



Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

# The Strategic Value of International Standards

Presented by  
the International Electrotechnical Commission

# Introduction

- This presentation was created by the International Electrotechnical Commission (IEC) to facilitate a better understanding of international standards for engineering students in universities around the world who are studying electrical, electronic and related technologies
- Standards are among the most important management tools ever devised and need to be studied carefully by engineers when designing, testing, certifying products or maintaining technology systems

## Introduction (cont.)

- In today's world of instant global technologies, it is of critical importance that engineers have a fundamental understanding of engineering standards and the process of international standardization
- In part, this presentation was created because schools of engineering in universities around the world are giving increased attention to integration of engineering standards in their curriculums. Some schools of engineering have already established courses on engineering standards. Other universities are working on the use of internet technology to facilitate development of courses that focus on the significance of engineering standards.

# Standards Influence Everything We Do

- “Standards, in one form or another, have always underpinned trade and business. Standards, including codes of practice and guides as well as formal standards, support compatibility and drive down costs through use of common parts, specifications and methods.

They can also help open markets, create new industries and realize the potential of new technologies.

Standards are so much a part of our daily routine that we use them without even being aware of doing so, and without giving thought to how they are created or the benefits they provide.”

*[United Kingdom National Standardization Strategic Framework, page 2 (2003); <http://www.nssf.info/FinalDocument.pdf>]*

# Historical Significance of Standards

- Standards have existed for thousands of years, for example, the first long distance roads in Europe were built by Imperial Rome for the benefit of their legions. The ruts created by the Roman chariots were then used by all other wagons and later became a gauge for laying the first railroad lines (1.44m)
- Standards are among the most important building blocks for all national economies and international trade
- Standards provide benefits such as defining accurate and necessary measurements, lowering product costs; improving product performance, quality, uniformity, interoperability and functionality; and providing a method to improve health, safety, the environment, communications, competition, international trade, and improving the quality of life

# Competitive Advantage

- “We cannot afford to go on taking standards for granted. The business world and society served by the standards infrastructure are changing rapidly. Global trade means that today’s products are built with components sourced from around the world, which must fit together and perform as expected.

Product life-cycles are becoming shorter and the pace of technological development is accelerating. . . . In this dynamic environment, the ability to harness the potential of standards is a source of competitive advantage”

*[United Kingdom National Standardization Strategic Framework (April 2003) at page 2; <http://www.nssf.info/FinalDocument.pdf>]*

# Value of International Standards

- International standards are basic technology and economic building blocks similar to DNA because they effect everything we do. It is estimated that more than 500,000 standards exist in the world today to support the global marketplace. [[www.thinkstandards.net/benefits.html](http://www.thinkstandards.net/benefits.html)]
- In 1999, the Organization for Economic Co-operation and Development published a report which estimated the value of standards and technical regulations directly affecting global trade to be more than 80% of world trade with a value of more than \$4 trillion (U.S.).

*[See OECD Report on Regulatory Reform and International Standardization, page 4; <http://www.oecd.org/dataoecd/33/19/1955309.pdf>]*

## Value of International Standards (cont.)

- In 2000, an economic analysis sponsored by the German Institute for Standardization (DIN), German government and private sector estimated that standardization has an annual economic value of least 1% of a nation's gross national product.

*[See Economic Benefits of Standardization at page 28;*

*[http://www.normung.din.de/sixcms\\_upload/media/1350/engl\\_zusammenfassung.pdf](http://www.normung.din.de/sixcms_upload/media/1350/engl_zusammenfassung.pdf)]*

# IEC International Standards

- IEC standards for electrical and electronic products facilitate world trade by removing technical barriers to trade, leading to new markets and economic growth
- IEC standards are vital since they also represent the essence of the World Trade Organization's ("WTO") Agreement on Technical Barriers to Trade. IEC and WTO Members explicitly recognize that international standards play a critical role in developing world trade
- IEC standards provide a critical framework for economies of design, greater quality, interoperability, better production, delivery efficiency, and an improved quality of life through contributions to safety, human health and protection of the environment.

