-how. By defining the characteristics that products and services will be expected to meet on export markets, International Standards give developing countries a basis for making the right decisions when investing their scarce resources and thus avoid squandering them.

For **consumers**, conformity of products and services to International Standards provides assurance about their quality, safety and reliability.

For **everyone**, International Standards contribute to the quality of life in general by ensuring that the transport, machinery and tools we use are safe.

For **the planet** we inhabit, International Standards on air, water and soil quality, on emissions of gases and radiation and environmental aspects of products can contribute to efforts to preserve the environment.

1.2.4 Benefits

Standardization of screw threads helps to keep chairs, children's bicycles and aircraft together and solves the repair and maintenance problems caused by a lack of standardization that were once a major headache for manufacturers and product users.

Standards establishing an international consensus on terminology make technology transfer easier and safer. They are an important stage in the advancement of new technologies and dissemination of innovation.

Without the standardized dimensions of freight containers, international trade would be slower and more expensive.

Without the standardization of telephone and banking cards, life would be more complicated.

A lack of standardization may even affect the quality of life itself: for the disabled, for example, when they are barred access to consumer products, public transport and buildings because the dimensions of wheel-chairs and entrances are not standardized.

Standardized symbols provide danger warnings and information across linguistic frontiers.

Consensus on grades of various materials gives a common reference for suppliers and clients in business dealings.

Agreement on a sufficient number of variations of a product to meet most current applications allows economies of scale with cost benefits for both producers and consumers. An example is the standardization of paper sizes.

Standardization of performance or safety requirements of diverse equipment makes sure that users' needs are met while allowing individual manufacturers the freedom to design their own solution on how to meet those needs.

Standardized computer protocols allow products from different vendors to "talk" to each other.

Standardized documents speed up the transit of goods, or identify sensitive or dangerous cargoes that may be handled by people speaking different languages.

Standardization of connections and interfaces of all types ensures the compatibility of equipment of diverse origins and the interoperability of different technologies.

Agreement on test methods allows meaningful comparisons of products, or plays an important part in controlling pollution – whether by noise, vibration or emissions.

Safety standards for machinery protect people at work, at play, at sea and at the dentist's.

Without the international agreement contained in ISO standards on metric quantities and units, shopping and trade would be haphazard, science would be unscientific and technological development would be handicapped.

1.2.5 Conformity Assessment

"Conformity assessment" means checking that products, materials, services, systems, processes or people measure up to the specifications of a relevant standard or specification. Today, many products require testing for conformity with specifications or compliance with safety, or other regulations before they can be put on many markets. ISO guides and standards for conformity assessment represent an international consensus on best practice. Their use contributes to the consistency of conformity assessment worldwide and so facilitates trade.

1.2.6 Who can Join ISO?

Membership of ISO is open to national standards institutes most representative of standardization in their country (one member in each country).

- Full members, known as **member bodies**, each have one vote, whatever the size or strength of the economy of the country concerned.
- **Correspondent members** pay reduced membership fees. They are entitled to participate in any policy or technical body as observers, with no voting rights.
- **Subscriber members** also pay reduced membership fees. They are institutes from countries with very small economies that nevertheless wish to maintain contact with international standardization.

Although individuals or enterprises are not eligible for membership, both have a range of opportunities for taking part in ISO's work:

- Individuals may be selected by national member institutes to serve as **experts on national delegations** participating in ISO technical committees
- Individuals and enterprises may provide their input during the process of developing a national consensus for presentation by the delegation. This may done through national **mirror committees** to the corresponding ISO technical committee
- International organizations and associations, both non-governmental and representing industry sectors, can apply for **liaison** status to a technical committee. They do not vote, but can participate in the debates and the development of consensus.

1.3 ISO FEATURES

- **Democratic**

  Every full member of ISO has the right to take part in the development of any standard which it judges to be important to its country's economy. No matter what the size or strength of that economy, each participating member in ISO has one vote. Each country is on an equal footing to influence the direction of ISO's work at the strategic level, as well as the technical content of its individual standards.

- **Voluntary**

  ISO standards are voluntary. As a non-governmental organization, ISO has no legal authority to enforce the implementation of its standards. ISO does not regulate or legislate. However, countries may decide to adopt ISO standards – mainly those concerned with health, safety or the environment – as regulations or refer to them in legislation, for which they provide the technical basis. In addition, although ISO standards are voluntary, they may become a market requirement, as has happened in the case of ISO 9001 quality management systems, or of dimensions of freight containers and bank cards. ISO itself does not regulate or legislate.

- **Market-driven**

  ISO only develops standards for which there is a market requirement. The work is mainly carried out by experts from the industrial, technical and business sectors which have asked for the standards, and which subsequently put them to use.

- **Consensus**

  ISO standards are based on international consensus among the experts in the field. Consensus, like technology, evolves and ISO takes account both of evolving technology and of evolving interests by requiring a periodic review of its standards at least every five years to decide whether they should be maintained, updated or withdrawn. In this way, ISO standards retain their position as the state of the art.

- **Globally relevant**

  ISO standards are technical agreements which provide the framework for compatible technology worldwide. They are designed to be globally relevant-useful everywhere in the world.

1.4 MANAGEMENT OF ISO SYSTEM

All strategic decisions are referred to the ISO members, who meet for an annual General Assembly. The proposals put to the members are developed by the ISO Council, drawn from the membership as a whole, which resembles the board of directors of a business organization.

ISO Council meets twice a year and its membership is rotated to ensure that it is representative of ISO's membership.

ISO's operations are managed by a **Secretary-General**, which is a permanent appointment resembling the chief executive of a business enterprise. The Secretary-General reports to the ISO Council, the latter being chaired by the **President** who is a prominent figure in standardization or in business, elected for two years.

The Secretary-General is based at **ISO Central Secretariat** in Geneva, Switzerland, with a compact staff which provides administrative and technical support to the ISO members, coordinates the decentralized standards' development programme, and publishes the output.

ISO launches the development of new standards in response to the sectors that express a clearly established need for them. An industry or business sector communicates its requirement for a standard to one of ISO's national members. The latter then proposes the new work item to ISO as a whole. If accepted, the work item is assigned to an existing technical committee. Proposals may also be made to set up technical committees to cover new scopes of activity.

At the end of 2010, there were 3274 technical bodies in the ISO system, including 214 ISO technical committees.

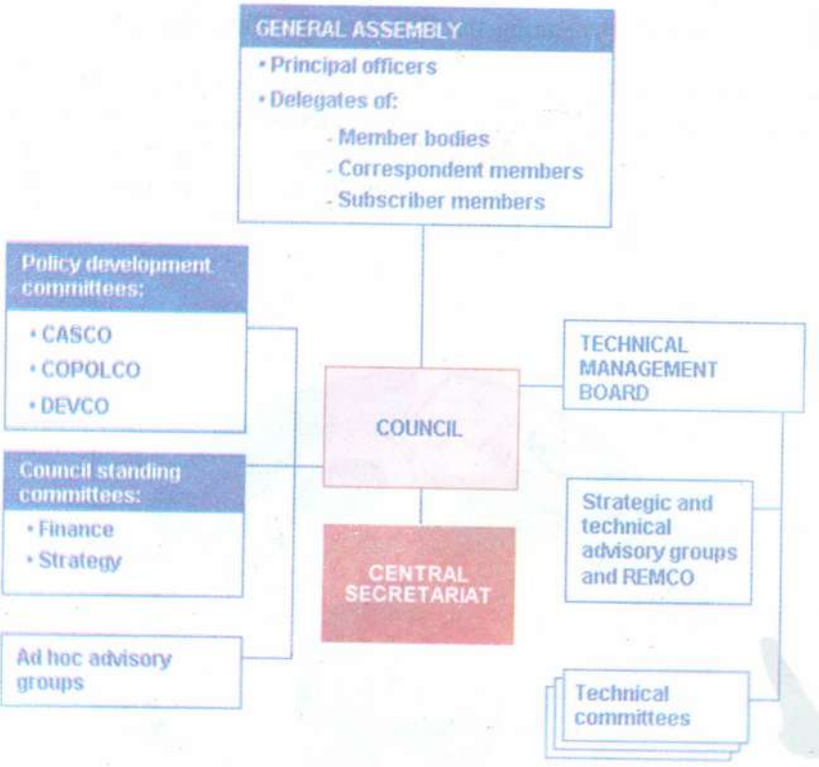

Fig. 1: ISO Council

The focus of the technical committees is specialized and specific. In addition, ISO has three general policy development committees that provide strategic guidance for the standards' development work on cross-sector aspects. These committees ensure that the specific technical work is aligned with broader market and stakeholder group interests. They are:

- CASCO (conformity assessment)
- COPOLCO (consumer policy), and
- .DEVCO (developing country matters).

1.4.1 Objectives and Structure of CASCO

ISO/CASCO is ISO's policy development committee on conformity assessment, reporting to the ISO Council. CASCO, as it is commonly referred to, was established in 1970 to study means of conformity assessment, prepare documents concerning the practice and operation of conformity assessment, and to promote their use.

CASCO's terms of reference and objectives are to:

- Study means of assessing the conformity of products, processes, services and management systems to appropriate standards or other technical specifications
- Prepare standards and guides relating to the practice of testing, inspection and certification of products, processes and services, and to the assessment of management systems, testing laboratories, inspection, certification and accreditation bodies, and their operation and acceptance
- Promote mutual recognition and acceptance of national and regional conformity assessment systems, and the appropriate use of International Standards for testing, inspection, certification, assessment and related purposes.

CASCO membership is open to all ISO member bodies as participating (P) or observer (O) members, with both developing and industrialized countries well represented.

CASCO also assists implementing the ISO Strategic Plan 2011-2015.

CASCO has a structure that reflects it's various roles of policy development, writing of technical documents, promotion of those documents and monitoring market feedback on the use of those documents. A continual improvement cycle is in place to ensure that CASCO provides globally relevant documents that reflect modern conformity assessment practice.

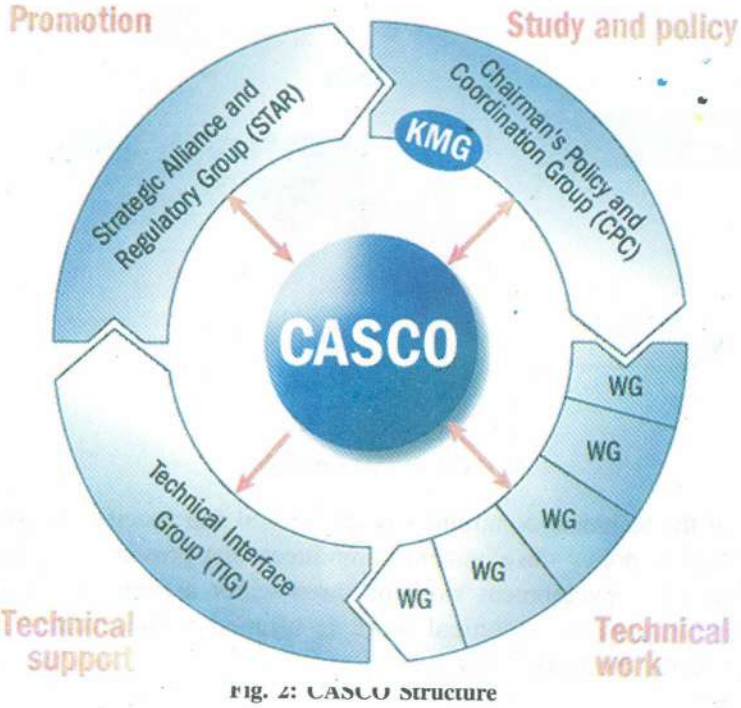

Fig. 2: CASCO Structure

1.4.2 COPOLCO's Objectives

Through the ISO Committee on consumer policy (COPOLCO), ISO undertakes to:

- Make COPOLCO's services available to ISO members worldwide
- Support its members in developing consumer participation in standards-making
- Study how consumers can benefit from standardization
- Promote the positive role of standards in consumer protection
- Encourage the exchange of experience on standards work of consumer interest

- Channel consumers' views into both current standards projects and proposals for new work in areas of interest to consumers.

1.4.3 DEVCO

ISO has established a policy committee – DEVCO – specifically to address the needs of developing countries. Developing countries need to focus both on acquiring world-class technological competence and on achieving a good understanding of the technical requirements underlying global trade. For over 40 years, ISO has been assisting in both these areas through ISO/DEVCO, the ISO Committee on developing country matters. DEVCO's membership comprises over 135 national standards institutes from industrialized as well as developing countries.

The committee has four main objectives:

- To identify the needs and requirements of developing countries in the fields of standardization and related activities and to assist the developing countries, as necessary, in defining these needs and requirements.
- Having established these needs and requirements, to recommend actions to assist the developing countries in meeting them.
- To monitor the implementation of *The ISO Action Plan for developing countries.*
- To provide a forum for the discussion of all aspects of standardization and related activities, and for the exchange of experience among developed and developing countries.

In all these activities, DEVCO works closely with other ISO policy committees (COPOLCO – dealing with consumer matters, CASCO – dealing with conformity assessment), the Technical Management Board (TMB), as well as with specialized agencies of the United Nations and with the International Electrotechnical Commission (IEC).

1.5 DEVELOPMENT OF ISO STANDARDS

ISO standards are developed by technical committees comprising experts from the industrial, technical and business sectors which have asked for the standards, and which subsequently put them to use. These experts may be joined by representatives of government agencies, testing laboratories, consumer associations, non-governmental organizations and academic circles.

The experts participate as national delegations, chosen by the ISO national member institute for the country concerned. These delegations are required to represent not just the views of the organizations in which their participating experts work, but of other stakeholders too.

According to ISO rules, the member institute is expected to take account of the views of the range of parties interested in the standard under development. This enables them to present a consolidated, national consensus position to the technical committee. ISO standards are developed by experts from the sectors which have asked for them.

The national delegations of experts of a technical committee meet to discuss, debate and argue until they reach consensus on a draft agreement. This is circulated as a Draft International Standard (DIS) to ISO's membership as a whole for comment and balloting.

Many members have public review procedures for making draft standards known

The draft International Standard (DIS) is circulated to all ISO member bodies by the ISO Central Secretariat for voting and comments within a period of five months. It is approved for submission as a final draft International Standard (FDIS) if a two-thirds majority of the P-members of the TC/SC are in favour and not more than one-quarter of the total number of votes cast are negative. If the approval criteria are not met, the text is returned to the originating TC/SC for further study and a revised document will again be circulated for voting and comment as a draft International Standard.

Stage 5: Approval Stage

The final draft International Standard (FDIS) is circulated to all ISO member bodies by the ISO Central Secretariat for a final Yes/No vote within a period of two months. If technical comments are received during this period, they are no longer considered at this stage, but registered for consideration during a future revision of the International Standard. The text is approved as an International Standard if a two-thirds majority of the P-members of the TC/SC is in favour and not more than one-quarter of the total number of votes cast are negative. If these approval criteria are not met, the standard is referred back to the originating TC/SC for reconsideration in light of the technical reasons submitted in support of the negative votes received.

