Standards Organizations and Internet Standards

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The Importance of Standards

- Telecom industry has long accepted that standards are required to govern the different characteristics of communication equipment
  - communication equipment vendors recognize that their equipment will generally interface to and communicate with other vendors' equipment
- In the past, Computer industry didn't embrace this view
  - computer vendors have traditionally attempted to monopolize their customers
- The proliferation of computers and distributed processing has made that an untenable position
- Computers from different vendors must communicate with each other
- With the ongoing evolution of protocol standards, customers will no longer accept special purpose protocol conversion software development
- The result is that standards now permeate all the areas of technology

Categories of Standards

- De facto
  - Meaning “by fact” or “by convention”
  - Standards that have not been approved an organized body but have been adopted as standards through widespread use

- De jure
  - Meaning “by law” or “by regulation”
  - Standards that have been legislated by an officially recognized body

Standards Organizations

- Standards are developed through the cooperation of
  - Standards creation committees
  - Forums
  - Government Regulatory Agencies

Standards Creation Committees

- International Standards Organization (ISO)
  - Multinational body whose membership is mainly drawn from the standards creation committees of various governments throughout the world
  - Aims to facilitate international exchange of goods and services by providing models for compatibility, improved quality, increased productivity and decreased prices
  - The OSI model
    - A result of ISO's efforts in the field of Information Technology
- International Telecommunications Union – Telecommunications Sector (ITU - T)
  - Old name
    - Consultative Committee for International Telegraphy and Telephony (CCITT)
  - Devoted to the research and establishment of standards for phone and data systems

Standards Creation Committees

- Institute of Electrical and Electronics Engineers (IEEE)
  - Largest professional engineering society in the world
  - Aims to advance theory, creativity and product quality in the field electrical engineering, electronics and related branches of engineering
  - Observes the development and adoption of international standards for computing and communication

- Electronic Industries Association (EIA)
  - Has defined physical interfaces and electronic signaling specification for data communications

Forums

- ATM Forum
- Frame Relay Forum

Advantages of the standards-making process

- standard assures that there will be a large market for a particular piece of equipment or software
  - encouraging mass production
  - consequently, lower costs.
- standard allows products from multiple vendors to communicate
  - the purchaser has more flexibility in equipment selection and use

Disadvantages of the standards-making process

- standard tends to freeze the technology
  - By the time a standard is developed, subjected to review and compromise, and promulgated, more efficient techniques are possible
- There are multiple standards for the same thing
  - not a disadvantage of standards per se, but of the current way things are done
  - in recent years the various standards-making organizations have begun to cooperate more closely
  - We still have areas where multiple conflicting standards exist

Internet Standards

- Thoroughly tested specification that is useful to or adhered to by those who work with the Internet
- It is a formalized regulation that must be followed
- A strict procedure by which a specification attains Internet standard status
  - Specification begins as an Internet Draft
    - Internet Draft is a working document (a work in progress) with no official status and a six-month life time
  - Request for Comment (RFC)
    - Upon recommendation from the Internet authorities, a draft may by published as a Request for Comment (RFC)