# World Trade Organization

- International standards are essential to the proper implementation of the technical barriers to trade (“TBT”) agreement administered by the WTO, and the functionality of the global trading system
- In 2000, the WTO TBT Committee adopted a list of six principles that must be observed by all international standardization bodies: Transparency, Openness, Impartiality & consensus, Effectiveness & relevance, Coherence, and Development Dimension.

*[World Trade Organization Second Triennial Review of the Agreement on Technical Barriers to Trade (November 2000 ); see <http://www.standards.org.au/newsroom/tgs/2001-04/trade/trade.htm>]*

# Nature of the Development Process

- The development process for an international standard is a multidisciplinary process that includes the interaction of several disciplines such as engineering, technology, science, conformity assessment, economics, trade, public policy and law.
- Development of an international standard requires facilitating a proper balance of interests necessary to achieve the purposes of the international standard.

# Analysis and Preparation

- Analysis and preparation are necessary to ensure the successful development of an international standard, for example, development typically includes the following:
  - Reviewing existing consensus standards related to the standard being developed and reconciliation of such standards where necessary;
  - Reviewing existing policies, laws and regulations where necessary;
  - Reviewing specific issues such as health, safety, the environment, trade, and competition where necessary;
  - Establishing a realistic development schedule; and
  - Providing sufficient resources necessary to ensure the success of the project

# International Standards Consequences

- International standards have consequences. Although international standards are voluntary consensus standards developed within a transparent system of checks and balances, these standards can have enormous economic consequences within individual nations and international markets as a whole.
- Wide participation in the development of international standards is, therefore, essential to ensure that all issues are fairly and adequately evaluated, discussed and resolved.
- It is essential that international standards be based on performance concepts whenever possible, enhance global trade and competition, and be supported by a strong consensus among the nations of the world.

# Strategic Value of International Standards

- In the final analysis, the strategic value of international standards is determined by individual organizations, industries and nations
- The lessons of history are clear. Participation in the development of international standards by all market players, be they organizations, industries or national governments, is essential to ensure that their futures remain bright and full of promise

# IEC Perspectives on the Value of Standards

- IEC provides significant strategic and economic value to its Members, for example:
  - Access to global markets;
  - Access to strategic sources of information on market developments and state-of-the-art technical progress ;
  - Access to strategic partnerships;
  - Significant opportunities to reduce costs and improve performance;
  - Significant opportunities to enhance national, regional and global markets;
  - Significant opportunities to meet certification and conformity assessment requirements.
  - [*See [http://www.iec.ch/benefits/worldsays/worldsays\\_entry.htm](http://www.iec.ch/benefits/worldsays/worldsays_entry.htm)*]

# Access to Global Markets

- “Without IEC standards, we cannot work.” (Kamal Gad, Chairman, ABB (Egypt))
- “Standards today are a powerful tool both to promote and potentially to inhibit trade amongst nations, and companies that wish to survive must actively participate at all levels in the standards development process.” (Circuit Breakers Industries (South Africa))
- “If I had not been involved in the development of this international standard, Clipsal might have introduced a product that was irrelevant in the marketplace.” (Tan Boo Chong, Engineering Manager, Clipsal industries (Singapore))

# Access to Strategic Information

- Participation in IEC technical committees is an important strategic decision. Participation in technical committee development work significantly facilitates a better understanding of current and future technology issues
- “It ‘would be a catastrophe’ if Imetec were not involved directly in helping to develop standards because we would be operating without knowledge of the future.” (Arturo Morgandi, R&D Manager, Imetec (Italy))

# Access to Strategic Partnerships

- It is in the best interests of Siemens and all other major players to engage as many participants as possible in standardization, particularly small and medium-sized enterprises because they represent the suppliers whose products account for as much as half of Siemens' annual turnover. “More and more, IEC standards are part of the criteria established to determine potential partnerships ... because we have a compatibility-related responsibility towards our customers.” (Guido Gürtler, General Manager, Corporate Standardization and Regulation, Siemens (Germany))

