

# IEEE / CSS Five Year Plan

## Report of the Long-Range Planning Committee to the Board of Governors of the IEEE Control Systems Society

June, 2003

### Planning Process

This report documents both the long range plan and the process used to develop the plan. Four steps have been followed:

1. Assessment of factors that influence the society's health.
2. Input from each VP, Past President, President, and two appointed members of the Long Range Planning Committee.
3. Presentation of report at the May meeting of the Executive Committee of the Control Systems Society, and at the June meeting of the Board of Governors, and solicitation of feedback.
4. The final document incorporating feedback will be distributed to the members of the Board of Governors by e-mail during the summer.

The Long Range Planning committee convenes once every five years to review and provide an update to the Control System Society's Long Range Plan. The members of the committee in 2003 are:

Doug Birdwell, Chair and President-Elect  
David Castanon, Vice President for Financial Activities  
Ted Djaferis, Vice President for Member Activities  
Alberto Isidori, Vice President for Publication Activities  
Harris McClamroch, appointed member  
Len Shaw, Past President  
Roberto Tempo, Vice President for Conference Activities  
Bjorn Wittenmark, appointed member

In this report, factors that can significantly affect the health and vitality of the Control Systems Society are discussed, followed by a listing of findings, grouped by category according to the roles of the vice presidents of the society. All of the factors, and the findings, should be viewed in the context of the following questions, which are highly relevant to the rapidly changing conditions within IEEE and the profession:

1. Why should an individual join and retain membership in IEEE and our technical society? What benefits justify the cost of membership?
2. Why should our society's volunteers continue to contribute to the well-being of the IEEE, rather than create a new, competitive society (which may be a "virtual community" on the Internet) that addressed their perceived needs at lower cost?

3. How can our society continue to meet its financial obligations to the IEEE and its professional obligations to its members and customers?

We would all like for our society to be sufficiently relevant to its membership and its customers (those who utilize its intellectual property or services) to be able to maintain a stable, or growing, membership and continue to hold a respected leadership position in our field. We also prefer that the cost of society membership and society services, such as conferences, to society members be low relative to the value of those benefits. These are, in some ways, conflicting goals, and it is the responsibility of the society's Board of Governors to analyze the trade-offs and make appropriate choices. As shall be apparent in the next section there are significant risks that our society will not achieve these goals, and the uncertainties in many predictions of future trends are abnormally high. Therefore, this strategic planning exercise is both timely and extraordinarily relevant.

## Significant Factors

- ◆ **Rapid evolution of the publishing industry with the change to digital publications and increased competition.**

The traditional publications market is disappearing, and this transition is rapid. Our society has already seen much of the transition to electronic publication, where the unit of publication is no longer the journal or magazine issue, but the article or conference paper. The IEEE is faced with competition from both commercial publishers, such as Elsevier, and non-commercial publishers such as MIT's D-space effort. The IEEE's pricing strategy is shifting away from subscriptions to journals and toward "per click" payments, and subscription income to IEEE societies is moving toward payments based upon accesses to a society's intellectual property and measures of publication quality. The IEEE's strength is the perception of journal and conference quality and broad scope, engendered by rigorous review standards, but a weakness is publication delays. The shift toward electronic publication and Internet content delivery has occurred more rapidly than most people expected, and it is difficult to predict how the market will respond to both pricing changes and the wealth of publication options that are available to authors. It is likely that eventually much of the intellectual content that one now pays to access will be freely available; the trick is to control the process of change so that societies, and the IEEE, can survive. A comment that was made during the last IEEE TAB meeting was that the question is not whether IEEE publications will be freely available, but when. This has profound implications for both the financial health of IEEE societies and the future role of societies in the profession.

The following bulleted items summarize these factors:

- ◆ Widespread adoption of electronic distribution is occurring much faster than most expectations.
- ◆ The IEEE will move toward a new structure for determining income to a society from non-member subscriptions.
- ◆ Current thinking is it will be based upon database "hits" and "richness" (e.g. quantity of articles in transactions) rather than only upon pages and journals published.
- ◆ The unit of publication is the article, not the journal or magazine.

- ◆ There is a potentially large impact of free and other alternative avenues of publication (e.g., Elsevier and D-Space).

How can CSS package its intellectual property to meet two needs:

- ◆ Service to its members, and
- ◆ Maximization of revenue?