Stage 6: Publication Stage

Once a final draft International Standard has been approved, only minor editorial changes, if and where necessary, are introduced into the final text. The final text is sent to the ISO Central Secretariat which publishes the International Standard.

Review of International Standards (Confirmation, Revision, Withdrawal)

All International Standards are reviewed at the least three years after publication and every five years after the first review by all the ISO member bodies. A majority of the P-members of the TC/SC decides whether an International Standard should be confirmed, revised or withdrawn.

1.6 ISO PARTNERS AND MEMBERS

1.6.1 International Partners

ISO collaborates with its partners in international standardization, the International Electrotechnical Commission (IEC) and International Telecommunication Union (ITU). The three organizations, all based in Geneva, Switzerland, have formed the World Standards Cooperation (WSC) to act as a strategic focus for collaboration and the promotion of international standardization.

ISO has a close relationship with the World Trade Organization (WTO) which particularly appreciates the contribution of ISO's standards to reducing technical barriers to trade.

ISO collaborates with the United Nations (UN) Organization and its specialized agencies and commissions, particularly those involved in the harmonization of regulations and public policies, such as:

- CODEX Alimentarius, on food safety measurement, management and traceability
- UN Economic Commission for Europe (UN/ECE), on the safety of motor vehicles and the transportation of dangerous goods
- World Health Organization (WHO), on health technologies

- International Maritime Organization (IMO), on transport security
- World Tourism Organization (UNWTO), on the quality of services related to tourism.

In addition, ISO cooperates with UN organizations that provide assistance and support to developing countries, such as the United Nations Conference on Trade and Development (UNCTAD), the United Nations Industrial Development Organization (UNIDO) and the International Trade Centre (ITC).

ISO's technical committees have formal liaison relations with over 600 international and regional organizations.

ISO has reinforced its links, too, with international organizations representing different groups of stakeholders, including:

- World Economic Forum (WEF)
- Consumers International (CI)
- World Business Council for Sustainable Development (WBCSD), and
- International Federation of Standards Users (IFAN).

Lastly, ISO also collaborates regularly with the major international organizations for metrology, quality and conformity assessment.

1.6.2 Regional Partners

Many of ISO's members also belong to regional standardization organizations. ISO has recognized regional standards organizations representing Africa, the Arab countries, the area covered by the Commonwealth of Independent States, Europe, Latin America, the Pacific area, and the South-East Asia nations. The regional bodies (listed below) commit themselves to adopt ISO standards as the national standards of their members.

- African Regional Organization for Standardization (ARSO)
- Arab Industrial Development and Mining Organization (AIDMO)
- European Committee for Standardization (CEN)
- Pan American Standards Commission (COPANT)
- Euro Asian Council for Standardization, Metrology and Certification (EASC)
- Pacific Area Standards Congress (PASC)
- ASEAN Consultative Committee for Standards and Quality (ACCSQ)

1.6.3 ISO Members

ISO is made up of 162 members who are divided into three categories:

Member bodies, Correspondent members, Subscriber members:

1) **Member Bodies:** Algeria, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Cameroon, Canada, Chile, China, Colombia, The Democratic Republic of the Congo, Costa Rica, Croatia, Cuba, Cyprus, Czech Republic, Côte d'Ivoire, Denmark, Ecuador, Egypt, Estonia, Ethiopia, Fiji, Finland, France, Germany, Ghana, Greece, Hungary, Iceland, India, Indonesia, Islamic Republic of Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Democratic People's Republic Korea, Republic of Korea,

Kuwait, Lebanon, Libyan Arab Jamahiriya, Lithuania, Luxembourg, Malaysia, Mali, Malta, Mauritius, Mexico, Mongolia, Morocco, Namibia, Netherlands, New Zealand, Nigeria, Norway, Oman, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Saint Lucia, Saudi Arabia, Senegal, Serbia, Singapore, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Sudan, Sweden, Switzerland, Syrian Arab Republic, United Republic of Tanzania, Thailand, The former Yugoslav Republic of Macedonia, Trinidad and Tobago, Tunisia, Turkey, USA, Ukraine, United Arab Emirates, United Kingdom, Uruguay, Uzbekistan, VietNam, Yemen, Zimbabwe

2) **Correspondent Members:** Afganistán, Albania, Angola, Benin, Bhutan, Bolivia, Brunei Darussalam, Burkina Faso, The Republic of the Congo, Dominican Republic, El Salvador, Gabon, Gambia, Georgia, Guatemala, Guinea, Hong Kong (China), Kyrgyzstan, Latvia, Lesotho, Liberia, Macau(China), Madagascar, Malawi, Mauritania, Republic of Moldova, Montenegro, Mozambique, Myanmar , Nepal, Palestine, Papua New Guinea, Paraguay, Rwanda, Seychelles, Sierra Leone, Suriname, Swaziland, Tajikistan, Turkmenistán, Uganda, Zambia

3) **Subscriber Members:** Antigua and Barbuda, Burundi, Cambodia, Central African Republic, Dominica, Eritrea, Guyana, Honduras, Lao People's Democratic Rep., Saint Vincent and the Grenadines

1.7 LIST OF ISO STANDARDS

There are 18,627 ISO standards as of April 2011. This is a list of International Organization for Standardization (ISO) standards. About 300 of the standards produced by ISO and IEC's Joint Technical Committee 1 (JTC1) have been made freely/publicly available.

ISO 1-ISO 999

ISO 1:2002 Geometrical Product Specifications (GPS) – Standard reference temperature for geometrical product specification and verification

ISO 2:1973 Textiles – Designation of the direction of twist in yarns and related products

ISO 3:1973 Preferred numbers – Series of preferred numbers

ISO 4:1997 Information and documentation – Rules for the abbreviation of title words and titles of publications

ISO 5 Photography and graphic technology – Density measurements

ISO 5-1:2009 Geometry and functional notation

ISO 5-2:2009 Geometric conditions for transmittance density

ISO 5-3:2009 Spectral conditions

ISO 5-4:2009 Geometric conditions for reflection density

ISO 6:1993 Photography – Black-and-white pictorial still camera negative film/ process systems – Determination of ISO speed

ISO 7 Pipe threads where pressure-tight joints are made on the threads

ISO 7-1:1994 Dimensions, tolerances and designation

ISO 7-2:2000 Verification by means of limit gauges

ISO 8:1977 Documentation – Presentation of periodicals

ISO 9:1995 Information and documentation – Transliteration of Cyrillic characters into Latin characters – Slavic and non-Slavic languages

ISO 11:1987 Aircraft – Ground pressure testing connections for pressure cabins

ISO 12:1987 Aerospace – Pipelines – Identification

ISO 13:1978 Grey iron pipes, special castings and grey iron parts for pressure main lines (withdrawn 2004-07-19)

ISO 14:1982 Straight-sided splines for cylindrical shafts with internal centering – Dimensions, tolerances and verification

ISO 16:1975 Acoustics – Standard tuning frequency (Standard musical pitch)

ISO 17:1973 Guide to the use of preferred numbers and of series of preferred numbers

ISO 18 Documentation – Contents list of periodicals

ISO 31 Quantities and units

ISO 31-0:1992 General principles (withdrawn 2009-11-17)

ISO 65:1981 Carbon steel tubes suitable for screwing in accordance with ISO 7-1

ISO 68 ISO general-purpose screw threads – Basic profile

ISO 68-1:1998 Metric screw threads

ISO 68-2:1998 Inch screw threads

ISO 128:1982 Technical drawings – General principles of presentation (withdrawn 2001-04-17)

ISO 216:2007 Writing paper and certain classes of printed matter – Trimmed sizes – A and B series, and indication of machine direction

ISO 226:2003 Acoustics – Normal equal-loudness-level contours

ISO 228 Pipe threads where pressure-tight joints are not made on the threads

ISO 228-1:2000 Dimensions, tolerances and designation

ISO 228-2:1987 Verification by means of limit gauges

ISO 233:1984 Transliteration of Arabic characters into Roman characters

ISO 233-2:1993 Arabic language – Simplified transliteration

ISO 259:1984 Documentation – Transliteration of Hebrew characters into Roman characters

ISO 259-2:1994 Simplified transliteration

ISO 261 General purpose metric screw threads. General plan

ISO 262 Selected metric-screw-thread sizes for screws, bolts, and nuts

ISO 361 Basic ionizing radiation symbol

ISO 500 Agricultural tractors – Rear-mounted power take-off

ISO 639 Codes for the representation of names of languages

ISO 639-1 Alpha-2 code

ISO 639-2 Alpha-3 code

ISO 639-3 Alpha-3 code for comprehensive coverage of languages

ISO 639-5 Alpha-3 code for language families and groups

ISO/IEC 646 Internationalized 7 bit ASCII variants

ISO 657 Hot-rolled steel sections

ISO 668 Series 1 freight containers – Classification, dimensions and ratings

ISO 690 bibliographic references

ISO 704 Terminology work – Principles and methods

ISO 732 Photography – 120-size and 220-size films – Dimensions

ISO 764 Horology – Magnetic resistant watches

ISO 838 Standard for punching filing holes into paper

ISO 843:1997 Conversion of Greek characters into Roman characters

ISO 860 Terminology work – Harmonization of concepts and terms

ISO 898 Mechanical Properties of Fasteners Made of Carbon Steel and Alloy Steel

ISO 898-1 Bolts, screws and studs with specified property classes-Coarse thread and fine pitch thread

ISO 898-2 Nuts with specified proof load values-Coarse thread

ISO 898-5 Set screws and similar threaded fasteners not under tensile stresses

ISO 898-6 Nuts with specified proof load values-Fine pitch thread

ISO 898-7 Torsional test and minimum torques for bolts and screws with nominal diameters 1 mm to 10 mm

ISO 965 General purpose metric screw threads – Tolerances

ISO 965-1 Principles and basic data

ISO 965-2 Limits of sizes for general purpose external and internal screw threads

ISO 965-3 Deviations for constructional screw threads

ISO 965-4 Limits of sizes for hot-dip galvanized external screw threads to mate with internal screw threads tapped with tolerance position H or G after galvanizing

ISO 965-5 Limits of sizes for internal screw threads to mate with hot-dip galvanized external screw threads with maximum size of tolerance position h before galvanizing

ISO 999 Guidelines for the content, organization, and presentation of indexes

ISO 1000-ISO 9999

ISO 1000 SI units and recommendations for the use of their multiples and of certain other units

ISO 1004 Magnetic ink character recognition

ISO 1007 13.5 film format

ISO 1028 Information processing – Flowchart symbols

ISO/IEC 1539 Fortran programming language

ISO 1629 Establishes a system of terms and nomenclature for polymers

ISO 1745 Information processing – Basic mode control procedures for data communication systems

ISO 1750 Pesticides and other agrochemicals – Common names

ISO 1789 Medical vehicles and their equipment. Road ambulances

ISO/IEC 2022 Information technology: Character code structure and extension techniques

ISO 2108 International standard book numbering (ISBN)

ISO 2145 Numbering of divisions and subdivisions in written documents

ISO 2162 Technical product documentation – Springs – Part 1: Simplified representation

ISO 2171 Cereals and milled cereal products – Determination of total ash

ISO 2242 Photography – Light sources for use in sensitometric exposure – Simulation of the spectral distribution of photoflood illumination

ISO 2281 Water-resistant watches

ISO 2533 Standard Atmosphere

ISO 2636 Information processing - Conventions for incorporating flowchart symbols in flowcharts

ISO 2709 Format for information exchange (e.g. MARC)

ISO 2768 Standard for dimensional tolerance in manufacturing

ISO 3029 Photography – 126-size cartridges – Dimensions of cartridge, film and backing paper [withdrawn 1999-03-18]

ISO 3082 Iron ores – Sampling and sample preparation procedures

ISO 3098 Technical product documentation – Lettering – Part 0: General requirements

ISO 3103 Method of brewing tea for the purpose of sensory tests

ISO 3166 Codes for the representation of names of countries and their subdivisions

ISO 3166-1 Country codes

ISO 3166-2 Country subdivision code

ISO 3166-3 Code for formerly used names of countries

ISO 3297 International standard serial number (ISSN)

ISO 3506 Mechanical properties of corrosion-resistant stainless steel fasteners

ISO 3536 Road vehicles – Safety glazing materials – Vocabulary

ISO 3537 Road vehicles – Safety glazing materials – Mechanical tests

ISO 3538 Road vehicles – Safety glazing materials – Method for the determination of solar transmittance

ISO 3601 Fluid power systems – O-rings

ISO 3601-1 Inside diameters, cross-sections, tolerances and size identification code (Recently updated)

ISO 3601-2 Housing dimensions for general applications (Recently updated)

ISO 3601-4 Anti-extrusion rings (back-up rings) (Recently updated)

ISO 3602 Romanization of Japanese

ISO 3632 Quality of Saffron

ISO 3635:1981 Size designation of clothes – Definitions and body measurement procedure

ISO 3864 Safety labels

ISO 3901 International Standard Recording Code (ISRC)

ISO 3977 Design and procurement standards for gas turbine system applications

ISO 4074 Natural latex rubber condoms – Requirements and test methods

ISO 4157 Subdivision of construction works

ISO 4157-1 Buildings and part of buildings

ISO 4157-2 Room numbers

ISO 4157-3 Room identifiers

ISO 4179 Ductile iron pipes and fittings for pressure and non-pressure pipelines – Cement mortar lining

ISO 4217 Currency codes

ISO 4628 Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of defects, and of intensity of uniform changes in appearance

ISO 4628-1 General introduction and designation system

ISO 4628-3 Assessment of degree of rusting

ISO/IEC 4873:1991 8-bit code for information interchange

ISO 4892 Plastics – Methods of exposure to laboratory light sources

ISO 5127 Information and documentation – Vocabulary

ISO 5167 Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full

ISO 5167-1 General principles and requirements

ISO 5167-2 Orifice plates

ISO 5167-3 Nozzles and Venturi nozzles

ISO 5167-4 Venturi tubes

ISO 5218 Representation of human sexes

ISO 5455 Technical drawings: scales

ISO 5457 Technical product documentation – Sizes and layout of drawing sheets

ISO 5775 Bicycle tires and rims

ISO 5800 Photography – Colour negative films for still photography – Determination of ISO speed

ISO 5964 Guidelines for the Establishment and Development of Multilingual Thesauri

ISO 5971:1981 Size designation of clothes – Pantyhose

ISO 6166 Securities and related financial instruments – International securities identification numbering system (ISIN)

ISO 6194 Rotary-shaft lip-type seals incorporating elastomeric sealing elements

ISO 6194-5 Identification of visual imperfections

ISO 6344 Coated abrasives – Grain size analysis

ISO 6344-1 Grain size distribution test

ISO 6344-2 Determination of grain size distribution of macrogrits P12 to P220

ISO 6344-3 Determination of grain size distribution of microgrits P240 to P2500

ISO 6336 Calculation of load capacity of spur and helical gears

ISO 6429 Information technology: Control functions for coded character sets

ISO 6438 Documentation – African coded character set for bibliographic information interchange

ISO 6579 Microbiological detection of Salmonella spp in food and animal feeding stuffs

