"Prediction Is Very Difficult, Especially About the Future" (Niels Bohr)

I am writing this column in early December, prior to the IEEE Conference on Decision and Control (CDC) in Florence, but after the IEEE Technical Activity Board (TAB) meeting in New Jersey and the IEEE Control Systems Society (CSS) Executive Committee meeting that was held in Stuttgart. Amid all this travel, I have been contemplating reoccurring themes at the TAB and CSS meetings, both this year and in the past. One important theme relates to technology change and its potential impact on the future of CSS. Another is why our numerous volunteers work so hard for their professional Society.

I teach a first-year course on electrical engineering careers. The final lecture includes a discussion of the technology changes over the last quarter century. For example, music storage and delivery has transitioned significantly: vinyl records, cassettes, eight tracks, portable cassette players, portable CD players, MP3 players, iPods, streaming media. For beginning engineering students, as they start their careers, contemplating their potential contributions to technologically changing fields is an exciting prospect. However, for their future employers, such technology change holds both risk due to obsolescence and reward from new product sales.

Similarly, technology has significantly changed CSS conference and journal operations over the last few decades. Conference papers were previously hand prepared on oversized mats, delivered by postal services to a

Elena, Frank, Amber, Jay, Kirsten, Yutaka, Warren, Ed, and Mimiko outside the Mercedes museum in Stuttgart, Germany.

Members of the CSS Executive Committee end a process control tour in Stuttgart, Germany.

printer, reduced in size, and bound by the printer into multivolume sets over a foot thick that were shipped to the conference and carried back to home institutions for later reading. Now papers are submitted in final form as pdf files, automatically checked for format and plagiarism, and distributed electronically via IEEE *Xplore* or a tiny (and easily carried) memory stick. Similar changes have affected journal operations and the review process for both journals and conferences.

This same time frame has seen the development of new, versatile, and inexpensive means to share software, data, movies of experimental results, and lectures. These developments positively affect the rate and impact of our theoretical, algorithmic, and implementation research developments.

Thankfully, due to the thoughtful leadership of the CSS, our conferences, transactions, and magazine all have both high-quality technical content and the sound financial foundation that enables their continuity. Due to the value that it provides, CSS membership is growing and becoming more international.

at first glance that the bicycle must be "easy" because of their obvious familiarity with the bicycle. From that point on, the bicycle serves as an illusive target that resists solution attempts and becomes more complex with each successive try. The bicycle adopts a role much like the errant broom in P. A. Dukas' *The Sorcerer's Apprentice*. Each repeated attempt to grasp the bicycle usually results in a fractured problem and for which the issues become more illusive and multiplied. The students, as apprentices, become increasingly motivated to acquire more and more theory so as to overcome this common object, the bicycle. When the students thirst for more knowledge and eagerly grab the body of systems-theoretic material, then the pedagogical victory is assured. ⊕

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Members of the CSS Executive Committee enjoying dinner after a committee meeting.

Nonetheless, technological change creates concerns about what might happen to the CSS in the future. How will open access publication affect IEEE *Xplore* and the various publications of the Society? How will various technology changes affect the technical, financial, and social success of our conferences?

Just as predicting the advent of streaming user-specific audio would have been difficult in the era of the portable CD player, the prediction of the future modes of delivery of technical content is difficult. However, the need for and growth of high-quality, peer-reviewed technical communication is clear. While the technology exists to obviate the need for thousands of control theorists and practitioners to travel to one location to communicate the latest developments in our field, those technologies do not allow the social, technical, and networking experiences necessary to build strong life-long collaborative relationships. I expect (and hope) that conferences in some form will continue far into the future.

While at IEEE and CSS meetings, I sometimes contemplate why numerous volunteers sacrifice time that could be invested in various other activities. This thought especially occurs when diverse opinions about the future cause contrary opinions about the correct course of current actions. The fact that many people continue to volunteer, throughout their careers and into retirement, shows that the volunteers place value on this activity. In addition to the social interaction, which could be attained in many easier ways, I believe that professional society volunteer activities allow a rather unique opportunity: to positively influence the future of our profession and its impact on society. This opportunity can be as exciting for experienced professionals as for first-year students contemplating the impact that they will have after earning their degree.

One such innovation is the CSS collaborative effort with other IEEE Societies to publish *IEEE Life Science Letters*. The Phase II proposal was approved at the IEEE TAB meeting in November 2013. Within the CSS, this new publication has been spearheaded by Mathukumalli Vidyasagar and Frank Doyle.

I look forward to future discussions with you about the future of technical and social exchange, why we volunteer, or suggestions for the future of our professional Society.

Jay A. Farrell

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