- ◆ **IEEE direct charges to societies for services, and resulting increased cost of society operations.**

IEEE's headquarters operation appears to have finally restored order to its finances. This, however, does not mean a return to times past. There was a roughly two-year lag between the time when the financial markets and economy provided signals that investment strategies should become more conservative, and the time when the IEEE developed an adequate response. This caused a very large loss in the societies' financial reserves. At the same time, IEEE's management changed its strategy for cost recovery. The IEEE now charges societies for reimbursable services; these charges are large, and are growing. The Control System Society's income is dominated by subscriptions revenues and conferences, and the society must manage pricing of these items, and the operations of conferences it sponsors, to ensure solvency.

The following bulleted items summarize these factors:

- ◆ IEEE HQ made large financial mistakes in reacting to the dot-com bust and 9/11 – resulting in 2 years of substantial loss of reserves.
- ◆ HQ appears to have gained control of much of the excess cost, but it is also passing much more cost to the societies as direct charges.
- ◆ The result: IEEE/CSS must generate additional revenue. The primary sources of revenue: conferences and publications.

- ◆ **Conferences are now a high financial risk but represent a substantial portion of society revenue.**

The post-September 11<sup>th</sup> landscape for conferences contains a high degree of uncertainty. The perception of risk, the possibility (or, perhaps more accurately, probability) of future terrorist attacks, the US-Iraq war, public attitudes toward various countries, and problems associated with foreign travel (specifically, visas), all contribute to conference income volatility. More recently, the SARS epidemic has already had a major financial impact within the IEEE, and this impact will become much worse if the epidemic is not rapidly brought under control.

At the same time, the IEEE is instituting requirements that societies be able to track and accurately predict conference net income. Our society conferences are not organized at the present time to be able to meet these requirements.

The following bulleted items summarize these factors:

- ◆ September 11<sup>th</sup> changed the financial risks of conferences substantially – perhaps this is a transient, but perhaps not.
  - ◆ IEEE TAB will begin requiring accurate prediction and tracking of conference revenue and expenses.
  - ◆ Conferences are a substantial source of CSS revenue, but can also result in substantial losses.
  - ◆ We need to operate conferences as a revenue generating business and manage them much more closely.
- ◆ **Virtual communities of engineers exist (created by IEE) and are a reason for membership in IEE.**

The IEE has led the way in creating “virtual communities” on the Internet that allow individuals with common technical interests to interact. We need to ask the question: What features of the Control Systems Society attract new members and keep existing members involved? For many members, the answer is no longer access to publications because they already have the necessary access through their place of work. The price differential of member versus non-member conference registration probably does not justify society membership for most members. Newly graduated engineers grew up with the Internet and electronic access to most information that older society members traditionally sought in (paper) books. Colleges and universities have an increasing presence on the Internet and offer on-line courses and degree programs. What services can we offer our members through means of electronic delivery, from content, to networks of engineers working on similar problems, to on-line and just-in-time training, and for which of these services are members and their employers likely to be willing to pay?

◆ **PaperPlaza and IEEE CSS web site.**

The PaperPlaza should be viewed as a valuable resource that can be used to provide services to society members. At present, it is used to automate conference paper submission and review processes; it could probably be extended to offer electronic-only content delivery to society members. A society electronic-only journal that provides rapid review and turn-around of brief papers and exists outside the domain of IEEE Xplore (and therefore beyond the reach of IEEE infrastructure charges) could be created. Material that cannot be published in a Transaction, such as very long expositions or papers that contain very large amounts of graphics could be published on the web. The medium would also allow innovative electronic publication of material that cannot be offered in the traditional formats, such as course materials, video and video conferencing services (virtual conferences), and software. Standards of review similar to those used by transactions could be enforced, but with all steps performed electronically and responsibility for production of final content resting with the authors rather than a traditional publisher.

The IEEE is exploring innovative publication opportunities for IEEE Xplore, but if the society does this first, and outside the boundaries of Xplore, then the society should be able to retain all profits.

The following bulleted items summarize these factors:

- ◆ IEEE/CSS has PaperPlaza and CSS web site.
- ◆ IEE has introduced “virtual communities” – basically, Internet discussion groups.
- ◆ The CSS membership is declining (8% decline from 2002 to 2003).
- ◆ Can the CSS Internet resources grow to provide support for virtual communities and electronic delivery of services?
- ◆ What reasons exist for joining CSS and being active, especially if one has institutional access to Xplore?