ISO 6594 Cast iron drainage pipes and fittings – Spigot series

ISO 6709 Standard representation of latitude, longitude and altitude for geographic point locations

ISO 6946 Building components and building elements – Thermal resistance and thermal transmittance – Calculation method

ISO 7001 Graphical symbols – Public information symbols

ISO 7002 Agricultural food products – Layout for a standard method of sampling from a lot

ISO 7098 Romanization of Chinese

ISO 7200 Technical product documentation – Data fields in title blocks and document headers

ISO 7240 Fire detection and alarm systems

ISO 7372 Trade data interchange

ISO/IEC 7501 Identification cards – Machine readable travel documents

ISO/IEC 7501-1:2008 Machine readable passport

ISO/IEC 7501-2:1997 Machine readable visa

ISO/IEC 7501-2:2005 Machine readable official travel documents

ISO 7736 Car radio installation space

ISO/IEC 7810 Identification cards – Physical characteristics

ISO/IEC 7811 Identification cards – Recording technique

ISO/IEC 7812 Identification cards – Identification of issuers

ISO/IEC 7813 Information technology – Identification cards – Financial transaction cards

ISO/IEC 7816 Identification cards – Integrated circuit cards

ISO/IEC 7942 Graphical Kernel System

ISO 8000 Data quality

ISO 8090 Cycles – Terminology

ISO 8180 Ductile iron pipelines – Polyethylene sleeving for site application

ISO 8373 Manipulating industrial robots – Vocabulary

ISO 8402 Quality Management and Quality Assurance – Vocabulary

ISO 8501-1 Preparation of steel substrates before application of paints and related products

ISO 8554 Hardware for furniture – Terms for furniture locks [withdrawn, 1999-11-11]

ISO 8555 Hardware for furniture – Terms for furniture fittings

ISO 8559:1989 Garment construction and anthropometric surveys – Body dimensions

ISO 8583 Financial transaction card originated messages – Interchange message specifications

ISO 8583-1 Messages, data elements and code values

ISO 8583-2 Application and registration procedures for Institution Identification Codes (IIC)

ISO 8583-3 Maintenance procedures for messages, data elements and code values

ISO 8601 Data elements and interchange formats – Information interchange – Representation of dates and times

ISO/IEC 8613 Open Document Architecture

ISO/IEC 8632 Computer Graphics Metafile

ISO 8651 Graphical Kernel System language bindings

ISO/IEC 8652 Information technology – Programming languages – Ada

ISO 8653:1986 Jewellery – Ring-sizes – Definition, measurement and designation

ISO 8691 Petroleum products – Low levels of vanadium in liquid fuels – Determination by flameless atomic absorption spectrometry after ashing

ISO 8805 Graphical Kernel System for Three Dimensions and the C language bindings are ISO 8806

ISO 8806-4 Graphical Kernel System for Three Dimensions, C language bindings

ISO 8807 Language Of Temporal Ordering Specification (LOTOS)

ISO/IEC 8824 Abstract Syntax Notation One (ASN.1)

ISO/IEC 8825 ASN.1 Encoding Rules

ISO 8859 8-bit coded character sets

ISO 8859-1 Latin-1

ISO 8859-2 Latin-2

ISO 8859-3 Latin-3 or "South European"

ISO 8859-4 Latin-4 or "North European"

ISO 8859-5 Cyrillic

ISO 8859-6 Arabic

ISO 8859-7 Greek

ISO 8859-8 Hebrew

ISO 8859-9 Latin-5

ISO 8859-10 Latin-6, rearrangement of 8859-4

ISO 8859-11 Thai

ISO 8859-13 Latin-7 or "Baltic Rim"

ISO 8859-14 Latin-8 or "Celtic"

ISO 8859-15 Latin-9, revision of 8859-1

ISO 8859-16 Latin-10 South-Eastern European languages and others

ISO 8879 Standard Generalized Markup Language (SGML)

ISO 9000 Quality management system in production environments

ISO 9001 Quality management

ISO 9069 SGML support facilities – SGML Document Interchange Format (SDIF)

ISO/IEC 9075 SQL

ISO/IEC 9126 Software engineering – Product quality

ISO 9141 Network interconnection of computers in a vehicle

ISO 9141-2 California Air Resources Board requirements for interchange of digital information. See On-Board Diagnostics.

ISO 9241 Ergonomic requirements for office work with visual display terminals

ISO 9362 Bank Identifier Code or BIC system

ISO 9407 Shoe sizes – Mondopoint system of sizing and marking

ISO/IEC 9541 Information technology – Font information interchange

ISO/IEC 9541-1:1991 Architecture

ISO/IEC 9541-2:1991 Interchange Format

ISO/IEC 9541-3:1994 Glyph shape representation

ISO 9564 Banking – Personal Identification Number management and security

ISO/IEC 9579 Remote database access for SQL

ISO 9592, ISO 9593 PHIGS (Programmer's Hierarchical Interactive Graphics System)

ISO/IEC 9594 Information technology – Open Systems Interconnection – The Directory

ISO 9660 Information processing – Volume and file structure of CD-ROM for information interchange

ISO/IEC 9796 Information technology – Security techniques – Digital signature schemes giving message recovery

ISO/IEC 9797 Information technology – Security techniques – Message Authentication Codes (MACs)

ISO/IEC 9798 Information technology – Security techniques – Entity authentication

ISO/IEC 9834 Information technology – Open Systems Interconnection – Procedures for the operation of OSI Registration Authorities

ISO 9869 Thermal insulation – Building elements – In-situ measurements of thermal resistance and thermal transmittance

ISO 9899 C programming language

ISO/IEC 9945 Portable Operating System Interface (POSIX)

ISO 9984 Conversion of Georgian characters into Roman characters

ISO 9985 Conversion of Armenian characters into Roman characters

ISO 9992:1999 Financial transaction cards – Security architecture of financial transaction systems using integrated circuit cards

ISO/IEC 9995 Information technology – Keyboard layouts for text and office systems

ISO 9999 Technical aids for persons with disabilities. Classification and terminology

ISO 10000-ISO 19999

ISO 10006 Quality management – Guidelines to quality in project management

ISO 10007 Quality management – Guidelines for configuration management

ISO 10012 Measurement management systems – Requirements for measurement processes and measuring equipment

ISO/IEC 10021 Message Oriented Text Interchange Systems (MOTIS)

ISO/IEC 10026 Open Systems Interconnection

ISO 10077 Thermal performance of windows, doors and shutters – Calculation of thermal transmittance

ISO/IEC 10089 Information technology; 130 mm rewritable optical disk cartridge for information interchange – 650 MB per cartridge

ISO 10160 Information and documentation – Open Systems Interconnection – Interlibrary Loan Application Service Definition

ISO 10161 Information and documentation – Open Systems Interconnection – Interlibrary Loan Application Protocol Specification

ISO/IEC 10164 Information technology – Open Systems Interconnection – Systems

Management

ISO/IEC 10179:1996 Document Style Semantics and Specification Language (DSSSL)

ISO 10202:1991 Financial transaction cards – Security architecture of financial transaction systems using integrated circuit cards

ISO 10206 Extended Pascal (programming language)

ISO 10211 Thermal bridges in building construction – Heat flows and surface temperatures – Detailed calculations

ISO 10279 BASIC programming language

ISO 10303 Industrial automation systems and integration – Product data representation and exchange. Known as STEP, STandard for the Exchange of Product data

ISO 10383 Securities and related financial instruments – Codes for exchanges and market identification (MIC)

ISO 10487 Connections for passenger car stereos

ISO 10628 Flow diagrams for process plants

ISO 10646 Universal Character Set (equivalent to Unicode's character set)

ISO 10664 Hexalobular internal driving feature for bolts and screws – Torx screw head

ISO 10957 Information and documentation – International Standard Music Number (ISMN)

ISO 10962 Securities and related financial instruments – Classification of Financial Instruments (CFI code)

ISO 10993 Biological evaluation of medical devices

ISO 10993-1 Evaluation and testing within a risk management process

ISO 10993-2 Animal welfare requirements

ISO 10993-3 Tests for genotoxicity, carcinogenicity and reproductive toxicity

ISO 10993-4 Selection of tests for interactions with blood

ISO 10993-5 Tests for in vitro cytotoxicity

ISO 10993-6 Tests for local effects after implantation

ISO 10993-7 Ethylene oxide sterilization residuals

ISO 10993-8 Selection and qualification of reference materials for biological tests [withdrawn 2003-12-15]

ISO 10993-9 Framework for identification and quantification of potential degradation products

ISO 10993-10 Tests for irritation and skin sensitization

ISO 10993-11 Tests for systemic toxicity

ISO 10993-12 Sample preparation and reference materials

ISO 10993-13 Identification and quantification of degradation products from

polymeric medical devices

ISO 10993-14 Identification and quantification of degradation products from ceramics

ISO 10993-15 Identification and quantification of degradation products from metals and alloys

ISO 10993-16 Toxicokinetic study design for degradation products and leachables

ISO 10993-17 Establishment of allowable limits for leachable substances.

ISO 10993-18 Chemical characterization of materials

ISO 10993-19 Physico-chemical, morphological and topographical characterization of materials

ISO 10993-20 Principles and methods for immunotoxicology testing of medical devices

ISO 11064 Ergonomic design of control centres

ISO 11064-1:2000 Principles for the design of control centres

ISO 11064-2:2000 Principles for the arrangement of control suites

ISO 11064-3:1999 Control room layout ISO 11064-3:1999/Cor 1:2002

ISO 11064-4:2004 Layout and dimensions of workstations

ISO 11064-5:2008 Displays and controls

ISO 11064-6:2005 Environmental requirements for control centres

ISO 11064-7:2006 Principles for the evaluation of control centres

ISO/IEC 11172 MPEG-1

ISO 11170:2003 Hydraulic fluid power – Filter elements – Sequence of tests for verifying performance characteristics

ISO/IEC 11179 Information Technology – Metadata Registries (MDR)

ISO/IEC 11179-1:2004 Framework

ISO/IEC 11179-2:2005 Classification

ISO/IEC 11179-3:2003 Registry metamodel and basic attributes

ISO/IEC 11179-4:2004 Formulation of data definitions

ISO/IEC 11179-5:2005 Naming and identification principles

ISO/IEC 11179-6:2005 Registration

ISO 11180 Postal addressing [Withdrawn, 2004-01-15]

ISO/IEC 11404:1996 Language-independent datatypes (See also General purpose datatypes)

ISO 11446:2004 Connectors for the electrical connection of towing and towed vehicles - 13-pole connectors for vehicles with 12 V nominal supply voltage

ISO 11469:2000 Plastics – Generic identification and marking of plastics products

ISO 11521 Replaced by ISO 15022

ISO/IEC 11578:1996 Information technology – Open Systems Interconnection – Remote procedure call (RPC)

ISO 11783 aka. IsoBus – J1939-based communication protocol for the agriculture industry

ISO/IEC 11801 Information technology – Generic cabling for customer premises

ISO 11898 Road vehicles – Controller area network (CAN)

ISO 12006 Building construction. Organization of information about construction works

ISO 12207 Software lifecycle processes

ISO 12639 Graphic technology – Prepress digital data exchange – Tag image file format for image technology (TIFF/IT)

ISO 12641 Graphic technology – Prepress digital data exchange – Colour targets for input scanner calibration

ISO 13239 High-level data link control (HDLC) procedures

ISO/IEC 13249 SQL multimedia and application packages

ISO/IEC 13250 Topic map

ISO 13346 Volume and file structure of write-once and rewritable media, on which UDF is based

ISO 13370 Thermal performance of buildings – Heat transfer via the ground – Calculation methods

ISO 13406 Ergonomic requirements for work with visual displays based on flat panels

ISO 13406-1:1999 Introduction

ISO 13406-2:1002 Ergonomic requirements for flat panel displays

ISO 13407:1999 Human-centred design processes for interactive systems

ISO 13450 110 film format

ISO 13485:2003 Medical devices – Quality management systems – Requirements for regulatory purposes

ISO 13490 Information technology: Volume and file structure of read-only and write-once compact disk media for information interchange

ISO 13567/1 to 3 Technical product documentation; Organization and naming of layers for Computer-aided design (CAD)

ISO/IEC 13568:2002 Information Technology – Z Formal Specification Notation – Syntax, Type System and Semantics

ISO 13616 Financial services – International bank account number (IBAN)

ISO 13628 Petroleum and natural gas industries – Design and operation of subsea production systems

ISO 13628-1 General requirements and recommendations

ISO 13628-2 Unbonded flexible pipe systems for subsea and marine applications

ISO 13628-3 Through flowline (TFL) systems

ISO 13628-4 Subsea wellhead and tree equipment

ISO 13628-5 Subsea umbilicals

ISO 13628-6 Subsea production control systems

ISO 13628-7 Completion/workover riser systems

ISO 13628-8 Remotely Operated Vehicle (ROV) interfaces on subsea production systems

ISO 13628-9 Remotely Operated Tool (ROT) intervention systems

ISO 13628-10 Specification for bonded flexible pipe

ISO 13628-11 Flexible pipe systems for subsea and marine applications

ISO 13849-1 Safety of machinery, Safety related parts of control systems, General principles for design

ISO/IEC 13818 MPEG-2

ISO 13837 Road vehicles – Safety glazing materials – Method for the determination of solar transmittance

ISO 14000 Environmental Management Standards in production environments

ISO 14001 Environmental Management

ISO 14064 Greenhouse Gases

ISO 14155:2011 Clinical investigation of medical devices for human subjects – Good clinical practice

ISO 14223:2011 Radiofrequency [sic] identification of animals – Advanced transponders [33]

ISO 14230 Road vehicles – Diagnostic systems – Keyword Protocol 2000

ISO 14230-1 Physical layer

ISO 14230-2 Data link layer

ISO 14230-3 Application layer

ISO 14230-4 Requirements for emission-related systems

ISO/IEC 14443 Identification cards – Contactless integrated circuit(s) cards – Proximity cards

ISO/IEC 14496 MPEG-4

ISO 14644 Cleanrooms and associated controlled environments

ISO 14644-1:1999 Classification of Air Cleanliness

ISO 14644-2:2000 Testing and Monitoring to prove Compliance

ISO 14644-3:2005 Metrology & Test Methods

ISO 14644-4:2001 Design, Construction and Start-up

ISO 14644-5:2004 Operations

ISO 14644-6:2007 Vocabulary

ISO 14644-7:2004 Separative Devices

ISO 14644-8:2006 Classification of Airborne Molecular Contamination

ISO 14644-9 Clean Surfaces

ISO 14651 Information technology: International string ordering and comparison

ISO 14698

ISO-14698-1 Bio-contamination Control – General Principles

ISO-14698-2 Evaluation & Interpretation of Bio-contamination Data

ISO 14750 Information technology – Open Distributed Processing – Interface Definition Language

ISO/IEC 14755 Input methods to enter unicode characters from ISO/IEC 10646

ISO 14855-1:2005 Aerobic Biodegradation under controlled composting conditions

ISO 14855-2:2007 Aerobic Biodegradation under controlled composting conditions with gravimetric measurement of carbon dioxid