## Reducing Costs and Improving Performance

- “Without IEC standards, Schneider Electric would become more reactive than strategic and its costs would rise.” (Claude, Ricaud, Vice President for R&D, Schneider Electric (France))
- We survived an economic crisis in Argentina “because we could still export our products to other countries and because our products were in total compatibility with the global market.” (Higino Ridolfi, President, Automacion Micromecanica, Grupo, Micro (Argentina))
- IEC gives Rockwell Automation one set of global conditions against which the company’s designers can concentrate their efforts. (Pip Pearce, Vice President of Global Standards Promotion, Rockwell Automation (USA))

# Consensus Management

- The global trading system is based in significant part on consensus management, i.e., the ability of nations to reach substantial agreement
- The opportunity to participate in global standardization programs is critical to those corporations that plan to survive
- “Nowadays the world has become such a global market that companies like Corning and others have to be in this ‘trading bazaar’ of specifications, data and test methods to reach some consensus, without which it is impossible to go forward.” (Robert B. Brown, Vice President, Optical Fibre, Corning, Inc.)

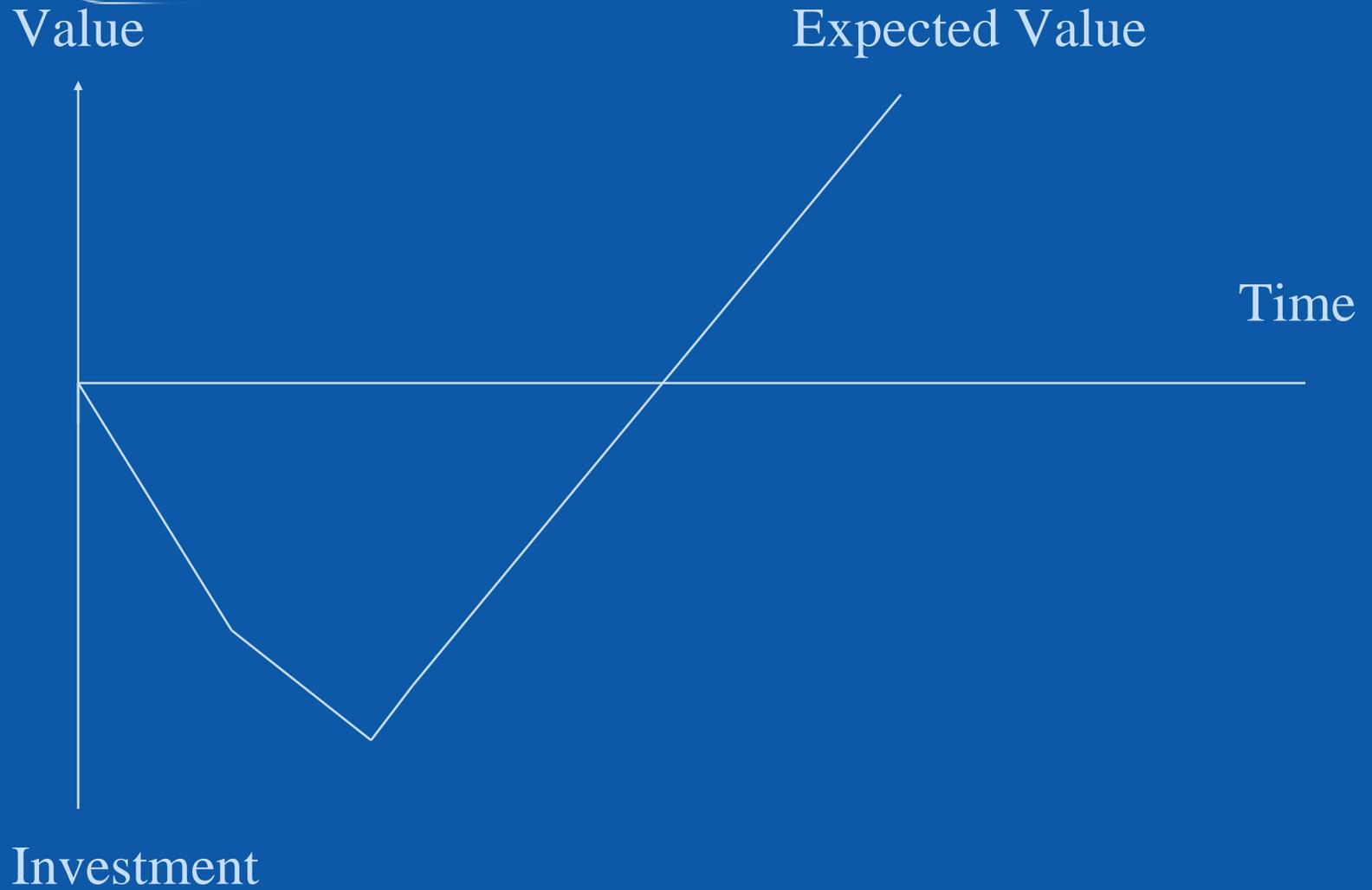
# Development Procedures

- Most standardization work takes place in a committee environment. IEC's International Membership provides access to experts from corporations, governments and national standards committees from all over the world
- Reliable and well defined development procedures are therefore essential for creation of international consensus standards, for example, fairness, openness, transparency, and methods to ensure consideration of the views for all interested parties
- Proposed international consensus standards are published for public review with an opportunity for comment

# IEC Development Procedures

1. Preliminary Stage: planning of future work which is typically driven by market-place needs and circumstances.
2. Proposal Stage: proposals are typically recommended by a National committee.
3. Preparatory Stage: preparation of a working Committee draft.
4. Committee Stage: submission of a working draft to all National committees for comment.
5. Enquiry Stage: bilingual Committee Draft for Vote submitted to all National Committees for voting (five months) . Revised version sent to IEC Central Office to prepare a Final Draft International Standard (FDIS).
6. Approval Stage: FDIS sent to all National Committee for voting (two months). Publication follows final approval.
7. IEC standards development procedures may be reviewed at: <http://www.iec.ch/ourwork/stages-e.htm>.

# Expected Value of a Standard



# A Standard's Structure

- Although a standard's structure may vary according to circumstances, the following contents are typical:
  - Scope
  - Normative References
  - Definitions
  - Symbols and Units