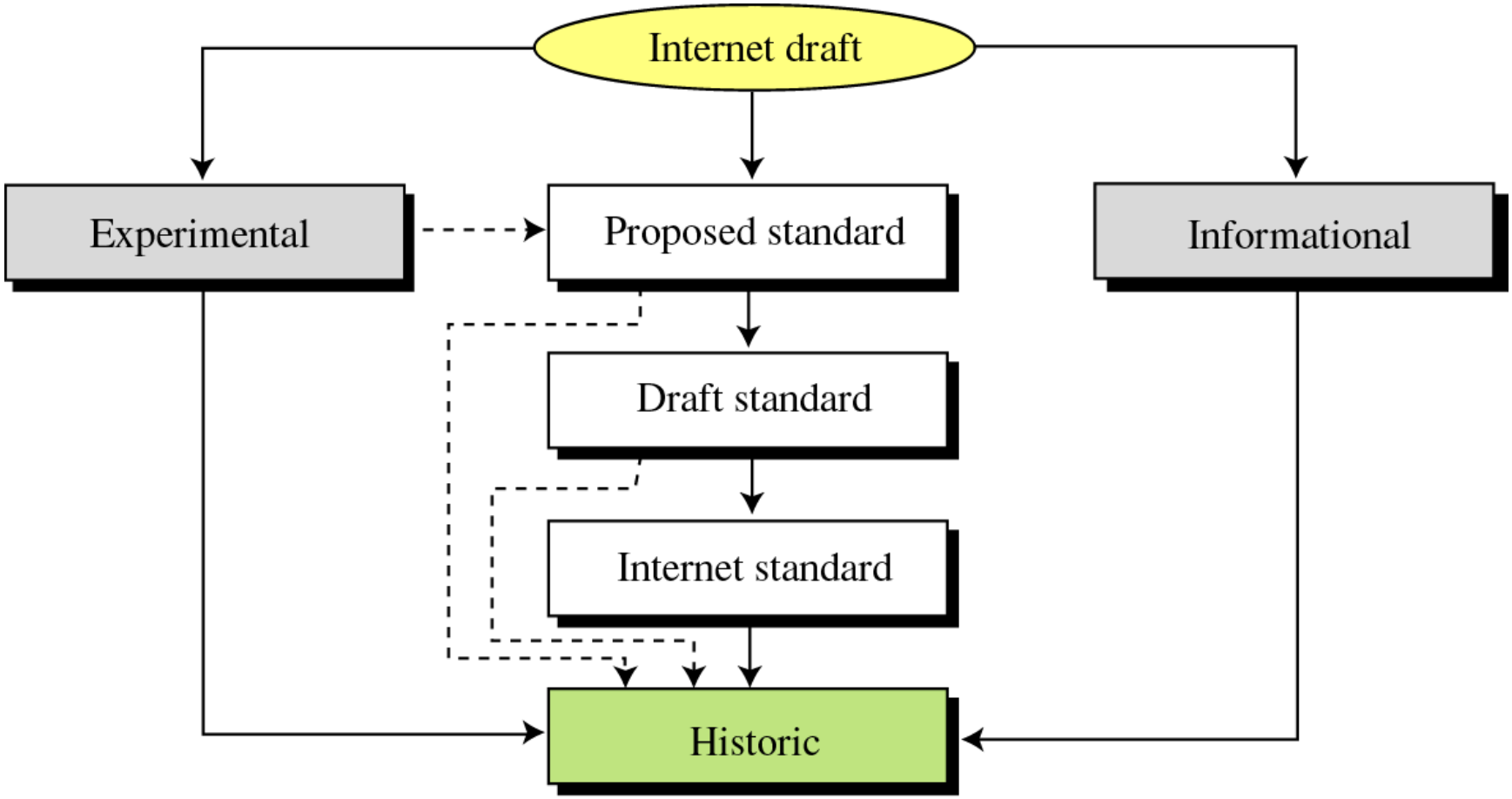
Maturity Levels

- An RFC, during its life time, falls into one of six maturity levels
  - Proposed Standard
    - A specification that is stable, well understood, and of sufficient interest to the community
    - At this level, the specification is usually tested and implemented by several different groups
  - Draft Standard
    - A proposed standard is elevated to the level of draft standard status after at least two successful independent and interoperable implementations
    - A draft standard, with modifications if specific problems are encountered, normally becomes the Internet Standard
  - Internet Standard
    - A draft standard reaches Internet standard status after demonstrations of successful implementation

Maturity Levels

- Historic
  - Significant from a historical perspective
  - Either superseded by later specifications or have never passed the necessary maturity levels to become an Internet Standard
- Experimental
  - Describes work related to an experimental situation that does not affect the operation of the Internet
  - Should not be implemented in any functional Internet service
- Informational
  - Contains general, historical or tutorial information related to the Internet
  - Usually written by someone in a non-Internet organization, such as a vendor