ISO/IEC 14882 Programming Languages – C++

ISO 14915 Software ergonomics for multimedia user interfaces

ISO 14915-1:2002 Design principles and framework

ISO 14915-2:2003 Multimedia navigation and control

ISO 14915-3:2002 Media selection and combination

ISO 14971:2007 Medical Devices – Application Of Risk Management To Medical Devices

ISO/IEC 14977 Extended Backus-Naur Form (EBNF)

ISO 15000 Electronic business eXtensible Markup Language ebXML

ISO 15000-1:2004 Collaboration-protocol profile and agreement specification (ebCPP)

ISO 15000-2:2004 Message service specification (ebMS)

ISO 15000-3:2004 Registry information model specification (ebRIM)

ISO 15000-4:2004 Registry services specification (ebRS)

ISO 15000-5:2005 ebXML Core Components Technical Specification, Version 2.01(ebCCTS)

ISO 15022 Securities: Scheme for messages(Data Field Dictionary)

ISO 15082 Road vehicles – Tests for rigid plastic safety glazing materials

ISO 15099 Thermal performance of windows, doors and shading devices – Detailed calculations

ISO 15112 Natural gas – Energy determination

ISO 15189 Medical laboratories – Particular requirements for quality and competence

ISO 15223 Medical devices – Symbols to be used with medical device labels, labelling, and information to be supplied

ISO 15288 Systems engineering – System life cycle processes

ISO 15289 Systems and software engineering – Content of systems and software life cycle process information products (Documentation)

ISO/IEC 15291 Information technology – Programming languages – Ada Semantic Interface Specification (ASIS)

ISO 15403 Natural gas – Natural gas for use as a compressed fuel for vehicles

ISO 15403-1 Designation of the quality

ISO/IEC 15408 Common Criteria – Evaluation Criteria for Information Technology Security

ISO/IEC 15434 Information technology – Automatic Identification and Data Capture Techniques – Syntax for High-Capacity ADC Media. For example: Data Matrix 2D barcode

ISO/IEC 15444 JPEG 2000

ISO/IEC 15445:2000 ISO HTML, a subset of Hypertext Markup Language (HTML) 4

ISO/IEC 15504 Framework for the assessment of software processes, also known as SPICE (Software Process Improvement and Capability Determination)

ISO 15614-13:2002 Specification and qualification of welding procedures for metallic materials-Welding procedure test

ISO 15686 Service life planning for constructive works in 10 parts

ISO/IEC 15693 Identification cards – Contactless integrated circuit(s) cards – Vicinity cards

ISO 15706 International Standard Audiovisual Number

ISO 15707 International Standard Musical Work Code

ISO 15836 The Dublin Core metadata element set

ISO 15897 Standard for the registration of new POSIX locales and POSIX charmaps

ISO 15924 Codes for the representation of names of scripts

ISO 15930 Graphic technology – Prepress digital data exchange using PDF

ISO/IEC 15948:2003 Portable Network Graphics (PNG)

ISO 15970 Natural gas – Measurement of properties – Volumetric properties: density, pressure, temperature and compression factor

ISO 15971:2008 Natural gas – Measurement of properties – Calorific value and Wobbe index [35]

ISO/IEC 16500 Generic Digital Audio-Visual Systems DAVIC

ISO 16071:2003 Ergonomics of human-system interaction, Guidance on accessibility for human-computer interfaces

ISO 16134 Earthquake- and subsidence-resistant design of ductile iron pipelines

ISO 16232 Road vehicles – Cleanliness of components of fluid circuits

ISO 16232-8 Particle nature determination by microscopic analysis

ISO 16232-9 Particle sizing and counting by automatic light extinction particle counter

ISO 16232-10 Expression of results

ISO/IEC 16262 ECMAScript

ISO 16549 Textiles – Unevenness of textile strands – Capacitance method

ISO 16750 Road vehicles – Environmental conditions and testing for electrical and electronics equipment

ISO/TS 16949 Quality management systems – Particular requirements for the application of ISO 9001:2000 for automotive production and relevant service part organizations

ISO 16982:2002 Ergonomics of human-system interaction, Usability methods supporting human-centred design

ISO/IEC 17020:1998 General criteria for the operation of various types of bodies performing inspection

ISO/IEC 17024:2003 specifies requirements for a body certifying persons against specific requirements, including the development and maintenance of a certification scheme for personnel

ISO/IEC 17025 General requirements for competence of test and calibration laboratories

ISO 17202 Textiles – Determination of twist in single spun yarns – Untwist/retwist method

ISO 17776 Petroleum industries

ISO/IEC 17799 Information technology: Code of practice for information security management

ISO/IEC 17894 Ships and marine technology – Computer applications – General principles for development and use of PES in marine applications

ISO/IEC 18000 Information Technology AIDC Techniques-RFID (Radio Frequency Identification) for Item Management – Air Interface

ISO/IEC 18000-1 Generic Parameters for the Air Interface for Globally Accepted Frequencies

ISO/IEC 18000-2 Parameters for Air Interface Communications below 135 kHz

ISO/IEC 18000-3 Parameters for Air Interface Communications at 13.56 MHz

ISO/IEC 18000-4 Parameters for Air Interface Communications at 2.45 GHz

ISO/IEC 18000-5 Parameters for Air Interface Communications at 5.8 GHz (Withdrawn)

ISO/IEC 18000-6 Parameters for Air Interface Communications at 860 to 960 MHz

ISO/IEC 18000-7 Parameters for Air Interface Communications at 433 MHz

ISO/IEC 18004 QR Code Standardization

ISO/IEC 18009 Information technology – Programming languages – Ada: Conformity assessment of a language processor (ACATS)

ISO/IEC 18013 Information technology – Personal Identification – ISO-compliant driving license

ISO/IEC 18013-1:2005 Physical characteristics and basic data set

ISO/IEC 18013-2:2008 Machine-readable technologies

ISO/IEC 18013-3:2009 Access control, authentication and integrity validation

ISO/IEC 18014 Information technology – Security techniques – Time-stamping services

ISO/IEC 18023:2006 Information technology – SEDRIS

ISO/IEC 18023-1:2006 Functional specification

ISO/IEC 18023-2:2006 Abstract transmittal format

ISO/IEC 18023-3:2006 Transmittal format binary encoding

ISO/IEC 18024-4:2006 Information technology – SEDRIS language bindings – Part 4: C

ISO/IEC 18025:2005 Information technology – Environmental Data Coding Specification (EDCS)

ISO/IEC 18026:2006 Information technology – Spatial Reference Model (SRM)

ISO/IEC 18033 Information technology – Security techniques – Encryption algorithms

ISO/IEC 18033-1 General

ISO/IEC 18033-2 Asymmetric ciphers

ISO/IEC 18033-3 Block ciphers

ISO/IEC 18033-4 Stream ciphers

ISO/IEC 18041-4:2005 Information technology – EDCS language bindings – Part 4: C

ISO/IEC 18042-4:2006 Information technology – Spatial Reference Model (SRM) language bindings – Part 4: C

ISO/IEC 18092 Information technology – Telecommunications and information exchange between systems – Near Field Communication – Interface and Protocol (NFCIP-1)

ISO 18152:2003 Ergonomics of human-system interaction, Specification for the process assessment of human-system issues

ISO 18185 Wireless standard for electronic seals using active RFID (Radio Frequency Identification)

ISO 18245 standard concerning the assignment of Merchant Category Codes (MCC) in retail financial services

ISO 18529:2000 Ergonomics of human-system interaction, Human-centred lifecycle process descriptions

ISO 18629 standardized Process Specification Language (PSL)

ISO 19005 Document management – Electronic document file format for long-term preservation

ISO 19011 standard providing guidelines for quality and environmental management systems auditing

ISO 19092 Financial Services – Security

ISO 19092-1 Security framework

ISO 19092-2 Message syntax and cryptographic requirements

ISO 19101 Geographic information – Reference model

ISO/TS 19103 Geographic information – Conceptual schema language

ISO/TS 19104 Geographic information – Terminology

ISO 19105 Geographic information – Conformance and testing

ISO 19106 Geographic information – Profiles

ISO 19107 Geographic information – Spatial schema

ISO 19108 Geographic information – Temporal schema

ISO 19109 Geographic information – Rules for application schema

ISO 19110 Geographic information – Methodology for feature cataloguing

ISO 19111 Geographic information – Spatial referencing by coordinates

ISO 19112 Geographic information – Spatial referencing by geographic identifiers

ISO 19113 Geographic information – Quality principles

ISO 19114 Geographic information – Quality evaluation procedures

ISO 19115 Geographic information – Metadata

ISO 19116 Geographic information – Positioning services

ISO 19117 Geographic information – Portrayal

ISO 19118 Geographic information – Encoding

ISO 19119 Geographic information – Services

ISO/TR 19120 Geographic information – Functional standards

ISO/TR 19121 Geographic information – Imagery and gridded data

ISO/TR 19122 Geographic information/Geomatics – Qualification and certification of personnel

ISO 19123 Geographic information – Schema for coverage geometry and functions

ISO 19125 Geographic information – Simple feature access

ISO 19126 Geographic information – Feature concept dictionaries and registers

ISO/TS 19127 Geographic information – Geodetic codes and parameters

ISO 19128 Geographic information – Web map server interface

ISO/TS 19129 Geographic information – Imagery, gridded and coverage data framework

ISO/TS 19130 Geographic information – Imagery sensor models for geopositioning

ISO 19131 Geographic information – Data product specifications

ISO 19132 Geographic information – Location-based services – Reference model

ISO 19133 Geographic information-Location-based services-Tracking and navigation

ISO 19134 Geographic information-Location-based services-Multimodal routing and navigation

ISO 19135 Geographic information-Procedures for item registration

ISO 19136 Geographic information-Geography Markup Language (GML)

ISO 19137 Geographic information-Core profile of the spatial schema

ISO/TS 19138 Geographic information-Data quality measures

ISO/TS 19139 Geographic information-Metadata-XML schema implementation

ISO 19141 Geographic information-Schema for moving features

ISO 19142 Geographic information-Web Feature Service

ISO 19143 Geographic information-Filter encoding

ISO 19144 Geographic information – Classification systems

ISO 19146 Geographic information – Cross-domain vocabularies

ISO 19439 Framework for enterprise modelling

ISO 19440 Constructs for enterprise modelling

ISO/IEC 19501 Unified Modeling Language (UML)

ISO/IEC 19502 Meta-Object Facility (MOF)

ISO/IEC 19503 XML Metadata Interchange (XMI)

ISO/IEC 19757 Document Schema Definition Languages (DSDL)

ISO/IEC FDIC 19757-2 Regular-grammar-based validation RELAX NG

ISO/IEC 19757-3 Rule-based validation – Schematron

ISO/IEC 19757-4 Namespace-based Validation Dispatching Language (NVDL)

ISO/IEC 19770 Information technology – Software asset management

ISO/IEC 19785 Common Biometric Exchange Formats Framework (CBEFF 2.0)

ISO/IEC 19790 Security requirements for cryptographic modules (see also FIPS 140)

ISO/IEC 19794 Information technology – Biometric data interchange formats

ISO/IEC 19794-1:2006 Framework

ISO/IEC 19794-2:2005 Finger minutiae data

ISO/IEC 19794-3:2006 Finger pattern spectral data

ISO/IEC 19794-4:2005 Finger image data

ISO/IEC 19794-5:2005 Face image data

ISO/IEC 19794-6:2005 Iris image data

ISO/IEC 19794-7:2007 Signature/sign time series data

ISO/IEC 19794-8:2006 Finger pattern skeletal data

ISO/IEC 19794-9:2007 Vascular image data

ISO/IEC 19794-10:2007 Hand geometry silhouette data

ISO 20000-ISO 29999

ISO/IEC 20000:2005 IT Service Management System (based on BS15000)

ISO 20022 Financial Services – universal financial industry message scheme

ISO/IEC TR 20943 Information technology – Procedures for achieving metadata registry content consistency

ISO/IEC TR 20943-1:2003 Data elements

ISO/IEC TR 20943-3:2004 Value domains

ISO/IEC 21000 Information technology – Multimedia framework (MPEG-21)

ISO/IEC 21481 Information technology – Telecommunications and information exchange between systems – Near Field Communication Interface and Protocol -2 (NFCIP-2)

ISO 21482 Ionizing-radiation warning – Supplementary symbol

ISO 22000 Food safety management systems – Requirements for any organization in the food chain

ISO/TS 22003 Food safety management systems – Requirements for bodies providing audit and certification of food safety management systems

ISO 22093 Industrial automation systems and integration – Physical device control – Dimensional Measuring Interface Standard (DMIS)

ISO 22241 Diesel engines – NOx reduction agent AUS 32

ISO 22241-1 Quality requirements

ISO 22241-2 Test methods

ISO 22241-3 Handling, transportation and storing

ISO/IEC TR 22250 Regular Language description for XML – (RELAX)

ISO/IEC TR 22250-1:2002 RELAX Core

ISO/PAS 22399:2007 Social security – Guideline for incident preparedness and operational continuity management

ISO 22716:2007 Cosmetics – Good Manufacturing Practices (GMP) – Guidelines on Good Manufacturing Practices

ISO/IEC 23003

ISO/IEC 23003-1 MPEG Surround (aka MPEG-D)

ISO/IEC 23270:2003 C# programming language

ISO/IEC 23360 Linux Standard Base (LSB) core specification 3.1 (in publication as of 2005-12)

ISO/IEC 23360-1 Generic specification

ISO/IEC 23360-2 Specification for IA32 architecture

ISO/IEC 23360-3 Specification for IA64 architecture

ISO/IEC 23360-4 Specification for AMD64 architecture

ISO/IEC 23360-5 Specification for PPC32 architecture

ISO/IEC 23360-6 Specification for PPC64 architecture

ISO/IEC 23360-7 Specification for S390 architecture

ISO/IEC 23360-8 Specification for S390X architecture

ISO 23733 Textiles – Chenille yarns – Test method for the determination of linear density

ISO 23950 Library standard ANSI/NISO Z39.50 – Protocol for searching and retrieving information, usually from bibliographic records

ISO/IEC 24707:2007 Information technology – Common Logic (CL): a framework for a family of logic-based languages

ISO/IEC 24727 Identification cards – Integrated circuit card programming interfaces

ISO/IEC 24727-1 Architecture

ISO/IEC 24727-2 Generic card interface

ISO/IEC 24727-3 Application interface

ISO/IEC 24727-4 Application programming interface (API) administration

ISO/IEC 24744:2007 Software Engineering – Metamodel for Development Methodologies

ISO/IEC 24762:2008 Information technology – Security techniques – Guidelines for information and communications technology disaster recovery services

ISO/IEC DIS 25961 Recommended Practice for Architectural Description of Software-Intensive Systems. See IEEE 1471

ISO 26000 Guidance on social responsibility

ISO/IEC 26300 OpenDocument Format (ODF)

ISO/IEC 27000-series Information security management system family of standards

ISO/IEC 27000 Information security management systems – Overview and vocabulary

ISO/IEC 27001 Information security management systems – Requirements

ISO/IEC 27002 Code of practice for information security management

ISO/IEC 27003 Information security management system implementation guidance

ISO/IEC 27004 Information security management – Measurement

ISO/IEC 27005 Information security risk management

ISO/IEC 27006 Requirements for bodies providing audit and certification of information security management systems

ISO/IEC 27007 Guidelines for information security management systems auditing

ISO/IEC 27011 Information security management guidelines for telecommunications organizations based on ISO/IEC 27002

ISO/PAS 28000 Specification for security management systems for the supply chain

ISO/PAS 28004 Guidelines for the implementation of ISO/PAS 28000

ISO/IEC 29119 Software Testing ISO 29119 Software Testing standard

ISO/IEC 29119-1 Concepts & Vocabulary

ISO/IEC 29119-2 Test Process

ISO/IEC 29119-3 Test Documentation

ISO/IEC 29119-4 Test Techniques

ISO/IEC 29500 Office Open XML

ISO/IEC 29500-1 Fundamentals and Markup Language Reference

ISO/IEC 29500-2 Open Packaging Conventions

ISO/IEC 29500-3 Markup Compatibility and Extensibility

ISO/IEC 29500-4 Transitional Migration Features

ISO 30000-ISO 39999

ISO 30000:2009 Ships and marine technology – Ship recycling management systems – Specifications for management systems for safe and environmentally sound ship recycling facilities

ISO 31000 Risk management – Principles and guidelines

ISO 32000 Document management – Portable document format

ISO/IEC 38500 Corporate governance of information technology

ISO 80000

ISO/IEC 80000 Quantities and units

Check Your Progress 1

Note: a) Space is given below for writing your answers.

b) Compare your answers with the one given at the end of this Unit.