  - Test procedures
  - Acceptance Criteria
  - Effective Date
  
- International standards are typically supported by a Conformity Assessment Program.

## IEC Standards Example

- To facilitate a review of international standards, IEC has provided a standards example: *IEC International Standard 61400-11 for Wind turbine generator systems, Part 11: Acoustic noise measurement techniques*
- When reviewing slides 24-30, 34 please note the references to IEC 61400-11
- The complete standard is included with this presentation for your consideration.

## Scope

- The scope of a standard specifies which products or issues the standard will apply to. Carefully note whether the scope covers all products in a specific technology product group, or is limited to coverage of a specific issue such as noise emissions
- See page 6 of IEC 61400-11 for an example of a standard's Scope

# Normative References

- It is common for international consensus standards to incorporate by reference other standards
- It is essential to determine whether other standards may be indispensable for the application of the international standard under consideration
- See page 6 of IEC 61400-11 for an example of Normative References, and the critical relationship to other international standards.

# Definitions

- Definitions are intended to describe all words or terms unique to the standard. Carefully note all relevant definitions to ensure, for example, that a design project falls within the definitions of an international standard
- See page 7 of IEC 61400-11 for an example of Definitions.

# Symbols and Units

- The use of symbols and units is common to virtually all standards
- Note that symbols are a form of universal language that may be particularly appropriate in international standards
- See page 8 of IEC 61400-11 for an example of Symbols and units.

# Test Procedures

- Test procedures set forth the manner in which a technology will be evaluated. Procedures vary according to the complexity of the standard
- A test procedure may be established based upon laboratory conditions, a simulation of real world conditions to the greatest extent possible, or a combination of both
- See pages 9-34 of IEC 61400-11 for an example of Test Procedures
- Note IEC 61400-11 Appendices A-D, Figures 1-11, and Tables 1, 2, D.1 provide additional information which may affect the test procedure and test results. This information should be reported where relevant and necessary. See pages 35-43

# Acceptance Criteria

- Acceptance criteria determine a product's acceptable level of performance
- Acceptance criteria are typically defined in two ways: design criteria (a specific technical solution) or performance criteria, e.g., creation of maximum or minimum criteria. In general, public policy prefers the use of performance acceptance criteria because it provides for greater flexibility and application of the standard
- Acceptance criteria typically includes issues such as health, safety, energy and the environment