Maturity levels of an RFC



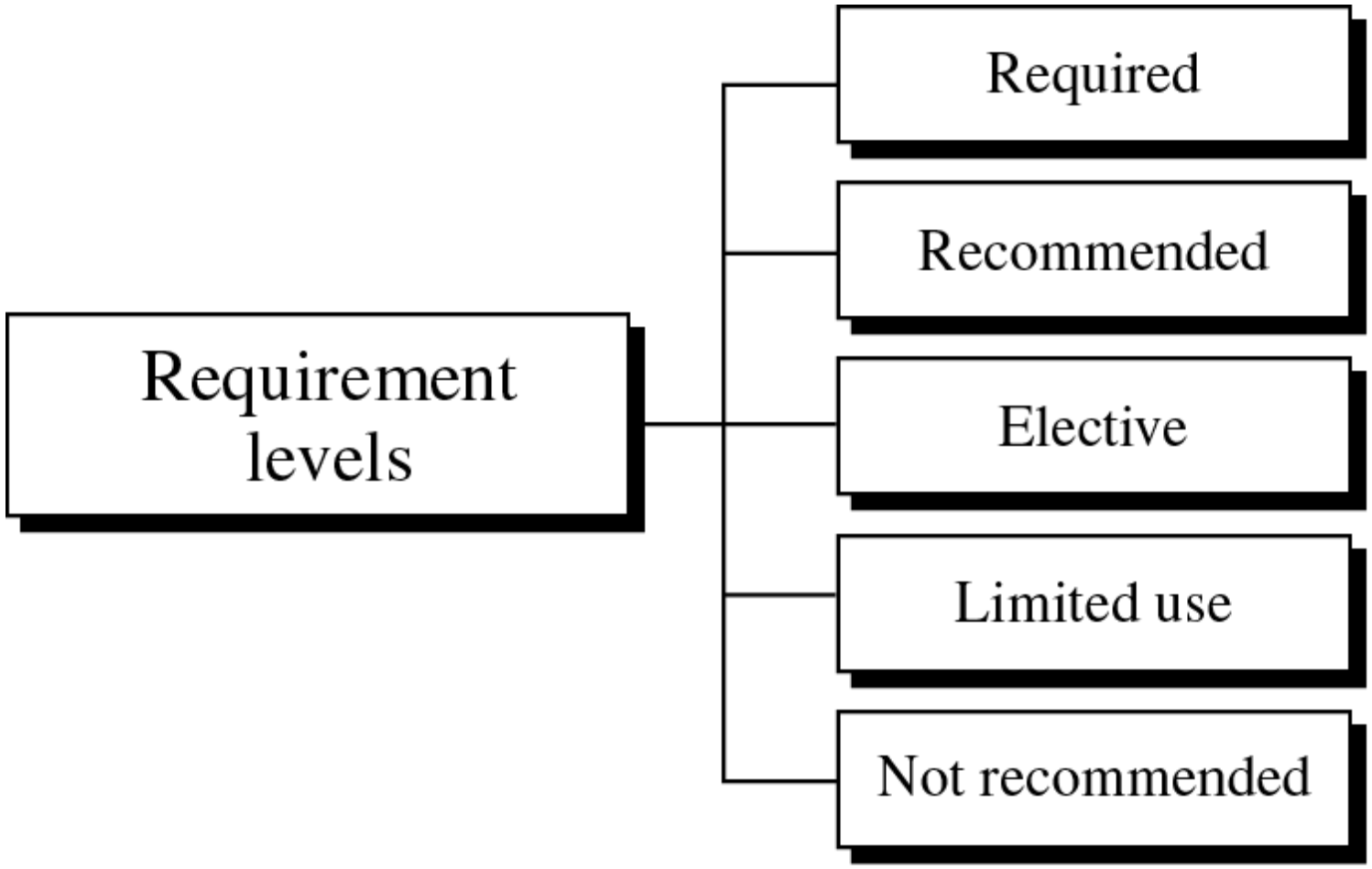
Requirement Levels of an RFC

- RFCs are classified into five requirement levels
  - Required
    - Must be implemented by all Internet systems to achieve minimum conformance
    - E.g. IP, ICMP
  - Recommended
    - Not required for minimal conformance
    - Recommended because of its usefulness
    - E.g. FTP, TELNET
  - Elective
    - Not required and not recommended
    - A system may use it for its own benefit