1) What is the role of ISO Standards?

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2) Explain features of ISO.

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3) What are the objectives of COPOLCO?

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4) What are the stages of the development of International Standards?

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1.8 ISO 9000

The ISO 9000 family of standards relate to quality management systems and are designed to help organizations ensure they meet the needs of customers and other stakeholders. ISO 9000 deals with the fundamentals of quality management systems, including the eight management principles on which the family of standards is based. ISO 9001 deals with the requirements that organizations wishing to meet the standard have to fulfill.

Third party certification bodies provide independent confirmation that organizations meet the requirements of ISO 9001. Over a million organizations worldwide are independently certified, making ISO 9001 one of the most widely used management tools in the world today.

1.8.1 Reasons for Use

The global adoption of ISO 9001 may be attributable to a number of factors. A number of major purchasers require their suppliers to hold ISO 9001 certification. In addition to several stakeholders' benefits, a number of studies have identified significant financial benefits for organizations certified to ISO 9001, with a 2011 survey from the British Assessment Bureau showing 44% of their certified clients had won new business. It was showed that certified organizations achieved superior return on assets compared to otherwise similar organizations without certification. Naveh and Marcus (2007) showed that implementing ISO 9001 led to superior operational performance. Sharma (2005) identified similar improvements in operating performance and linked this to superior financial performance. Chow-Chua et al (2002) showed better overall financial performance was achieved for companies in Denmark.

ISO 9000 was first published in 1987. It was based on the BS 5750 series of standards from BSI that were proposed to ISO in 1979.

1.8.2 Contents of ISO 9001

ISO 9001:2008 Quality Management Systems (QMS) – Requirements is a document of approximately 30 pages which is available from the national standards organization in each country. Outline contents are as follows:

- Page iv: *Foreword*
- Pages v to vii: Section 0 *Intro*
- Pages 1 to 14: *Requirements*
  - Section 1: *Scope*
  - Section 2: *Normative Reference*
  - Section 3: *Terms and definitions* (specific to ISO 9001, not specified in ISO 9000)
- Pages 2 to 14 132 1
  - Section 4: *Quality Management System*
  - Section 5: *Management Responsibility*
  - Section 6: *Resource Management*
  - Section 7: *Product Realization*
  - Section 8: *Measurement, analysis and improvement*

In effect, users need to address all sections 1 to 8, but only 4 to 8 needs implementing within a QMS.

- Pages 15 to 22: Tables of Correspondence between ISO 9001 and other standards
- Page 23: *Bibliography*

The standard specifies six compulsory documents:

- Control of Documents (4.2.3)
- Control of Records (4.2.4)
- Internal Audits (8.2.2)
- Control of Nonconforming Product/Service (8.3)
- Corrective Action (8.5.2)
- Preventive Action (8.5.3)

In addition to these, ISO 9001:2008 requires a quality policy and Quality Manual (which may or may not include the above documents).

Summary of ISO 9001:2008 in informal language

- The quality policy is a formal statement from management, closely linked to the business and marketing plan and to customer needs.
- The quality policy is understood and followed at all levels and by all employees. Each employee works towards measurable objectives.
- The business makes decisions about the quality system based on recorded data.
- The quality system is regularly audited and evaluated for conformance and effectiveness.
- Records show how and where raw materials and products were processed, to allow products and problems to be traced to the source.

- The business determines customer requirements.
- The business has created systems for communicating with customers about product information, inquiries, contracts, orders, feedback and complaints.
- When developing new products, the business plans the stages of development, with appropriate testing at each stage. It tests and documents whether the product meets design requirements, regulatory requirements and user needs.
- The business regularly reviews performance through internal audits and meetings. The business determines whether the quality system is working and what improvements can be made. It has a documented procedure for internal audits.
- The business deals with past problems and potential problems. It keeps records of these activities and the resulting decisions, and monitors their effectiveness.
- The business has documented procedures for dealing with actual and potential nonconformances (problems involving suppliers or customers, or internal problems).
- The business (1) makes sure no one uses bad product, (2) determines what to do with bad product, (3) deals with the root cause of problems, and (4) keep records to use as a tool to improve the system.

1.8.3 Certification

ISO does not itself certify organizations. Many countries have formed accreditation bodies to authorize certification bodies, which audit organizations applying for ISO 9001 compliance certification. Although commonly referred to as ISO 9000:2000 certification, the actual standard to which an organization's quality management can be certified is ISO 9001:2008. Both the accreditation bodies and the certification bodies charge fees for their services. The various accreditation bodies have mutual agreements with each other to ensure that certificates issued by one of the Accredited Certification Bodies (CB) are accepted worldwide.

The applying organization is assessed based on an extensive sample of its sites, functions, products, services and processes; a list of problems ("action requests" or "non-compliance") is made known to the management. If there are no major problems on this list, or after it receives a satisfactory improvement plan from the management showing how any problems will be resolved, the certification body will issue an ISO 9001 certificate. The certificate is limited by a certain scope (e.g. production of golf balls) and names the locations covered.

An ISO certificate is not a once-and-for-all award, but must be renewed at regular intervals recommended by the certification body, usually around three years. There are no grades of competence within ISO 9001: either a company is certified (meaning that it is committed to the method and model of quality management described in the standard), or it is not. In this respect, it contrasts with measurement-based quality systems such as the Capability Maturity Model.

1.8.4 Auditing

Two types of auditing are required to become registered to the standard: auditing by an external certification body (external audit) and audits by internal staff trained for this process (internal audits). The aim is a continual process of review and assessment, to verify that the system is working as it's supposed to, find out where it can improve and to correct or prevent problems identified. It is considered healthier for internal auditors to audit outside their usual management line, so as to bring a degree of independence to their judgments.

Under the 1994 standard, the auditing process could be adequately addressed by performing "compliance auditing":

- Tell me what you do *(describe the business process)*
- Show me where it says that *(reference the procedure manuals)*
- Prove that this is what happened *(exhibit evidence in documented records)*

The 2000 standard uses a different approach. Auditors are expected to go beyond mere auditing for rote "compliance" by focusing on risk, status and importance. This means they are expected to make more judgments on what is effective, rather than merely adhering to what is formally prescribed. The difference from the previous standard can be explained thus:

Under the 1994 version, the question was broadly "Are you doing what the manual says you should be doing?", whereas under the 2000 version, the question is more specific "Will this process help you achieve your stated objectives? Is it a good process or is there a way to do it better?"

1.8.5 Effectiveness

The debate on the effectiveness of ISO 9000 commonly centers on the following questions:

1) Are the quality principles in ISO 9001:2000 of value? (Note that the version date is important: in the 2000 version ISO attempted to address many concerns and criticisms of ISO 9000:1994).

2) Does it help to implement an ISO 9001:2000 compliant quality management system?

3) Does it help to obtain ISO 9001:2000 certification?

Effectiveness of the ISO system being implemented depends on a number of factors, the most significant of which are:

1) Commitment of Senior Management to monitor, control, and improve quality. Organizations that implement an ISO system without this desire and commitment, often take the cheapest road to get a certificate on the wall and ignore problem areas uncovered in the audits.

2) How well the ISO system integrates into their business practices. Many organizations that implement ISO try to make their system fit into a cookie-cutter quality manual rather than create a manual that documents existing practices and only adds new processes to meet the ISO standard when necessary.

3) How well the ISO system focuses on improving the customer experience. The broadest definition of quality is "Whatever the customer perceives good quality to be". This means that you don't necessarily have to make a product that never fails, some customers will have a higher tolerance for product failures if they always receive shipments on-time, or some other dimension of customer service. Your ISO system should take into account all areas of the customer experience, the industry expectations, and seek to improve them on a continual basis. This means taking into account all processes that deal with the three stakeholders (your customers, your suppliers, and your organization), only then will you be able to sustain improvements in your customer experience.

4) How well the auditor finds and communicates areas of improvement. While ISO auditors may not provide consulting to the clients they audit, there is the

potential for auditors to point out areas of improvement. Many auditors simply rely on submitting reports that indicate compliance or non-compliance with the appropriate section of the standard, however, to most executives, this is like speaking a foreign language. Auditors that can clearly identify and communicate areas of improvement in language and terms executive management understands allows the companies they audit to act on improvement initiatives. When management doesn't understand why they were non-compliant and the business implications, they simply ignore the reports and focus on what they do understand.

1.8.6 Advantages

It is widely acknowledged that proper quality management improves business, often having a positive effect on investment, market share, sales growth, sales margins, competitive advantage, and avoidance of litigation. The quality principles in ISO 9000:2000 are also sound, according to Wade and also to Barnes, who says that ISO 9000 guidelines provide a comprehensive model for quality management systems that can make any company competitive implementing ISO often gives the following advantages:

1) Create a more efficient, effective operation

2) Increase customer satisfaction and retention

3) Reduce audits

4) Enhance marketing

5) Improve employee motivation, awareness, and morale

6) Promote international trade

7) Increase profit

8) Reduce waste and increase productivity.

1.8.7 Problems

A common criticism of ISO 9001 is the amount of money, time and paperwork required for registration. According to Barnes, "Opponents claim that it is only for documentation. Proponents believe that if a company has documented its quality systems, then most of the paperwork has already been completed."

ISO 9001 is not in any way an indication that products produced using its certified systems are any good. A company can intend to produce a poor quality product and providing it does so consistently and with the proper documentation can put an ISO 9001 stamp on it. According to Seddon, ISO 9001 promotes specification, control, and procedures rather than understanding and improvement. Wade argues that ISO 9000 is effective as a guideline, but that promoting it as a standard "helps to mislead companies into thinking that certification means better quality, [undermining] the need for an organization to set its own quality standards." Paraphrased, Wade's argument is that reliance on the specifications of ISO 9001 does not guarantee a successful quality system.

While internationally recognized, most US consumers are not aware of ISO 9000 and it holds no relevance to them. The added cost to certify and then maintain certification may not be justified if product end users do not require ISO 9000. The cost can actually put a company at a competitive disadvantage when competing against a non ISO 9000 certified company.

The standard is seen as especially prone to failure when a company is interested in certification before quality. Certifications are in fact often based on customer contractual requirements rather than a desire to actually improve quality. "If you just want the certificate on the wall, chances are, you will create a paper system that doesn't have much to do with the way you actually run your business," said ISO's Roger Frost. Certification by an independent auditor is often seen as the problem area, and according to Barnes, "has become a vehicle to increase consulting services." In fact, ISO itself advises that ISO 9001 can be implemented without certification, simply for the quality benefits that can be achieved.

Another problem reported is the competition among the numerous certifying bodies, leading to a softer approach to the defects noticed in the operation of the Quality System of a firm.

Abrahamson argued that fashionable management discourse such as Quality Circles tends to follow a lifecycle in the form of a bell curve, possibly indicating a management fad.

1.8.8 The ISO 9000 Family of Documents

The ISO 9000 Family of Quality Management Standards		
The ISO 9000 series		
	Description	**Status**
ISO 9000 ANSI/ISO/ASQ Q9000-2000	Quality management systems – fundamentals and vocabulary	Amendment in final approval stages
ISO 9001 ANSI/ISO/ASQ Q9001-2000	Quality management systems – requirements	Expect amendment in 2008
ISO 9004 ANSI/ISO/ASQ Q9004-2000	Quality management systems – guidelines for performance improvements	Expect revision in 2008
Implementation and support package for ISO 9001 Download free at: *www.iso.ch/tc176/sc2*		
ISO/TC176/SC2 N524R4	ISO 9000 introduction and support package module: guidance on ISO 9001 subclause 1.2 "application"	April 29, 2004 version
ISO/TC176/SC2 N525R	ISO 9000 introduction and support package: guidance on the documentation requirements of ISO 9001	March 13, 2001 version
ISO/TC176/SC2 N526R	ISO 9000 introduction and support package: guidance on the terminology used in ISO 9001 and ISO 9004	May 17, 2001 version
ISO/TC176/SC2 N544R2r	ISO 9000 introduction and support package: guidance on the concept and use of the process approach for management systems	May 13, 2004
ISO/TC176/SC2 N630R2	ISO 9000 introduction and support package: guidance on "outsourced processes"	November 24, 2003
Sector-specific quality management system standard		
ISO/TS 16949	Quality management systems – particular requirements for the application of ISO 9001 for automotive production and relevant service part organizations	
Supporting standards and technical reports		
ISO/CD 10001	Quality management – customer satisfaction – guidelines on codes of conduct for organizations	New project; at committee draft for comments-only stage
ISO 10002	Quality management – customer satisfaction – guidelines for complaints handling in organizations	In U.S. adoption process as ANSI/ISO/ASQ Q10002-200X
ISO/CD 10003	Quality management – customer satisfaction – guidelines for dispute resolution external to organizations	New project; at committee draft for comments-only stage
ISO 10005	Quality management – guidelines for quality plans	Revision in final approval stages
ISO 10006	Quality management systems – guidelines for quality management in projects	In U.S. adoption process as ANSI/ISO/ASQ Q10006-200X
ISO 10007	Quality management systems – guidelines for configuration management	In U.S. adoption process as ANSI/ISO/ASQ Q10007-200X
ISO 10012	Measurement management systems – requirements for measurement processes and measuring equipment	In U.S. adoption process as ANSI/ISO/ASQ M10012
ISO/TR 10013	Guidelines for quality management system documentation	
ISO/TR 10014	Guidelines for managing the economics of quality	Revision at draft international standard stage
ISO 10015 ANSI/ISO/ASQ Q10015-2001	Quality management – guidelines for training	Systematic review in progress
ISO/TR 10017	Guidance on statistical techniques for ISO 9001	
ISO 10019	Guidelines for the selection of quality management system consultants and use of their services	

Fig. 3: The ISO 9000 Family of Documents (July 2005)

1.9 ISO 14000

The **ISO 14000** Environmental Management Standards (EMS) exist to help organizations (a) minimize how their operations (processes etc.) negatively affect the environment (i.e. cause adverse changes to air, water, or land); (b) comply with applicable laws, regulations, and other environmentally oriented requirements, and (c) continually improve in the above.