### ◆ **Increased need for continuing education in engineering.**

There is a large, and increasing, need for continuing education in electrical engineering. Our society has traditionally served only the “upper crust” of this need through the short courses and workshops offered at conferences. The bulk of the demand is most likely at a lower level, serving engineers with BS-level terminal degrees and offering technology updates to meet the needs of industry. The society participated in work skills assessment activities about ten years ago, but there was no long-term follow-up. Should the society address this need and find ways to capitalize on it?

The following bulleted items summarize these factors:

- ◆ Professional engineering licensing and state laws in US often require documentation of continuing education.
- ◆ Industry is very much in favor of “just in time” education, purchasing what is needed as it is needed from the best quality / lowest cost supplier.
- ◆ The best control systems people in the world are often IEEE/CSS members.
- ◆ IEEE/CSS offers tutorials at conferences now.
- ◆ Can these services be offered over the Internet?
- ◆ The largest demand is likely to be for the more fundamental information. Are we focused on the correct audience?
- ◆ Will individuals and corporations pay for these services?
- ◆ Can this be a benefit to membership?

## Recommendations

The following recommendations are grouped along organizational lines:

- ◆ Conference Activities

- ◆ Publication Activities
- ◆ Member Activities
- ◆ Technical Activities
- ◆ Awards

The recommendations are organized into short-term items, which should be considered for implementation within the next two years, and longer-term items, which provide guidance over the next five years and beyond. Particular attention has been given to conference financial affairs, which must be addressed in the very near future, and to new publication concepts.

The recommendations are presented as bulleted lists, rather than in an expository format. The bullets tend to be self-explanatory, and it was decided that little additional benefit could be gained from more lengthy explanations. The point of this report is to focus short-term action and long-term thought on issues that affect the society's future viability and vitality, rather than to present a report that becomes an end in itself.

## Conference Activities

### Short Term Plan

- ◆ Increase the quality of the review process, and provide more feedback to authors and reviewers using PaperPlaza.
  - ◆ Periodically update the list of CEB AEs and verify that all areas are covered.
- ◆ Encourage more book and journal publishers to attend CSS Sponsored conferences.
  - ◆ Industrial sponsorship of some conferences and conference activities is desirable;
  - ◆ Sponsorship may provide enhancements to conference revenue streams.
  - ◆ Sponsorship is likely to improve industrial participation in the technical programs.
  - ◆ However, it is recognized that sponsorship is probably very difficult to achieve in both Europe and the US, although it may be somewhat easier in Asia.
  - ◆ Should CSS establish a new committee under VP/CA to investigate sponsorship possibilities?
- ◆ Adopt a method to ensure that papers accepted for publications comply with IEEE specifications for Adobe PDF format.

### **Short Term Plans Specific to Conference Finances**

- ◆ The society must institute better financial controls for conferences, and conferences must provide periodic and accurate revenue and expense predictions, and minimize financial risks.
- ◆ A process must be observable before it can be controlled, and at present conference activities that impact CSS finances are not fully observable.
- ◆ For Technical Co-sponsored Conferences, consider whether a fee should be established for each approved event.
- ◆ Impose additional requirements on Sponsored Conference Operating Committees.

### **Recommendations for Sponsored Conference Operations**

- ◆ Increase assistance to General Chairs regarding contracts, financial estimates, and preliminary arrangements.
- ◆ Select General Chairs and Program Chairs with relevant experience and demonstrated ability to successfully manage conference operations.
- ◆ Require competitive evaluation by the General Chair of multiple cities (across a region) and multiple conference sites before selection of venue.
- ◆ Evaluate whether one registration should be required for each accepted paper, or whether a submission fee should be imposed.
- ◆ Require review and approval of all conference contracts and budgets by VP/Finance prior to acceptance by society and submission to IEEE HQ.
- ◆ Require accurate and realistic conference budgets that return a minimum percentage of gross receipts to the society. It is recommended that the Society require a minimum budgeted financial return to the Society of 20% of gross receipts.
- ◆ Require quarterly financial reports by conference finance chair and general chair to VP/Finance.
- ◆ Require pre-approval of significant (greater than 10% per category) deviations in anticipated expenditures and receipts by VP/Finance.

