Some Recollections on the Inaugural ABET Industrial Advisory Council

By Frank G. Splitt
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BACKGROUND – It was in 1948 that I graduated from St. Philip High School and began pre-engineering studies at Chicago's Wright Junior College. It was also the year that the life of **Aldo Leopold**, America's foremost conservationist and environmental scholar, came to a tragic end at the early age of 61. Over the years, Leopold's life story and work came to provide me with renewed inspiration and motivation to keep asking and seeking to answer Leopold's root question, *"How do we live on the land without spoiling it?"* This question was to have a profound impact on my ABET-related work

My concern about environmental issues began sometime in 1986 and emanated from work that my wife and I did with the Foundation for Global Community – formerly known as the Beyond War Foundation. It was through the Foundation that I first became aware of the concept of sustainable development and was introduced to the work of Donella Meadows, Jonas Salk, and a new way of thinking – that we are one, and, that individually and collectively, we share the responsibility for the future course of events on the planet. I also came to better understand the challenge before us – to affect an appropriate level of positive change to protect the environment – is of daunting proportions.

ENGINEERING EDUCATION – My interest in Engineering Education was kindled sometime in the mid-1980s by Professor **Ed Ernst**, then an Associate Dean at the University of Illinois and a highly regarded academic leader at ABET – the Accreditation Board for Engineering and Technology. Professor Ernst, a fellow director of the International Engineering Consortium (IEC), played an important role as a mentor and a facilitator within the academic and engineering accreditation communities. With additional encouragement and strong support from IEC Executive Director **Bob Janowiak** and Deans **Bill Schowalter** at Illinois and **Jerry Cohen** at Northwestern, I began to speak and write on the subject of Engineering Education from an industry perspective.

The first venture was in 1986 at the National Communica-

tions Forum where my focus was on overspecialization as a problem for engineering education. Environmental issues began to be emphasized in the late 1980s with a call to our engineering students to take a leadership role in policy issues. Over time, I became a strong advocate for restructuring engineering education and worked to catalyze the changes that began to be called for since the early 1980s – not only in the way we educate our engineers, but also, as a member of the ABET Industry Advisory Board, in the criteria we use to accredit our engineering schools.

The IEC published the *Creating Our Common Future* monograph in 1991. The monograph addressed environmental, education, energy and economic issues of the day and saw worldwide dissemination. Among other things, it was used to help provide the context for a high-level path forward for the business and academic sectors of the Information Industry. At the time it was also clear that opportunities to revitalize education and facilitate environmental clean-up and sustainable development would be important drivers. Environmental and educational initiatives were seen to be synergistic and mutually supporting. Engineering Education and ABET now came to the fore. Here's how.

THE ABET INDUSTRY ADVISORY COUNCIL – During his term as the ABET president, Ed Ernst established the ABET Industry Advisory Council (IAC). It was Ed's view that ABET was in a highly leveraged position to affect change in engineering education. Why?…because he believed that a major restructuring of the accreditation criteria and process would have significant long-range effects. Ed invited me to serve on the board.

We had our first meeting in May of 1991. This was the time when President **James Duderstadt** of the University of Michigan, President **Charles Vest** of the Massachusetts Institute of Technology, and others, were calling for a fundamental change in the post-World War II model for Engineering Education that was proving to be inadequate – not capable of sup-

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porting the new emphasis on quality, customer focus, and continuous improvement. They also saw ABET's rigid, "bean-counting" implementation of accreditation criteria as a barrier to needed innovations in Engineering Education. This was also the time when the National Science Foundation was demonstrating increased interest in curricular innovation and would soon initiate a series of workshops on restructuring Engineering Education.

OUTCOMES APPROACH TO THE ACCREDITATION PROCESS – The ABET connection proved to be most rewarding. It provided a platform to implement the ideas described in *Creating Our Common Future*, as well as the concept of systems thinking advocated by MIT's **Peter Senge** in *The Fifth Discipline*. Most importantly, it provided a venue for a wide-scale introduction of environmental protection and sustainable development imperatives into Engineering Education. The restructuring process was helped considerably by ABET President **John Prados**, University of Tennessee, who was providing leadership to affect requisite change, and by Deans Jerry Cohen and Bill Schowalter who were providing valuable insights on accreditation practices as viewed by major research universities. As noted in the appended letter, these insights kindled the ABET IAC's thinking on an outcomes approach to the accreditation process.