ISO 14000 is similar to ISO 9000 quality management in that both pertain to the process of how a product is produced, rather than to the product itself. As with ISO 9000, certification is performed by third-party organizations rather than being awarded by ISO directly. The ISO 19011 audit standard applies when auditing for both 9000 and 14000 compliance at once.

1.9.1 Brief History of EMS

The concept of an Environmental Management System (EMS) evolved in the early nineties and its origin can be traced back to 1972, when the United Nations organized a Conference on the Human Environment in Stockholm and the United Nations Environment Programme (UNEP) was launched. These early initiatives led to the establishment of the World Commission on Environment and Development (WCED) and the adoption of the Montreal Protocol and Basel Convention.

In 1992, the first Earth Summit was held in Rio-de-Janeiro, which served to generate a global commitment to the environment (RMIT University). In the same year, BSI Group published the world's first environmental management systems standard, BS 7750. This supplied the template for the development of the **ISO 14000** series in 1996, by the International Organization for Standardization, which has representation from committees all over the world (ISO). As of 2010, ISO 14001 is now used by at least 223149 organizations in 159 countries and economies.

1.9.2 Development of the ISO 14000 Series

The ISO 14000 family includes most notably the ISO 14001 standard, which represents the core set of standards used by organizations for designing and implementing an effective environmental management system. Other standards included in this series are ISO 14004, which gives additional guidelines for a good environmental management system, and more specialized standards dealing with specific aspects of environmental management. The major objective of the ISO 14000 series of norms is "to promote more effective and efficient environmental management in organizations and to provide useful and usable tools – ones that are cost effective, system-based, flexible and reflect the best organizations and the best organizational practices available for gathering, interpreting and communicating environmentally relevant information".

Unlike previous environmental regulations, which began with command and control approaches, later replaced with ones based on market mechanisms, ISO 14000 was based on a voluntary approach to environmental regulation. The series includes the ISO 14001 standard, which provides guidelines for the establishment or improvement of an EMS. The standard shares many common traits with its predecessor ISO 9000, the international standard of quality management, which served as a model for its internal structure and both can be implemented side by side. As with ISO 9000, ISO 14000 acts both as an internal management tool and as a way of demonstrating a company's environmental commitment to its customers and clients.

Prior to the development of the ISO 14000 series, organizations voluntarily constructed their own EMS systems, but this made comparisons of environmental effects between companies difficult and therefore the universal ISO 14000 series

was developed. An EMS is defined by ISO as: "part of the overall management system, that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving and maintaining the environmental policy" (ISO 1996 cited in Federal Facilities Council Report 1999).

1.9.3 List of ISO 14000 Series Standards

- **ISO 14001** Environmental management systems – Requirements with guidance for use
- **ISO 14004** Environmental management systems – General guidelines on principles, systems and support techniques
- **ISO 14015** Environmental assessment of sites and organizations
- **ISO 14020** series (14020 to 14025) Environmental labels and declarations
- **ISO 14031** Environmental performance evaluation-Guidelines
- **ISO 14040** series (14040 to 14049), Life Cycle Assessment, LCA, discusses pre-production planning and environment goal setting.
- **ISO 14050** terms and definitions.
- **ISO 14062** discusses making improvements to environmental impact goals.
- **ISO 14063** Environmental communication-Guidelines and examples
- **ISO 14064** Measuring, quantifying, and reducing Greenhouse Gas emissions.
- **ISO 19011** which specifies one audit protocol for both 14000 and 9000 series standards together. This replaces ISO 14011 meta-evaluation-how to tell if your intended regulatory tools worked. 19011 is now the only recommended way to determine this.

1.9.4 ISO 14001 Consultancy

ISO 14001 relates to environmental issues. Although it is a system standard, it requires an organization to identify and assess environmental aspects and take necessary control to reduce environmental impacts. Many organizations need to put efforts into taking all additional environmental tasks so that they employ ISO 14001 consultancy firms to solve the technical environmental issues. Training is the first step of implementing ISO 14001 and then an organization needs to consider ISO14001 consultancy.

1.9.5 ISO 14001 Environmental Aspect Database

For ISO 14001 implementation, it is most important to identify and assess environmental aspects and impacts. Many organizations develop "list of environmental aspects and impacts" and use it to conduct environmental controls and write environmental procedures. It is also needed to be communicated within organization and as environmental awareness for staffs. Some companies use environmental aspect database instead of the long list because it can be easier to be searched by staff to know their related environmental issues. It is valuable tools for ISO 14001 implementation and you can try to obtain from many government websites, industry associations or internet search.

1.9.6 ISO 14001 Standard

The standard is not an environmental management system as such and therefore does not dictate absolute environmental performance requirements, but serves instead as a framework to assist organizations in developing their own environmental

management system (RMIT University). ISO 14001 can be integrated with other management functions and assists companies in meeting their environmental and economic goals.

ISO 14001, as with other ISO 14000 standards, is voluntary (IISD 2010), with its main aim to assist companies in continually improving their environmental performance, whilst complying with any applicable legislation. Organizations are responsible for setting their own targets and performance measures, with the standard serving to assist them in meeting objectives and goals and the subsequent monitoring and measurement of these (IISD 2010). This means that two organizations that have completely different measures and standards of environmental performance, can both comply with ISO 14001 requirements (Federal Facilities Council Report 1999).

The standard can be applied to a variety of levels in the business, from organizational level, right down to the product and service level (RMIT University). Rather than focusing on exact measures and goals of environmental performance, the standard highlights what an organization needs to do to meet these goals (IISD 2010). Success of the system is very dependant on commitment from all levels of the organization, especially top management, who need to be actively involved in the development, implementation and maintenance of the environmental management system (iso14001.com.au 2010). In 2008 there were an estimated 188 000 companies from 155 countries, certified as ISO 14001 compliant (ISO14001.com.au 2010).

ISO 14001 is known as a generic management system standard, meaning that it is applicable to any size and type of organization, product or service, in any sector of activity and can accommodate diverse socio-cultural and geographic conditions (Standards Australia/Standards New Zealand 2004). All standards are periodically reviewed by ISO and new ones issued (Standards Australia/Standards New Zealand 2004).

1.9.7 Basic Principles and Methodology

The fundamental principle and overall goal of the ISO 14001 standard, is the concept of continual improvement (Federal Facilities Council Report 1999). ISO 14001 is based on the Plan-Do-Check-Act methodology (Standards Australia/ Standards New Zealand 2004) which has been expanded to include 17 elements, grouped into five phases that relate to Plan-Do-Check-Act; Environmental Policy, Planning, Implementation & Operation, Checking & Corrective Action and lastly Management Review (Martin 1998).

Plan – establish objectives and processes required

Prior to implementing ISO 14001, an initial review or gap analysis of the organization's processes and products is recommended, to assist in identifying all elements of the current operation and if possible future operations, that may interact with the environment, termed environmental aspects (Martin 1998). Environmental aspects can include both direct, such as those used during manufacturing and indirect, such as raw materials (Martin 1998). This review assists the organization in establishing their environmental objectives, goals and targets, which should ideally be measurable; helps with the development of control and management procedures and processes and serves to highlight any relevant legal requirements, which can then be built into the policy (Standards Australia/Standards New Zealand 2004).

Do – implement the processes

During this stage the organization identifies the resources required and works out those members of the organization responsible for the EMS' implementation and

control (Martin 1998). This includes documentation of all procedures and processes; including operational and documentation control, the establishment of emergency procedures and responses, and the education of employees, to ensure they can competently implement the necessary processes and record results (Standards Australia/Standards New Zealand 2004). Communication and participation across all levels of the organization, especially top management is a vital part of the implementation phase, with the effectiveness of the EMS being dependant on active involvement from all employees (Federal Facilities Council Report 1999).

Check – measure and monitor the processes and report results

During the check stage, performance is monitored and periodically measured to ensure that the organization's environmental targets and objectives are being met (Martin 1998). In addition, internal audits are regularly conducted to ascertain whether the EMS itself is being implemented properly and whether the processes and procedures are being adequately maintained and monitored (Standards Australia/ Standards New Zealand 2004).

Act – take action to improve performance of EMS based on results

After the checking stage, a regular planned management review is conducted to ensure that the objectives of the EMS are being met, the extent to which they are being met, that communications are being appropriately managed and to evaluate changing circumstances, such as legal requirements, in order to make recommendations for further improvement of the system (Standards Australia/ Standards New Zealand 2004). These recommendations are then fed back into the planning stage to be implemented into the EMS moving forward.

1.9.8 Continual Improvement Process

The core requirement of a continual improvement process (CIP) is different from the one known from quality management systems. CIP in ISO 14001 has three dimensions (Gastl, 2009):

- **Expansion:** More and more business areas get covered by the implemented EMS.
- **Enrichment:** More and more activities, products, processes, emissions, resources etc. get managed by the implemented EMS.
- **Upgrading:** An improvement of the structural and organizational framework of the EMS, as well as an accumulation of know-how in dealing with business related environmental issues.

Overall, the CIP-concept expects the organization to gradually move away from merely operational environmental measures towards a strategic approach on how to deal with environmental challenges.

1.9.9 Benefits

ISO 14001 was developed primarily to assist companies' in reducing their environmental impact, but in addition to an improvement in environmental standards and performance, organizations can reap a number of economic benefits including higher conformance with legislative and regulatory requirements (Sheldon 1997) by utilising the ISO standard. Firstly by minimizing the risk of regulatory and environmental liability fines and improving an organization's efficiency (Delmas 2001), leading to a reduction in waste and consumption of resources, operating costs can be reduced (ISO14001.com.au 2010). Secondly, as an internationally recognised standard, businesses' operating in multiple locations across the globe can register as ISO 14001 compliant, eliminating the need for multiple registrations

or certifications (Hutchens 2010). Thirdly there has been a push in the last decade by consumers, for companies to adopt stricter environmental regulations, making the incorporation of ISO 14001 a greater necessity for the long term viability of businesses (Delmas and Montiel 2009) and providing them with a competitive advantage against companies that do not adopt the standard. This in turn can have a positive impact on a company's asset value and can lead to improved public perceptions of the business, placing them in a better position to operate in the international marketplace. Finally it can serve to reduce trade barriers between registered businesses.

Organizations can significantly benefit from EMS implementation through the identification of large cleaner production projects (e.g. which can drastically cut electricity costs in manufacturing industries). ISO 14001 can be a very effective tool to identify these cost savings opportunities for some organizations. Some other organizations can falter in its planning, lack of senior management commitment and poor understanding of how it should be implemented and find themselves managing an ineffective EMS. Improvements that organizations can take include adequately planning its structure and allocating adequate resources, providing training, creating forums for discussion, setting measurable targets and work according to the philosophy of continuous improvement.

1.9.10 Conformity Assessment

ISO 14001 can be used in whole or in part to help an organization, for profit or not-for-profit, better manage its relationship with the environment. If all the elements of ISO 14001 are incorporated into the management process, the organization may opt to prove that it has achieved full alignment or conformity with the international standard, ISO 14001, by using one of four recognized options. These are:

1) make a self-determination and self-declaration, or

2) seek confirmation of its conformance by parties having an interest in the organization, such as customers, or

3) seek confirmation of its self-declaration by a party external to the organization, or

4) seek certification/registration of its environmental management system by an external organization.

(Source: ISO 14001: 2004, Clause 1: Scope c))

One option is not better than the next. Each option serves different market needs. The adopting organization decides which option is best for them, wisely in conjunction with their market needs. Option 1 is sometimes incorrectly referred to as "self-certify" or "self-certification". This is not an acceptable reference under ISO terms and definitions, for it can lead to confusion in the market (Reference: ISO/IEC 17000:2004(E/F/R)). Option 2 is often referred to as a customer or 2nd party audit, which is an acceptable market term. Option 3 is an independent third-party process that is based on the EnviroReady Report, which is the proprietary name for a service provided by specially trained professional accountants. The training process for accountants is managed by 14000registry.com. It is categorized by ISO as a recognition scheme. It was designed to assist small and medium-sized enterprise, but can be used by any entity. The fourth option, certification, is another independent third-party process, which tends to be used by large firms. Certification is also known in some markets as registration. Service providers of certification or registration are accredited by national standards bodies; these service providers are usually listed on the website of the national standards body.

1.10 ISO/IEC 27001

ISO/IEC 27001, part of the growing ISO/IEC 27000 family of standards, is an Information Security Management System (ISMS) standard published in October 2005 by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). Its full name is *ISO/IEC 27001:2005 – Information technology -- Security techniques – Information security management systems – Requirements*. ISO/IEC 27001 formally specifies a management system that is intended to bring information security under explicit management control.

1.10.1 How the Standard Works?

Most organizations have a number of information security controls. Without an ISMS however, the controls tend to be somewhat disorganized and disjointed, having been implemented often as point solutions to specific situations or simply as a matter of convention. Maturity models typically refer to this stage as "ad hoc". The security controls in operation typically address certain aspects of IT or data security, specifically, leaving non-IT information assets (such as paperwork and proprietary knowledge) less well protected on the whole. Business continuity planning and physical security, for examples, may be managed quite independently of IT or information security while Human Resources practices may make little reference to the need to define and assign information security roles and responsibilities throughout the organization.

ISO/IEC 27001 requires that management:

- Systematically examine the organization's information security risks, taking account of the threats, vulnerabilities and impacts;
- Design and implement a coherent and comprehensive suite of information security controls and/or other forms of risk treatment (such as risk avoidance or risk transfer) to address those risks that are deemed unacceptable; and
- Adopt an overarching management process to ensure that the information security controls continue to meet the organization's information security needs on an ongoing basis.

While other sets of information security controls may potentially be used within an ISO/IEC 27001 ISMS as well as, or even instead of, ISO/IEC 27002 (the Code of Practice for Information Security Management), these two standards are normally used together in practice. Annex A to ISO/IEC 27001 succinctly lists the information security controls from ISO/IEC 27002, while ISO/IEC 27002 provides additional information and implementation advice on the controls.

Organizations that implement a suite of information security controls in accordance with ISO/IEC 27002 are simultaneously likely to meet many of the requirements of ISO/IEC 27001, but may lack some of the overarching management system elements. The converse is also true, in other words, an ISO/IEC 27001 compliance certificate provides assurance that the management system for information security is in place, but says little about the absolute state of information security within the organization. Technical security controls such as antivirus and firewalls are not normally audited in ISO/IEC 27001 certification audits: the organization is essentially *presumed* to have adopted all necessary information security controls since the overall ISMS is in place and is deemed adequate by satisfying the requirements of ISO/IEC 27001. Furthermore, management determines the scope of the ISMS for certification purposes and may limit it to, say, a single business unit or location. The ISO/IEC 27001 certificate does not necessarily mean the remainder of the organization, outside the scoped area, has an adequate approach to information security management.