### **Long Term Plan**

- ◆ For Co-Sponsored Conferences, look for new non-standard application areas within engineering (e.g. networking) and outside engineering (e.g. biology).
- ◆ Study the option of convention centers as an alternative to hotels, with the goal to control costs while still providing good facilities.

- ◆ Explore new ways of presenting papers at conferences such as interactive sessions and web-based sessions.
- ◆ Continue the cooperation with EUCA and SICE regarding the organization of joint events.
- ◆ Study the opportunity to establish virtual communities and committees.

## Publications Activities

### Short Term Plan by Publication

- ◆ Transactions on Automatic Control
  - ◆ Maintain a small backlog in both regular papers and technical notes (no more than 6 months from acceptance to publication).
  - ◆ Target one special issue per year to keep our readership informed about the latest developments in our field and in related fields from which we can benefit.
- ◆ Transactions on Control Systems Technology
  - ◆ Maintain a high number of associate editors affiliated with industry and research labs. If possible, increase the percentage from 40% to 50%. Maintain the strong emphasis of the journal on applications and technology.
- ◆ Control Systems Magazine
  - ◆ Keep the CSM about the same size (600 pp) for the next 5 years.

### Long Term Plan by Publication

- ◆ Transactions on Automatic Control
  - ◆ Continue to fine-tune the electronic infrastructure for the editorial process and look for the right opportunity to upgrade to the next generation of tools.
- ◆ Transactions on Control Systems Technology
  - ◆ Continue the transition to electronic publishing. Investigate possibilities for web-based submissions through IEEE and through the CSS. Follow IEEE's efforts for full electronic submission of manuscripts accepted for publication.
- ◆ Control Systems Magazine

- ◆ The CSM has received an award for technical content, and the strong emphasis on technical quality should be maintained. Continue to solicit general-interest articles and columns, but neither technical content nor quality should be reduced.

### **New Publication Directions**

- ◆ New proposals for hardcopy publications are not appropriate, and would have to meet a very high threshold to win IEEE approval.
- ◆ Electronic (only) journals offer the potential for:
  - ◆ Paperless review and publication process.
  - ◆ Leverage PaperPlaza and IEEE/CSS web site.
  - ◆ Bundled cross-society publications (Systems and Control Electronic Library, or similar offerings).
  - ◆ Innovative publication types such as courseware, system models, streaming media, and software.

### **New Publications Should Meet Three Criteria**

- ◆ Content quality commensurate with existing journals.
- ◆ Meet documented needs of both authors and consumers.
- ◆ Have a business plan that offers a reasonable expectation of net income to CSS.
- ◆ In addition, new publication products should be available only through Xplore and/or the CSS web site.

### **Member Access to Conference Publications**

- ◆ At the present time, CSS membership does not provide access to CSS conference publications through Xplore.
- ◆ This would be an obvious benefit of membership and should be corrected.
- ◆ Member access adds value to both CSS membership and the conferences.
- ◆ There should be a publication delay to minimize risk of cannibalizing conference attendance.

### **New Publication Concepts**

- ◆ There are two types of journal articles we do not offer that we should consider:
  - ◆ Short letters announcing new results and published rapidly (with review), and

- ◆ Long reviewed articles and monographs.
- ◆ Can the equivalent of IEEE Press reprint volumes be offered through Xplore and be profitable?
  - ◆ A significant percentage of profits should be shared with volume editors.
- ◆ Would a market exist for electronic textbooks and course materials?
- ◆ Investigate logistics and market potential of course and video materials offered in a streaming format via the Internet:
  - ◆ Short courses that provide course materials and video lectures, and reviewed content.
  - ◆ Plenary lectures.
  - ◆ CSS history videos.

## Member Activities

### Short Term Plan

- ◆ Continue the program of recognizing member contributions by nominating members for senior membership in IEEE.
- ◆ Use the CSS student brochure to promote membership in IEEE/CSS.
- ◆ Assist in activities that publicize CSS achievements/contributions.
- ◆ Continue current activities of promoting the systems/control field to high school students.
- ◆ Continue the disadvantaged countries travel support program for CDC and CCA only if it is financially feasible.
- ◆ Explore affiliate status CSS membership for individuals from disadvantaged countries.