# Acceptance Criteria

- Note that IEC 61400-11 does not set forth acceptance criteria which would establish a specific noise emission level for a particular environment. This standard is primarily a test procedure that focuses on the accuracy and reliability of testing, and measurement of test results. It does not establish any specific level of noise emissions as acceptable for the environment in which the technology is being used
- When it is necessary to establish acceptance criteria based upon an international standard such as IEC 61400-11, it is common for a national committee or government agency to make a decision best suited to the needs of a particular country

# Effective Date

- When does a consensus standard take effect? It depends...
- The effective date for a consensus standard may be established by a standard itself, a company, an industry group, a testing laboratory, a national committee or government agency
- Note that establishing an effective date is an important decision with potential market place consequences, e.g., potential effects competition
- IEC's policy concerning effective dates is to allow a national committee or government agency to make a determination best suited to the needs of a particular country
- Note that IEC 61400-11 does not contain an effective date

# Conformity Assessment

- Standards are vital tools of industry and commerce because they promote understanding between buyers and sellers and make possible mutually beneficial commercial transactions. Buyers cannot always evaluate product specifications or characteristics by inspection or even from prior experience. Information on a product's conformance (or nonconformance) to a particular standard can provide an efficient method of conveying information needed by a buyer on the product's safety and suitability

## Conformity Assessment (cont.)

- Those who rely on conformity assessment results need to know and understand which types of conformity assessment activities were included in the process. Conformity assessment activities typically include: inspection; testing; laboratory accreditation; certification programs and their accreditation; management system assessment/registration and accreditation; and recognition of the competence of accreditation programs
- Inspection is defined in ISO/IEC Guide 2 as "conformity evaluation by observation and judgment accompanied as appropriate by measurement, testing or gauging."

# IEC Conformity Assessment Schemes

- IEC's conformity assessment goal is "One standard, one test, one mark (where relevant)."
- IECEE system for conformity testing and certification of electrical equipment
  - CB scheme for mutual recognition of test certificates for electrical equipment.
  - CB-FCS scheme for mutual recognition of conformity assessment certificates for safety of electrical equipment
- IECQ quality assessment system for electronic components
- IECEx for certification to standards for electrical equipment for explosive atmospheres
- An overview of IEC Conformity Assessment schemes is available at:  
*[http://www.iec.ch/conformity/ca\\_entry.htm](http://www.iec.ch/conformity/ca_entry.htm)*

# International Consensus & Government Standards

- International consensus standards and government standards can be compared according to the development process, effective dates, and compliance
- The international development process for consensus standards is a voluntary process created by private sector organizations.
  - The government development process is created by a parliament and implemented by a government department or agency.

## International Consensus & Government Standards (Cont.)

- Consensus standards typically have an effective date that depends on marketplace considerations.
  - Government standards have a specific effective date for a standard.
- Compliance with International consensus standards typically depends on marketplace considerations. Note however that failure to comply with health, safety or environmental consensus standards may result in potential liabilities.
  - Compliance with government standards is typically enforced by civil or criminal penalties.

# Government Incorporation by Reference

- It is common for a government department or agency to incorporate by reference, in whole or in part, an international consensus standard into a government standard
- From a strategic point of view, development of a international consensus standard should consider the possibility that the standard will be incorporated into a government standard in whole or in part
- For example, IEC 64100-11 could be incorporated by reference into a national standard intended to address noise emissions in the ambient environment where wind turbine generators are being used
- If an international consensus standard is incorporated by government into a national environmental standard, it is important to note that the nature of a consensus standard such as IEC 64100-11 may no longer be voluntary but a matter of national law

# Global Engineering Tools

- Engineering and technology standards are essential building blocks for international trade
- In the 21<sup>st</sup> century, it is of great importance that engineering students develop a good understanding of engineering standards as global engineering tools that can be used to significantly improve the quality of life for everyone on the planet
- IEC hopes this presentation contributes to the increased use of international engineering standards in curriculums for engineering schools all over the world



# Contact Information

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