Other standards in the ISO/IEC 27000 family of standards provide additional guidance on certain aspects of designing, implementing and operating an ISMS, for example on information security risk management (ISO/IEC 27005).

1.10.2 Origins of ISO/IEC 27001

BS 7799 was a standard originally published by BSI Group in 1995. It was written by the United Kingdom Government's Department of Trade and Industry (DTI), and consisted of several parts.

The first part, containing the best practices for Information Security Management, was revised in 1998; after a lengthy discussion in the worldwide standards bodies, it was eventually adopted by ISO as ISO/IEC 17799, "Information Technology – Code of practice for information security management." in 2000. ISO/IEC 17799 was then revised in June 2005 and finally incorporated in the ISO 27000 series of standards as ISO/IEC 27002 in July 2007.

The second part of BS7799 was first published by BSI in 1999, known as BS 7799 Part 2, titled "Information Security Management Systems – Specification with guidance for use." BS 7799-2 focused on how to implement an Information security management system (ISMS), referring to the information security management structure and controls identified in BS 7799-2. This later became ISO/IEC 27001. The 2002 version of BS 7799-2 introduced the Plan-Do-Check-Act (PDCA) (Deming quality assurance model), aligning it with quality standards such as ISO 9000. BS 7799 Part 2 was adopted by ISO as ISO/IEC 27001 in November 2005.

BS 7799 Part 3 was published in 2005, covering risk analysis and management. It aligns with ISO/IEC 27001.

1.10.3 Certification

An ISMS may be certified compliant with ISO/IEC 27001 by a number of Accredited Registrars worldwide. Certification against any of the recognized national variants of ISO/IEC 27001 (e.g. JIS Q 27001, the Japanese version) by an accredited certification body is functionally equivalent to certification against ISO/IEC 27001 itself.

In some countries, the bodies that verify conformity of management systems to specified standards are called "certification bodies", in others they are commonly referred to as "registration bodies", "assessment and registration bodies", "certification/ registration bodies", and sometimes "registrars".

The ISO/IEC 27001 certification, like other ISO management system certifications, usually involves a three-stage audit process:

- **Stage 1** is a preliminary, informal review of the ISMS, for example checking the existence and completeness of key documentation such as the organization's information security policy, Statement of Applicability (SoA) and Risk Treatment Plan (RTP). This stage serves to familiarize the auditors with the organization and vice versa.
- **Stage 2** is a more detailed and formal compliance audit, independently testing the ISMS against the requirements specified in ISO/IEC 27001. The auditors will seek evidence to confirm that the management system has been properly designed and implemented, and is in fact in operation (for example by confirming that a security committee or similar management body meets regularly to oversee the ISMS). Certification audits are usually conducted by ISO/IEC 27001 Lead Auditors. Passing this stage results in the ISMS being certified compliant with ISO/IEC 27001.

- **Stage 3** involves follow-up reviews or audits to confirm that the organization remains in compliance with the standard. Certification maintenance requires periodic re-assessment audits to confirm that the ISMS continue to operate as specified and intended. These should happen at least annually but (by agreement with management) are often conducted more frequently, particularly while the ISMS is still maturing.

1.11 ISO STANDARDS IMPLEMENTATION: CASE STUDIES

1.11.1 ISO 9001 Case Study

Outcome: RoMan Manufacturing uses Pinnacle's Lean QMS® and Lean EMS® to develop an integrated quality and environmental management system, achieve ISO 9001 and ISO 14001 certification, and support Lean Manufacturing transformation.

Industry: Automotive, Telecommunication, Electronics, Manufacturing

Objectives

- Improve and simplify the existing ISO 9001 quality management systems.
- Make the quality management system value-added for running the business.
- Integrate with and support Lean Manufacturing transformation
- Develop a practical Environmental Management System and achieve ISO 14001 certification.

Approach

- Use Pinnacle's Lean QMS® methodology to simplify existing QMS documentation and maintain ISO 9001 certification.
- Use Pinnacle's Lean EMS® methodology to integrate the EMS with the QMS and achieve ISO 14001 certification.

Benefits

- A management system that is more easily navigable than the previous text-based system.
- Increased personnel involvement in relating the process to every part of the business.
- A seamless, rapid integration of Lean EMS® (ISO 14001) with the visual Lean QMS® resulting with a single integrated management system.

"For many employees, having to consult a three page single spaced document for every procedure was drudgery. The visual system makes everything easy to relate to. We actually started getting input from people."

Kendall Ymker, Management Representative

RoMan Manufacturing is a leading manufacturer of transformers, power supplies, switches, and inverters. Their multiple departments occupy 3 buildings in Southwest Grand Rapids, Michigan. RoMan began to explore making a commitment to a formal quality management program when one of their automotive customers put a group of its suppliers on a timeline for QS 9000 T&E. After discovering that the customer's QS 9000 T&E requirement didn't apply to their operation, RoMan began to pursue ISO 9001 certification and contacted outside consulting firms to assist them.

Early in the process they reviewed the Pinnacle Lean QMS® and agreed that there were aspects of the Lean QMS® that would simplify their certification and possibly be more appealing to present to the employees. However, they began normal preparation for their registration audit and development of a text based system. As the process continued and the quality manual grew in content, the certification activity began to feel like a management-only team exercise. There was no lack of process material available but according to Kendall Ymker, Management Representative, it seemed like just that "material, that didn't have a feel linking it to the business." It wasn't that there was negative feedback regarding the ISO 9001 certification process, the personnel just weren't in tune with what was taking place in the ISO 9001 implementation process.

About 5 months into the process after a successful registration audit, RoMan decided to convert to Pinnacle Enterprise Group's visual Lean QMS®. The conversion took about 5 more months, but the results were more than worth the effort, according to Operations Manager Greg Garthe. "The text-based books and manuals were good, but no one really took the time to use them. It was difficult to look things up on the computer. The visual based system was much easier to follow. People can actually see what's happening."

With the conversion to Pinnacle Lean QMS®, the RoMan quality manual went from 100 pages of single spaced text, to a three page graphical overview, called the Lean QMS® Map. The Lean QMS® Map is then linked to 20 pages of process maps that describe every core and support process. "It was like going from the dark ages to the enlightenment," stated Greg Garthe. "The visual system is very powerful."

With the visual system created by the Lean QMS®, the ISO 9001 certification initiative was no longer a management team only exercise. The team began to receive input from a wide variety of personnel. "People actually stopped just sitting around the table and became involved," said Kendall Ymker.

Not only did everyone begin sharing ideas for the certification process, but the system became an important tool for running the business. Even though there was no longer a customer requirement driving the need for certification, the leadership team and personnel alike felt the Lean QMS® truly represented the operation, and at the same time became the operation. RoMan uses it to run the business because it's both the easiest way and the best way. "We live it, it's what we do," states Garthe.

For RoMan, beginning with the Lean QMS® also provided an important economy of scale for their Environmental Management System. They were able to pick any core process and develop its environmental aspects easily and visually. Using Pinnacle Enterprise Group's Lean EMS®, RoMan was able to complete their ISO 14001 certification in less than 4 months, thanks to the system and culture which evolved during the ISO 9001 implementation process.

When asked whether using the Pinnacle system is cost effective, Ymker says, "It's not even a question mark just get it done!" Both the company leadership and personnel agree that it is easy to see the value.

1.11.2 ISO 9000 Case Studies

There are a few useful case studies about the financial performance of companies that have achieved ISO 9000 certification. Even though ISO 9000 is a Quality Management rather than an Environmental Management System standard, the fact that it yields economic benefits is indirect support for adopting an EMS. There are four studies demonstrating at least a correlation between ISO 9000 certification and financial performance. They are in chronological order:

1999: Northern Ireland Study

Study author Rodney McAdam examined the experiences of small businesses of fewer than 100 workers in Northern Ireland. The thrust of the study is that small companies can achieve positive business results despite the relatively high costs of ISO 9000 certification. According to McAdam, ISO 9000-certified small businesses were five times more likely to experience at least some benefits from ISO 9000 than small businesses without certification.

2002: UCLA Study

This study demonstrates a causal link between ISO 9000 and performance. The study authors paired publicly traded U.S. companies with similar return on assets (ROA) in three industrial sectors (chemicals, computer equipment and electronic equipment) and showed what happened when one of the companies attained ISO 9000 certification and the other didn't. In just about all cases, the ISO 9000 company had substantially higher ROAs in the subsequent 10 years than the non-ISO company against which it was paired. (Corbett et al.; see "The Financial Impact of ISO 9000 Certification in the U.S.: An Empirical Analysis," UCLA Anderson School of Management, 2002).

2003: U.S. Study

This study evaluates the linkage between ISO 9000 certification and benefits to shareholders of public companies by assessing the stock performance of ISO and non-ISO companies. Results: Companies that achieved ISO 9000 certification had higher stock price growth. The study found that $100,000 invested in a portfolio of non-ISO companies would have been valued at $424,000 nine years later. But the same $100,000 invested in ISO companies over the same period would have been valued at $814,000.

1.11.3 ISO 14001 Case Studies

Copley Square Hotel Case Study

A prominent hotel created an aggressive environmental program that provides a foundation for ISO 14001 registration. The hotel is an historic one with an upscale clientele. Their aggressive approach to reducing their impact on the environment helped them identify many ongoing benefits. The major benefit areas were: recycling, energy use reduction, and water use reduction. The following are the major actions and their results:

Recycling

Material	Recycling Revenue	Net Avolded Cost
Cardboard		980
Deposit Containers	1,400	58
Food Waste		1,050
Glass Bottles	350	
Metel Cans		70
Mixed Office Paper		350
Newspapers/Mags		350
Phone Books		21
Total – Annual	$1,750	$2,877

Energy Use Reduction

- Energy efficient lighting was installed in public areas which are light 24 hours per day. 60 watt incandescent corridor ceiling lights were replaced 15 watt compact fluorescent lights: savings equal $3,622 annually plus 90% reduction

in labor costs. 90 watt incandescent lights in table lamps in the lobby and elevator landings were replaced with 22 watt compact fluorescent lights: savings equal $1,540 annually and reduced labor costs. 30 watt exit sign lights were replaced with 1.8 watt LED exit signs: savings equal $1,179 annually.

- Install compact fluorescent bulbs in guest room table lamps and hanging lamps: predicted payback equal 1.81 years.
- Install compact fluorescent bulbs in back areas which are lit 24 hours: savings equal to $59.57 per bulb.
- Remind employees to turn off all energy using devices that are not being used: no estimate of savings.

Water Use Reduction

- Installing toilets with 1.5 gallon capacity, replacing ones with 3.5 gallon capacity will save $3,276 and 430,000 gallons annually.
- Showerheads of greater efficiency will save $6,546 and 859,000 gallons annually.
- Guest has been offered the option of reusing their towels and linens when staying more than one night. Projected savings are $4,000 annually.

Comments

This case includes savings that are well known and some that are innovative. Some of the reasons the program has been successful are:

- Everyone in the hotel participates in the program and can contribute from within their job responsibilities. Thus, the power of each individual to contribute in a positive way is harnessed.
- Small savings are as important as big ones. This recognizes that small savings add up and creates a culture that values contributions at all levels of the organization and of any size. The cumulative effect of many small acts of environmental impact reduction may not be quantifiable, but it may be significant.

Wilton Armetale Case Study

Wilton Armetale is a non-ferrous foundry located in Lancaster County, Pennsylvania. This area is home to some of the largest and oldest Amish settlements in the country, so the company is surrounded by environmentally conscious people. Wilton Armetale is a leader in its efforts to be a good neighbor and in its approach to environmental standards. In its effort to be environmentally responsible and certify to ISO 14000 it achieved these results:

- Reduced waste costs by about 40 percent over two years.
- Found that 60 to 70 percent of the waste generated could be reused, recycled, or eliminated.
- Vendors were asked to use returnable packaging. Skids and excess packaging were given away to individuals and companies who could use them. These reduced the cost of storing, hauling, and disposing of waste.
- The quantities of some raw material inputs to the manufacturing process were eliminated or reduced.

Some of the keys to Wilton Armetale's success include:

- The employees really cared about improving their environmental performance and the owners of the company were open new ideas.
- For some parts of the program, those requiring the greatest change, proponents sold their ideas to employees and management.
- The program included employee suggestions. Employees were encouraged to make suggestions and then take responsibility for implementing them. They were rewarded for these efforts.
- The program began as a way to reduce costs which benefits all stakeholders.

Comments

Giving away materials does not sound like a way to save money, but it is since is eliminates the need for other expenditures. This is a good example of the waste from one company reducing the costs of another and reducing the impact on the earth by getting more use out of the materials. Wilton Armetale self-declared ISO 14001 conformance on July 23rd, 1997. They became the first foundry in the U.S. to conform.

1.11.4 Mini Cases

Rockwell Automation (Twinsburg, Ohio)

The Twinsburg plant became one of the first registrants in the U.S. to ISO 14001. According the Roger Hartel, "certification sends a message to the company's stockholders, customers, and employees. Being an exemplary environmental citizen is absolutely of critical importance to all these populations and to international business as well." ISO 14000 and EMS have contributed to a continuing reduction of energy consumption and waste production. Recycling reduces material sent to landfills by about 150,000 pounds a year.

Plasticolor (Ashtabula, Ohio)

Registered to ISO 14001 in October, 1996. According to Don Herndon, they believe that a well-documented , efficient EMS provides a proactive approach for managing environmental activities. They are not just reacting to environmental problems, but "fix" them before they occur. This greater effectiveness helps reduce costs.

Xerox Corporation

Site recycling programs, including the conversion of solid waste to useable energy through incineration, saved Xerox over $12 million in 1995.

Xerox implemented a plastic recycling program. High grade plastic panels from returned Xerox products are collected, sorted, disassembled and ground for reprocessing. The plastic is then used to manufacture Xerox products or is sold on the open market. The program has already diverted 250 tons of plastic from landfill in Monroe County and 1996 estimates project 500 tons diverted with $100,000 in savings to Xerox.

3M

In 1990, 3M began a major waste reduction effort. By 3M definition, waste is what remains after raw materials are converted to products and by-products. During 1993, resource recovery activities in the U.S. recovered and sold almost 199 million pounds of paper, plastics, solvents, metals, and other by-products.

Since 1989, 3M realized more than $156 million by reclaiming and finding buyers for manufacturing waste. For example, employees at a 3M plant in Brazil developed a waste reduction program and sold $150,000 in waste materials and reduced waste disposal costs by $90,000.

3M's technical employees have conceived and implemented 4,590 pollution solutions under the 3P program. For example, a resin spray booth had been annually producing about 500,000 pounds of overspray that required special incineration disposal. New equipment was installed to eliminate excessive overspray. The new design reduced the amount of resin used, saving more that $125,000 a year, on a $45,000 investment in equipment.

