



Since the early 1980s, a formal course in telecommunications standards has been offered by the University of Colorado's Interdisciplinary Telecommunications Program (ITP). As a leading programme of graduate studies in telecommunications within the United States, the ITP continues to promote innovative research and educational initiatives. Recognizing that the importance of standards continues to grow, the ITP is establishing a new research centre and revised course offerings. International communication of such efforts will promote

A PERSPECTIVE ON ADVANCING STANDARDS RESEARCH AND EDUCATION

BUILDING ON THE TELECOMMUNICATIONS SCENE

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awareness and coordination of emerging standards-related research and education activities.

Consistent with its populist nature, the United States continues as home to hundreds of standards-related organizations. Many of these organizations offer some type of training in support of their activities. In addition, many institutions of higher education offer courses that consider standards to a lesser or greater extent. Unfortunately, a comprehensive list of organizations involved in standards-related research and education and their activities is not available. To produce such a list would be difficult because many of these activities

This paper represents the opinions of the authors only and does not represent any policy or position of any organization mentioned in the paper.

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are of recent origin in response to the growing importance of standards in the both public and private sectors, nationally and internationally. While this observation may be interpreted positively, current activities are not sufficient to meet the growing challenges of the standardization field – the growing complexity and importance of standards requires that new standards education and research initiatives be undertaken and coordinated internationally. Significant near- and long-term benefits to both industrialized and developing countries could be realized if such initiatives could be promoted and substantial

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resources obtained for their implementation and application. Especially necessary is to promote research and education on an interdisciplinary basis with a view toward more effectively conducting standardization activities of diverse industrial sectors that meet national and international public policy objectives.



Ken Krechmer, visiting ICSR Fellow, gives a public lecture titled, “Communications Standards and Patent Rights: Conflict or Coordination?” at the University of Colorado, Boulder, Colorado, USA on 10 November 1998.

Overview of ITP’s Telecommunications Standards Course

Since the early 1970s, the Interdisciplinary Telecommunications Program (ITP) at the University of Colorado (Boulder, Colorado, USA) has offered a graduate degree in telecommunications. As a leader in innovative education and research, the ITP in the early 1980s established a nationally unique course in telecommunications standards. In this case the course was developed as a result of collaboration between the ITP and a Federal government research organization (the Institute for Telecommunication Sciences). Instructors for the course continue to be standards practitioners from industry and government who teach for the ITP on a part-time basis. Prior to the establishment of the standards course, an emphasis on standards and standardization activities were included in a telecommunications policy course. By the early 1980s the critical dependence of telecommunications growth upon standardization became evident. Internationally, globalization of new telecommunications services and equipment required unprecedented standardization efforts (e.g., Integrated Services Digital Networks, ISDN). Nationally, establishment of competitive long distance services in the United States through the divestiture of AT&T also required unprecedented standardization efforts (e.g., establishment of Committee T1).

Currently, ITP’s telecommunications course on standards, titled Telecommunications Standards: Current Issues, is a three credit-hour elective course that can be applied towards satisfaction of the policy component of the ITP degree requirements. The course is typically offered each fall semester and taken by about 20 in-class students and about 20 distance-learning students via video tape and electronic mail (e-mail). The course continues to evolve consistent with ITP objectives, student feedback, and instructor interests. (For reference, the Box provides the autumn 1998 course description.)

As a graduate course, students are expected to be highly motivated and very pro-active in undertaking the large amount of required (and optional) readings. The course emphasizes group discussion (via on-line display) of relevant websites and associated information, and supplemental readings from the current literature. This style promotes active student participation in class and while tending to

ISO and standards research

Preeminent standards-developing organizations such as ISO continue to play a strong role in shaping key standards education and research opportunities and initiatives. ISO activities are, for example, helping bring to fruition the benefits of international standards to developing countries. ISO can also help bring to fruition additional benefits through the promotion of relevant new initiatives; for example, raising international awareness of recent initiatives such as the ICSR’s. In so doing, ISO would be extending and leveraging its efforts with organizations more academically focused. ISO could also, for example, emphasize the establishment of internship positions and assistance for the coordination of relevant not-for-profit educational and research initiatives. Through such organizational roles, urgently needed standards research results would be further developed and applied, and the availability of qualified standards practitioners increased in conjunction with other training and development activities.

minimize formal presentations by the lecturer (but not to the pleasure of all students!). Extensive use of guest lectures is also made via in-person and remote (i.e., teleconference) presentations. Other ITP courses (e.g., telecommunications regulation) supplement the general focus of the course – an exploration of issues associated with voluntary consensus standards organizations and processes that are of principal interest in telecommunications and information technology industries. An underlying philosophy of the course is that standardization is not “value free” and a balanced presentation from multiple perspectives is inherently required.

ented nature, attempting to achieve consensus on those contributions consistent with the SCIG Procedures Manual, and holding SCIG leadership positions. The SCIG operates entirely by e-mail, thus enabling distance learning students to be on an equal footing with in-class students as SCIG participants.

Having conducted this educational experiment for about three semesters, a wide variety of tradeoffs have been identified and the use of the SCIG as a primary component for future offerings of the ITP's standards course is being carefully evaluated. However, it has been concluded that conducting such educational experiments is essential to improving understanding of how standards education and research can be advanced.



Randy Bloomfield, ICSR Director, summarizes the Center's activities at the ITP annual meeting on 23 April 1999.