THE IMPACT OF SUSTAINABLE DEVELOPMENT – It was in the late 1980s that sustainable development came to be recognized as a major issue of our times. Clearly, this issue was going to have a significant impact on Engineering Education. **Jim Poirot**, the first chairman of the Advisory Board, introduced me to the *World Engineering Partnership for Sustainable Development*. Together, we worked to promote the idea that sustainable development was going to be the dominant economic, environmental, and social issue of the 21st century; and that in addition, a fundamental change in Engineering Education was required to help the next generation of engineers learn to design for sustainable development and long-range competitiveness. This view was reflected in a letter sent to the ABET President **Al Kersich** in late September of 1993, by ABET IAC Chairman **Mike Emery**. In the letter we called upon ABET to bring about a major paradigm shift in engineering education. Among other things, the ABET IAC asked that emphasis be placed on teamwork and an interdisciplinary understanding of the societal, ecological, financial, national, and global impacts of engineering. The letter also recommended a set of Accreditation Process Principles and Concepts & Supporting Strategies that later helped form the working basis for ABET Engineering Criteria 2000 (ABET EC 2000): Criterion 3 Programs Outcomes and Assessment.

THE ACCREDITATION PROCESS PRINCIPLES – The *Accreditation Process Principles* called for the *"understanding of and work toward sustainable development ... safety and environmental impact."* In the process of balancing specific guidance against flexibility of choice by engineering programs, the wording of the *Accreditation Process Principles* relative to environmental considerations was subsequently generalized. Thus, Criterion 3 did not reflect the emphasis that the ABET IAC *Accreditation Process Principles* placed on these considerations. The ABET IAC also asked that engineering programs seek to provide their graduates with a combination of skills, attributes, and characteristics among which were: *"A holistic approach to achieve solutions to engineering challenges by integrating the elements of general education including human needs, culture, history and tradition, sociology, politics and government, economics and the environment."* Emphasis on the environment and sustainable development was considered one of the ABET IAC's more important recommendations. This emphasis was also promul-

gated in my presentations at ABET and ASEE conferences. Subsequently, a multitude of examples came to illustrate just how important emphasis on sustainable development is to business leaders today.

CONCLUDING REMARKS – Looking back, I understand why ABET's Criterion on Program Outcomes and Assessment was generalized to the extent that it was. The burden of developing case studies and other mechanisms that enable student learning in the cited areas is exactly where it should be – on the engineering schools. Unfortunately, in my opinion, a significant opportunity for an appropriate level of emphasis and guidance may have been lost in the process of getting to this end objective. However, this emphasis and guidance could, and can, manifest itself in other ways… sometimes, in quite unexpected ways. Fortunately, as a consequence of a 2000-2003 campaign for systemic engineering education reform, ABET EC 2000 was revised in 2004 so that it now reflects what I believe to be the original intentions of the inaugural ABET Industrial Advisory Council.

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Frank G. Splitt
September 21, 2006

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APPENDIX: October 21, 1992 Letter from Frank Splitt to David Reyes-Guerra

October 21, 1992
Dr. David R. Reyes-Guerra
Executive Director, Accreditation Board
 For Engineering & Technology
345 East 47th Street
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Subject: Accreditation Practices and Major Research Universities

Dear Dave:
As you suggested at our August ABET/IAC meeting, I discussed the subject with University of Illinois at Urbana-Champaign, Dean Bill Schowalter, and Northwestern University Dean, Jerry Cohen. Both were kind enough to spend time with me and arranged for me to meet with some of their key people as well. A summary of our discussions follows:

Bill and Jerry are well aware of the growing tension between accreditation practices and the positions of major research universities. They also know that the dissension has engaged the attention of several university presidents who happen to be engineers and members of the National Academy of Engineering. Both Bill and Jerry are of the opinion that drastic action on the part of the major research universities would be counter productive in the long run. Furthermore, they believe several substantial changes in ABET practices are required if a serious rupture is to be avoided. These include:

1. The bean-counting perception of ABET evaluations must be dispelled.
2. Individual visitors should be empowered to make subjec-

tive judgments. Presumably, the visitors are chosen because of their high stature and credibility. Their high standing should be exploited in the evaluation process.
3. The ultimate measure of success of a program is the success of the alumni. That factor should receive more explicit recognition. What fraction of the students is placed at the time of graduation? What is the record of the alumni five and ten years after graduation? What do alumni surveys say about satisfaction with their education?
4. Experimentation and latitude should be encouraged within the context of the institution, its student body, and objectives. It is entirely correct that procedures at MIT should differ from those, at say, Notre Dame, which would again differ from those at Texas A&M, each program being, perhaps, perfectly acceptable for its special environment.