IBM

1995 energy conservation activities saved $15.1 million, reducing electricity use by 226 million kilowatt hours. These were achieved through such efforts as energy conservation in manufacturing processes (Vimercate, Italy), installation of a condenser tube cleaning system for refrigeration machines (Mainz, Germany), and upgrading HVAC, lighting, and chilled water system controls along with systematic testing and repairs of an extensive steam trap system (Endicott, USA).

The IBM site in Austin, Texas, produced financial and social benefits by implementing a project that reuses high-quality rinse water in existing cooling systems. 1995 savings for the city were $103,000 with a rebate of $30,000 to IBM. 1996 savings to the city are estimated at $179,000. Recycling for sites in New York, New Jersey, and Connecticut produced social benefits by recycling 1,669 tons of commodities in 1995. This equates to the conservation of 28,373 trees, 4,172 barrels of oil, 6.8 million kilowatts of electricity, 11.6 million gallons of water, or 6,676 cubic yards of landfill space. Another social benefit in 1995 was the avoidance of 17,000 tons of hazardous waste from production processes.

A new process for manufacturing ceramic substrates replaced methanol with deionized water. The estimated impact is a savings of $739,000 for every 100,000 pounds of glass frit, a raw material, used in production, a reduction in methanol emissions of 6,000 pounds, and improved cycle time of 30%.

Check Your Progress 2

Note: a) Space is given below for writing your answers.

b) Compare your answers with the one given at the end of this Unit.

1) What are the advantages of ISO 9000?

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2) List out ISO 14000 Series Standards.

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3) What are the benefits of ISO 14001?

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4) How ISO/IEC 27001 works?

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1.12 LET US SUM UP

ISO is the world's leading developer of International Standards. ISO standards specify the requirements for state-of-the-art products, services, processes, materials and systems, and for good conformity assessment, managerial and organizational practice. ISO standards make a positive contribution to the world we live in. They ensure vital features such as quality, ecology, safety, economy, reliability, compatibility, interoperability, efficiency and effectiveness. They facilitate trade, spread knowledge, and share technological advances and good management practices.

ISO (International Organization for Standardization) is a global network that identifies what International Standards are required by business, government and society, develops them in partnership with the sectors that will put them to use, adopts them by transparent procedures based on national input and delivers them to be implemented worldwide. ISO standards distil an international consensus from the broadest possible base of stakeholder groups. Expert input comes from those closest to the needs for the standards and also to the results of implementing them. In this way, although voluntary, ISO standards are widely respected and accepted by public and private sectors internationally.

ISO-a non-governmental organization-is a federation of the national standards bodies of 165 countries, one per country, from all regions of the world, including developed, developing and transitional economies. Each ISO member is the principal standards organization in its country. The members propose the new standards, participate in their development and provide support in collaboration with ISO Central Secretariat for the 3 000 technical groups that actually develop the standards.

ISO collaborates with its partners in international standardization, the IEC (International Electrotechnical Commission) and the ITU-T (International Telecommunication Union), particularly in the field of information and communication technology. They have established the World Standards Cooperation (WSC) as the focus for their combined strategic activity.

ISO has a strategic partnership with the World Trade Organization (WTO) aiming to promote a free and fair global trading system. Signatories to the WTO Agreement on Technical Barriers to Trade (TBT) commit themselves to promoting and using international standards of the type developed by ISO.

ISO cooperates closely with most of the specialized agencies and bodies of the United Nations that are involved in technical harmonization and assistance to developing countries.

ISO also maintains close working relations with regional standards organizations, many of whose members also belong to ISO. In addition, several hundred specialized organizations representing trade or regulatory sectors participate in developing ISO standards.

New growth areas for ISO standards in the coming years include:

- The environment – with standards for meeting new requirements such as greenhouse gas verification (climate change mitigation) and for other aspects of sustainable development;
- The service sectors – with standards already being developed for personal financial services, market opinion, social research and tourism;
- Security – among aspects already addressed are maritime port security, freight transport and countering illegal trafficking of radioactive materials;
- Good managerial and organizational practice – such as the guidelines ISO is developing on societal responsibility.

In addition, ISO is well placed to provide voluntary standards for formerly regulated areas such as energy, water supply or transportation.

1.13 CHECK YOUR PROGRESS: THE KEY

Check Your Progress 1

1) **Role of ISO standards**

- make the development, manufacturing and supply of products and services more efficient, safer and cleaner
- facilitate trade between countries and make it fairer
- provide governments with a technical base for health, safety and environmental legislation, and conformity assessment
- share technological advances and good management practice
- disseminate innovation
- safeguard consumers, and users in general, of products and services
- make life simpler by providing solutions to common problems

2) **Features of ISO**

- **Democratic**

  Every full member of ISO has the right to take part in the development of any standard which it judges to be important to its country's economy. No matter what the size or strength of that economy, each participating member in ISO has one vote. Each country is on an equal footing to influence the direction of ISO's work at the strategic level, as well as the technical content of its individual standards.

- **Voluntary**

  ISO standards are voluntary. As a non-governmental organization, ISO has no legal authority to enforce the implementation of its standards. ISO

does not regulate or legislate. However, countries may decide to adopt ISO standards – mainly those concerned with health, safety or the environment – as regulations or refer to them in legislation, for which they provide the technical basis. In addition, although ISO standards are voluntary, they may become a market requirement, as has happened in the case of ISO 9001 quality management systems, or of dimensions of freight containers and bank cards. ISO itself does not regulate or legislate.

- **Market-driven**

  ISO only develops standards for which there is a market requirement. The work is mainly carried out by experts from the industrial, technical and business sectors which have asked for the standards, and which subsequently put them to use.

- **Consensus**

  ISO standards are based on international consensus among the experts in the field. Consensus, like technology, evolves and ISO takes account both of evolving technology and of evolving interests by requiring a periodic review of its standards at least every five years to decide whether they should be maintained, updated or withdrawn. In this way, ISO standards retain their position as the state of the art.

- **Globally relevant**

  ISO standards are technical agreements which provide the framework for compatible technology worldwide. They are designed to be globally relevant-useful everywhere in the world.

3) **COPOLCO's objectives**

Through the ISO Committee on consumer policy (COPOLCO), ISO undertakes to:

- Make COPOLCO's services available to ISO members worldwide
- Support its members in developing consumer participation in standards-making
- Study how consumers can benefit from standardization
- Promote the positive role of standards in consumer protection
- Encourage the exchange of experience on standards work of consumer interest
- Channel consumers' views into both current standards projects and proposals for new work in areas of interest to consumers.

4) **Stages of the development of International Standards**

An International Standard is the result of an agreement between the member bodies of ISO. It may be used as such, or may be implemented through incorporation in national standards of different countries.

International Standards are developed by ISO technical committees (TC) and subcommittees (SC) by a six-step process:

If a document with a certain degree of maturity is available at the start of a standardization project, for example a standard developed by another

organization, it is possible to omit certain stages. In the so-called "Fast-track procedure", a document is submitted directly for approval as a draft International Standard (DIS) to the ISO member bodies (stage 4) or, if the document has been developed by an international standardizing body recognized by the ISO Council, as a final draft International Standard (FDIS, stage 5), without passing through the previous stages.

Stage 1: Proposal Stage

The first step in the development of an International Standard is to confirm that a particular International Standard is needed. A new work item proposal (NP) is submitted for vote by the members of the relevant TC or SC to determine the inclusion of the work item in the programme of work. The proposal is accepted if a majority of the P-members of the TC/SC votes in favour and if at least five P-members declare their commitment to participate actively in the project. At this stage a project leader responsible for the work item is normally appointed.

Stage 2: Preparatory Stage

Usually, a working group of experts, the chairman (convener) of which is the project leader, is set up by the TC/SC for the preparation of a working draft. Successive working drafts may be considered until the working group is satisfied that it has developed the best technical solution to the problem being addressed. At this stage, the draft is forwarded to the working group's parent committee for the consensus-building phase.

Stage 3: Committee Stage

As soon as a first committee draft is available, it is registered by the ISO Central Secretariat. It is distributed for comment and, if required, voting, by the P-members of the TC/SC. Successive committee drafts may be considered until consensus is reached on the technical content. Once consensus has been attained, the text is finalized for submission as a draft International Standard (DIS).

Stage 4: Enquiry Stage

The draft International Standard (DIS) is circulated to all ISO member bodies by the ISO Central Secretariat for voting and comments within a period of five months. It is approved for submission as a final draft International Standard (FDIS) if a two-thirds majority of the P-members of the TC/SC are in favour and not more than one-quarter of the total number of votes cast are negative. If the approval criteria are not met, the text is returned to the originating TC/SC for further study and a revised document will again be circulated for voting and comment as a draft International Standard.

Stage 5: Approval Stage

The final draft International Standard (FDIS) is circulated to all ISO member bodies by the ISO Central Secretariat for a final Yes/No vote within a period of two months. If technical comments are received during this period, they are no longer considered at this stage, but registered for consideration during a future revision of the International Standard. The text is approved as an International Standard if a two-thirds majority of the P-members of the TC/SC is in favour and not more than one-quarter of the total number of votes cast are negative. If these approval criteria are not met, the standard is referred back to the originating TC/SC for reconsideration in light of the technical reasons submitted in support of the negative votes received.

Stage 6: Publication Stage

Once a final draft International Standard has been approved, only minor editorial changes, if and where necessary, are introduced into the final text. The final text is sent to the ISO Central Secretariat which publishes the International Standard.

Review of International Standards (Confirmation, Revision, Withdrawal)

All International Standards are reviewed at the least three years after publication and every five years after the first review by all the ISO member bodies. A majority of the P-members of the TC/SC decides whether an International Standard should be confirmed, revised or withdrawn.

Check Your Progress 2

1) **Advantages of ISO 9000**

It is widely acknowledged that proper quality management improves business, often having a positive effect on investment, market share, sales growth, sales margins, competitive advantage, and avoidance of litigation. The quality principles in ISO 9000:2000 are also sound, according to Wade and also to Barnes, who says that "ISO 9000 guidelines provide a comprehensive model for quality management systems that can make any company competitive implementing ISO often gives the following advantages:

9) Create a more efficient, effective operation

10) Increase customer satisfaction and retention

11) Reduce audits

12) Enhance marketing

13) Improve employee motivation, awareness, and morale

14) Promote international trade

15) Increase profit

16) Reduce waste and increase productivity.

2) **List of ISO 14000 Series Standards**

- **ISO 14001** Environmental management systems-Requirements with guidance for use
- **ISO 14004** Environmental management systems-General guidelines on principles, systems and support techniques
- **ISO 14015** Environmental assessment of sites and organizations
- **ISO 14020** series (14020 to 14025) Environmental labels and declarations
- **ISO 14031** Environmental performance evaluation-Guidelines
- **ISO 14040** series (14040 to 14049), Life Cycle Assessment, LCA, discusses pre-production planning and environment goal setting.
- **ISO 14050** terms and definitions.
- **ISO 14062** discusses making improvements to environmental impact goals.
- **ISO 14063** Environmental communication-Guidelines and examples
- **ISO 14064** Measuring, quantifying, and reducing Greenhouse Gas emissions.

- **ISO 19011** which specifies one audit protocol for both 14000 and 9000 series standards together. This replaces ISO 14011 meta-evaluation-how to tell if your intended regulatory tools worked. 19011 is now the only recommended way to determine this.

3) **Benefits of ISO 140001**

ISO 14001 was developed primarily to assist companies' in reducing their environmental impact, but in addition to an improvement in environmental standards and performance, organizations can reap a number of economic benefits including higher conformance with legislative and regulatory requirements (Sheldon 1997) by utilising the ISO standard. Firstly by minimizing the risk of regulatory and environmental liability fines and improving an organization's efficiency (Delmas 2001), leading to a reduction in waste and consumption of resources, operating costs can be reduced (ISO14001.com.au 2010). Secondly, as an internationally recognised standard, businesses' operating in multiple locations across the globe can register as ISO 14001 compliant, eliminating the need for multiple registrations or certifications (Hutchens 2010). Thirdly there has been a push in the last decade by consumers, for companies to adopt stricter environmental regulations, making the incorporation of ISO 14001 a greater necessity for the long term viability of businesses (Delmas & Montiel 2009) and providing them with a competitive advantage against companies that do not adopt the standard. This in turn can have a positive impact on a company's asset value and can lead to improved public perceptions of the business, placing them in a better position to operate in the international marketplace. Finally it can serve to reduce trade barriers between registered businesses.

Organizations can significantly benefit from EMS implementation through the identification of large cleaner production projects (e.g. which can drastically cut electricity costs in manufacturing industries). ISO 14001 can be a very effective tool to identify these cost savings opportunities for some organizations. Some other organizations can falter in its planning, lack of senior management commitment and poor understanding of how it should be implemented and find themselves managing an ineffective EMS. Improvements that organizations can take include adequately planning its structure and allocating adequate resources, providing training, creating forums for discussion, setting measurable targets and work according to the philosophy of continuous improvement.

4) **ISO/IEC 27001**

Most organizations have a number of information security controls. Without an ISMS however, the controls tend to be somewhat disorganized and disjointed, having been implemented often as point solutions to specific situations or simply as a matter of convention. Maturity models typically refer to this stage as "ad hoc". The security controls in operation typically address certain aspects of IT or data security, specifically, leaving non-IT information assets (such as paperwork and proprietary knowledge) less well protected on the whole. Business continuity planning and physical security, for examples, may be managed quite independently of IT or information security while Human Resources practices may make little reference to the need to define and assign information security roles and responsibilities throughout the organization.

ISO/IEC 27001 requires that management:

- Systematically examine the organization's information security risks, taking account of the threats, vulnerabilities and impacts;

- Design and implement a coherent and comprehensive suite of information security controls and/or other forms of risk treatment (such as risk avoidance or risk transfer) to address those risks that are deemed unacceptable; and
- Adopt an overarching management process to ensure that the information security controls continue to meet the organization's information security needs on an ongoing basis.

While other sets of information security controls may potentially be used within an ISO/IEC 27001 ISMS as well as, or even instead of, ISO/IEC 27002 (the Code of Practice for Information Security Management), these two standards are normally used together in practice. Annex A to ISO/IEC 27001 succinctly lists the information security controls from ISO/IEC 27002, while ISO/IEC 27002 provides additional information and implementation advice on the controls.

Organizations that implement a suite of information security controls in accordance with ISO/IEC 27002 are simultaneously likely to meet many of the requirements of ISO/IEC 27001, but may lack some of the overarching management system elements. The converse is also true, in other words, an ISO/IEC 27001 compliance certificate provides assurance that the management system for information security is in place, but says little about the absolute state of information security within the organization. Technical security controls such as antivirus and firewalls are not normally audited in ISO/IEC 27001 certification audits: the organization is essentially presumed to have adopted all necessary information security controls since the overall ISMS is in place and is deemed adequate by satisfying the requirements of ISO/IEC 27001. Furthermore, management determines the scope of the ISMS for certification purposes and may limit it to, say, a single business unit or location. The ISO/IEC 27001 certificate does not necessarily mean the remainder of the organization, outside the scoped area, has an adequate approach to information security management.

Other standards in the ISO/IEC 27000 family of standards provide additional guidance on certain aspects of designing, implementing and operating an ISMS, for example on information security risk management (ISO/IEC 27005).

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