### Long Term Plan

- ◆ Identify needs of CSS members and develop strategies to address these needs.
- ◆ Explore the possibility of developing novel training and skill assessment material.
- ◆ Consider the creation of mid-career awards.

- ◆ CSS offers rewards for young researchers and for lifelong achievements, but less opportunities for mid-career individuals.
- ◆ This class of awards can be used by employers who are evaluating staff members for career advancement.
- ◆ Develop new methods for promoting the systems/control field to high school students.
- ◆ Develop new vehicles for showcasing CSS achievements and contributions.
- ◆ Develop appropriate strategies for promoting CSS membership to individuals from developing countries.

## Technical Activities

### Short Term Plan

- ◆ Review the activities of individual Technical Committees.
- ◆ Encourage more participation by TCs in conferences (e.g., preparation and submission of invited sessions).
- ◆ Reactivate the less active TCs by assigning new chairs or consolidate committees on related topics into larger committees that would be more robust to changes in trends.
- ◆ Create a new TC on Distributed Parameter Systems.
- ◆ Consider establishing a TC on Finance Systems and other major stochastic control/estimation areas that have traditionally fit under SIAM rather than CSS.
- ◆ Revitalize the TCs on Biosystems and Networks/Communications.
- ◆ Work with the Aerospace Control TC to ensure the new activities on command and control of UAVs and fleets of UAV's are properly covered by this committee.
- ◆ Work with Automotive and Power Systems TCs to ensure the fuel cell activity is covered by either or both committees.

### Long Term Plan

- ◆ Strengthen the (informal) interaction of TCs with CSS journals and conferences.
- ◆ Raise the level of TC activity in popularizing control outside CSS but also put more emphasis on the *expert* role the TCs can play within the field, in both research and education.

- ◆ Regional and student-oriented workshops.
- ◆ Increase the emphasis on activities in Asia, Europe, and S. America
- ◆ Increase the participation from industry on TCs.
- ◆ Find a role for senior (and very senior) researchers to play on TCs.

## Awards

### Short Term Plan

- ◆ Develop procedures and guidelines to assure that solicitations of foundation or corporate support for awards will reflect well on CSS and will focus on long-term relations rather than ad-hoc arrangements.
- ◆ Improve efficiency of selection procedures for Best Student-Papers at conferences.
- ◆ Improve publicity, especially for the *CST Award*, possibly in cooperation with employer of award winners.

### Long Term Plan

- ◆ Maintain the quality and integrity of the awards,
- ◆ Publicize the achievements of our award winners to improve the image of our field, and to stimulate a continuing flow of nominations of qualified candidates.
- ◆ Be alert to any need to develop additional awards.

## Summary

The Control Systems Society, and the IEEE in general, is at a critical point in its history, and this analysis of the long-term plan is timely. Traditional revenue sources (non-member subscriptions, conferences, and membership dues) are threatened, and the costs of operation have increased substantially, due in large part to the absence of any significant investment income (and a decline in investment values) and cost associated with the rapidly evolving technologies of publications.

The most important and immediate short-term goals are associated with cost control and protection of revenue: management of conferences. Several specific recommendations are made in this report that, if implemented, should provide timely and accurate financial projections for sponsored conferences. This is not just a requirement that is imposed by the society; the IEEE has stated that it will require accurate periodic predictions of conference net income in the near future. At present, our society can not meet this requirement, and fines will be levied against societies that do not meet forecast conference projections.

In the short- to medium-term, our governing board must ask why our society is attractive to its membership, and find methods to make membership more attractive. In essence, this means the society must offer services to its membership that members find worth the cost. Historically, this has been access to the society's intellectual property embodied in its conferences and publications. With employers providing many members access to all IEEE publications via the Internet, it is no longer necessary, or desirable, for these members to maintain personal libraries of hardcopy issues of the transactions and conference proceedings. Membership in the society has decreased by 8% over the last year, indicating that some members are deciding that the cost of membership is not justified. If this trend continues, the long-term viability of the society will be threatened.

The Control Systems Society is financially sound at present, although it, as with most other IEEE entities, incurred significant losses over the past two years. Members should take great pride in the quality of the society's publications, which include the premiere journals in the field. While the society must act quickly to better regulate its financial operations, this must not be done at the expense of quality. The Society has maintained very high standards in both its conferences and publications throughout its life, and these high standards should be the precepts by which all other society activities are judged.