Overview of the International Center for Standards Research (ICSR)

Educational experiences with respect to evolution of the ITP's standards course, professional experiences with respect to development of national and international telecommunications standards, and research experiences with respect to promoting interdisciplinary studies on contemporary standard issues collectively suggested opportunities for the submission of various funding proposals. During 1997, an ITP thesis was successfully defended that provided a concept study for establishment of a standards research center. In the summer of 1998 the Colorado Com-

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mission on Higher Education awarded the ITP a Center for Excellence Grant, a component of which is being used to establish a Center for Standards Research. Seed funding to establish the Center will be provided over a five-year period. A prototype website for the International Center for Standards Research (ICSR) has been established at www.StandardsResearch.org.

The ICSR's mission is “To advance the theory and practice of standardization on a worldwide basis through unbiased, innovative

Perhaps the most interesting experiment in evolving the ITP standards course has been the development of the Standards Current Issues Group (SCIG), and student participation in the SCIG as a course requirement. In essence, the SCIG has been established as a fully functional organization in which the students are required to participate as members. The SCIG is a global, open, volunteer group, implemented as a website and e-mail exploders, devoted to the discussion of current issues on all aspects of standardization (i.e., not limited to any particular discipline). Thus, the SCIG has been designed to also enable preliminary studies concerning how the standards research and education community may better communicate. The SCIG is contribution-driven and operates by consensus, which allows students to “learn by doing”. That is, students as SCIG members learn by developing SCIG contributions of an informational or action-ori-

research and education involving the engineering, business, policy, legal, economic, and social aspects of standards-related activities and products.”

As a global, not-for-profit, academically-based organization, the ICSR mission is accomplished by:

- Establishing an international Center that any interested commercial, academic, or government organization may join to support and benefit from advanced standards research. Focused technical studies of interest to the Center will be undertaken, based on the interests of ICSR Friendship, Observing and Supporting members and other participants. These studies will involve such topics as standards and collaborative decision-making, competitiveness, conformance, critical infrastructure protection, defense, disabilities, education, Global Information Infrastructure, economics, information technologies, intellectual property, journalism, law, mass media, marketing, manufacturing, philosophy, privacy, public policy, public safety, research methodology, strategic planning, systems engineering, telecommunications, testing, and trade.
- Providing a website open to all standards researchers that promotes advanced research and education through access to and distribution of timely and relevant information, including descriptions of active standards-related research efforts on a worldwide basis.
- Prototyping an open, worldwide forum for the ongoing, collaborative study of standards issues, interpreted broadly, through ICSR support of the Standards Current Issues Group (SCIG) and the use of the open e-mail exploders (e.g., standards-discuss@StandardsResearch.org).

The ICSR recognizes that standards have and will continue to play a vital and increasingly important role in economic, social, and technical development worldwide. It is further recognized that (1) the creation and application of standards are inherently not “value free” and (2) resolution of standards issues at all levels require solutions which are based on research results that are interdisciplinary in nature and broad in scope. Thus, the Center will promote standards research activities that are unbiased and whose results are distributed to the widest possible audience, including users, researchers, and decision-makers in both the public and private sectors on a worldwide basis.

The ICSR is only in its beginning stages and looks forward to working with other organizations involved with standards research or disposed to supporting such work consistent with mutual interests. The ITP and ICSR will continue to promote the development and advancement of standards-related educational opportunities (e.g., undergraduate and graduate courses and thesis work), especially on an international basis. Importantly, the ICSR anticipates undertaking a wide range of timely joint ventures; for example, those that will address growing needs for relevant conferences, publications, and academic and professional development courses.

Summary

Advancement of standards research and education is an important endeavour. Improved interaction between educators and practitioners is a timely proposition. CU's Interdisciplinary Telecommunications Program is addressing this proposition through its establishment of a new research center (the International Center for Standards Research) and revised standards-related course offerings. International communication of such efforts will promote awareness and coordination of emerging standards-related education and research activities. □

Course Description

- *Telecommunications Standards: Current Issues* (University of Colorado/Boulder, Colorado, U.S.A.; Autumn 1998)
- *Course Objective:* To develop a practical awareness of the importance of telecommunications standards and an understanding of contemporary issues in the telecommunication standards-setting environment.
- *Course Description:* The course explores the importance of telecommunication standards from both technical and non-technical perspectives. Major discussion topics include: frameworks and methodologies for assessing standardization issues, key international and domestic telecommunication standards organizations, and current issues in the telecommunication standards-setting environment (e.g., global and national information infrastructure initiatives, emergence of standards-related organizations, private and public sector roles and policy options). Special emphasis will be placed on the activities of the International Telecommunication Union (ITU), ISO, ANSI-accredited Committee T1, and the Internet Engineering Task Force (IETF). Representative telecommunication standards documents are reviewed to illustrate how important technical standards are developed and applied (e.g., ISDN, B-ISDN/ATM, NII/GII). The course participants conduct research on contemporary telecommunication standards issues and prepare relevant contributions. Special topics are presented to supplement the main topics discussed in the course.
- *Course Materials:* Required texts: *Standards Policy for Information Infrastructure* (ISBN 0-262-61117-1); *Global Standards: Building Blocks for the Future* (0-16-036163-X). Highly recommended text: *Information Technology Standards: Quest for the Common Byte* (ISBN 1-55558-131-5). Other materials will be assigned (e.g., articles from the current literature).
- *Prerequisites:* no specific graduate courses; however, those with a minimal background in telecommunications should contact the Instructor in this regard.

Note: Internet access (e-mail, FTP, WWW) is required to complete class assignments.