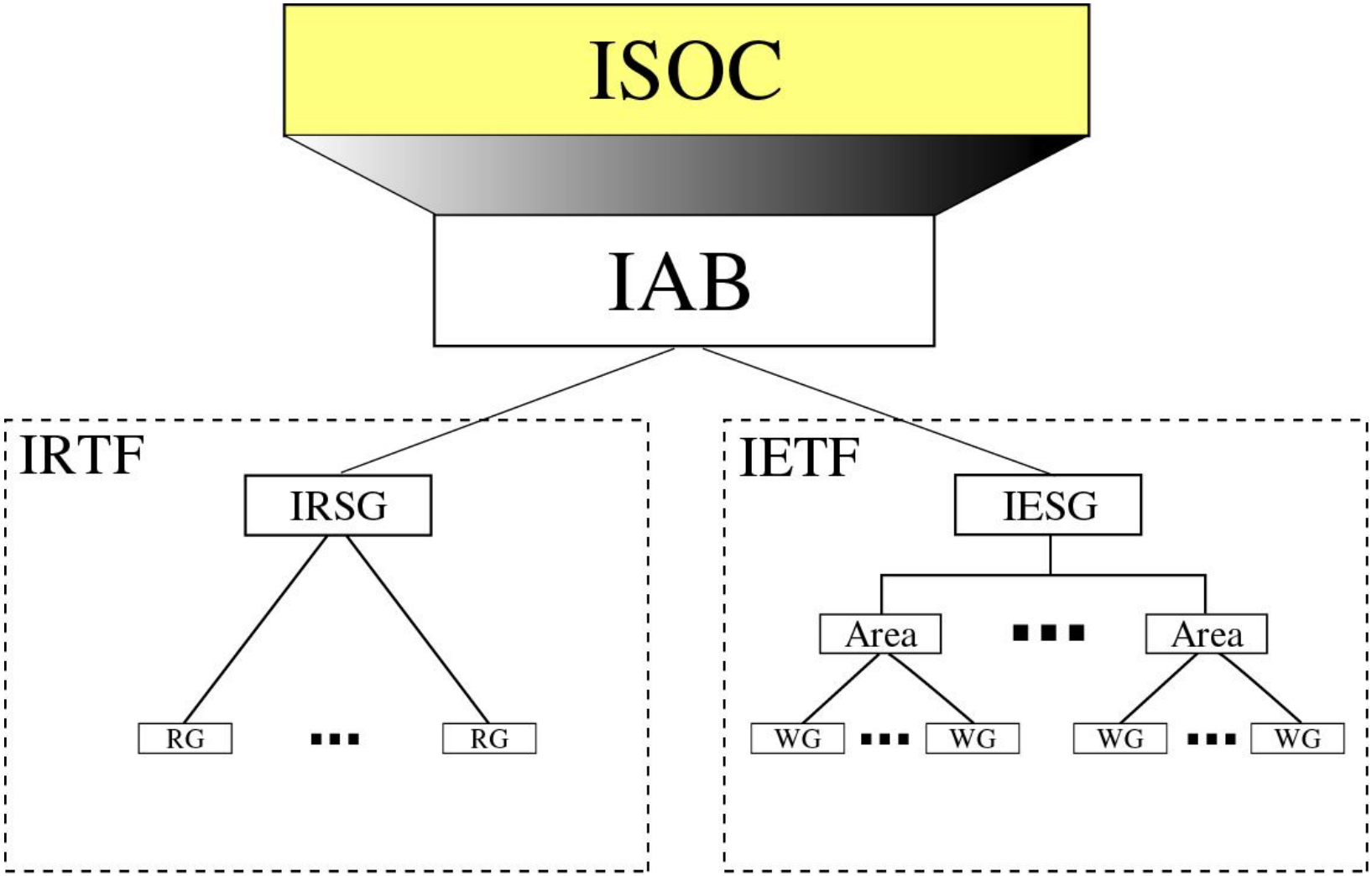
Requirement Levels of an RFC

- Limited Use
  - Should be used only in limited situations
  - Most experimental RFCs fall under this category
- Not Recommended
  - Inappropriate for general use
  - Normally a historic (obsolete) RFC may fall under this category

Requirement Levels of an RFC



Internet Administration



Internet Administration

- Internet Society (ISOC)
  - International non-profit organization formed on 1992 to provide support for the Internet standards process
  - Accomplishes this through maintaining and supporting other Internet administrative bodies such as IAB, IETF, IRTF and IANA
- Internet Architecture Board (IAB)
  - Technical advisor to ISOC
  - Main purposes
    - Oversee the continuing development of TCP/IP protocol suite
    - Serve in a technical advisory capacity to research members of the Internet community
  - Accomplishes this through its two primary components
    - Internet Engineering Task Force (IETF)
    - Internet Research Task Force (IRTF)
  - Responsible for editorial management of the RFCs
  - Acts as external liaison between Internet and other standards organizations and forums

Internet Engineering Task Force (IETF)

- Forum of working groups managed by the Internet Engineering Steering Group (IESG)
- Responsible for identifying operational problems and proposing solutions to these problems
- Develops and reviews specifications intended as Internet Standards
- Working groups are collected into areas, and each area concentrates on a specific topic
- Currently areas have been defined
  - Applications
  - Internet protocols
  - Routing
  - Operations
  - User Services
  - Network Management
  - Transport
  - Internet Protocol next generation (IPng)
  - Security

Internet Research Task Force (IRTF)

- Forum of working groups managed by the Internet Research Steering Group (IRSG)
- Focuses on long-term research topics related to Internet protocols, architecture and technology

IANA and ICANN

- Internet Assigned Numbers Authority (IANA)
  - Supported by the U.S. government of Internet domain names and addresses until October 1998
- Internet Corporation for Assigned Names and Numbers (ICANN)
  - A private non-profit corporation managed by an international board, assumed IANA operations after October 1998

Network Information Center (NIC)

- Responsible for collecting and distributing information about TCP/IP protocols