Additionally, Jerry believes that the examiners are often not the leaders in the field they are examining…many times they are from second-level schools. He feels that the latter is probably the fault of the research universities who are not promoting the examiner role. Jerry also believes that we need engineers who graduate ready to be "worker bees," but we especially need engineering leaders. To help the latter, he believes the engineering curriculum needs to be opened to a broader range of subjects… a move discouraged by present bean-counting practice. Going to a five-year curriculum to do the job will, in Jerry's opinion, kill engineering enrollments. In summarizing his views, Jerry pointed out the fact that, in spite of the recent criticism of our research universities, the educational function (especially at the graduate level) is the envy of the world. "Why else would there be so many applications from overseas? Can many of our industries say that? Where will the ideas for the next generation of industries come from if we continue to damage this vital part of our country?"

In closing, let me share some of my thinking with you. First, the accreditation process should be more output (crop) based, rather than input (seed/bean) based. Thoughtful consideration needs to be given to university programs within the overall context of their mission, goals, objectives and tactics (where the beans can be counted with relative ease). This requires judgment by empowered examiners.

Secondly, all teaching and learning need not be done via formal course work. There are other vehicles that can be used to multiplex new content with an in-place program. It is my view that relevant topics such as communication skills, ethics, leadership, TQM, and holistic thinking can be provided by integration into the current curriculum and/or overlaid with a professional growth seminar program. For elaboration on the integration approach, I commend the October 1992 ASEE/PRISM cover story to your attention.

We can discuss this further in San Antonio if you wish. Please copy others as you deem appropriate.

Warmest personal regards,

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Frank G. Splitt
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Engineering Education Fit for the 1970s

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Le Bourgeois Gentilehomme by 17-century playwright Molière describes Mr. Jourdain, a merchant who decided late in life to use his growing wealth to climb the social ladder. Jourdain's methodology is to hire a group of advisors and teachers – masters of music, dancing and fencing, a philosopher, and an expensive tailor, who will make him a nobleman. Mr. Jourdain has very little background or natural propensity to engage in music and philosophy. He had never danced. Still, he has enough money to attract "experts" in these fields and they would "educate" him at length and flatter him about his "progress" as long as they have access to his purse. Molière (and audiences of his play) have very good time with the would-be gentleman. A particularly memorable scene is when this newly educated aristocrat discovers (through the philosophy coach) that all human expression is made either in verse or in prose. "My goodness!" he exclaims "I've been talking prose for forty years and never known it!"

I was reminded of this old quote as I was looking recently through descriptions of what engineers in different disciplines do at work – as part of an IEEE renewed effort to re-examine engineering university curricula. The path of our engineering students to upward mobility is, one would hope, less absurd and more structured than that of Molière's farcical protagonist. Yet one of the questions I started asking myself, as I was comparing what engineers do to what engineers study, was this: will future engineers wake up one day in midlife to discover that "they have been software engineers for all these years and never known it"? And if they do, what would they think of us, their educators? Such late and rude awakening may induce some of them to hire "software masters" in a hurry, to develop a quick fix for this or that problem. Unfortunately, such "masters" are likely to be as effective at that late stage as Mr. Jourdain's miserable advisors were in Louis XV's French society.

The IEEE Educational Activities Board has decided recently to re-examine what IEEE has done in the area of engineering curriculum since the (rather successful) joint effort with ACM on model curricula in Computer Engineering, Software Engineering and Computer Science. We are looking at other areas of engineering, within IEEE's fields of interest, to understand whether a model curriculum effort would be worthwhile. In the course of this assessment, we looked in some depth at the engineering programs of twenty (20) reputable schools in the United States. We anticipated that, given the Zeitgeist, engineers of all stripes would get at least introductory information on application programs, web tools and protocols, operating systems and data management, programming and software design, and computer hardware. We expected further that in some curricula there would be deeper coverage, or at least a selection of electives would be made available, on databases, computer-aided design, specific families of applications, computer graphics, and software architecture.

The actual findings were very different. A leading program in Aerospace Engineering in a well known school was typical – it had a single one-semester course entitled "introduction to computing," and no other computing-related offerings among all required or elective courses. Most other engineering programs in the same school also had a single "computing for engineers" class – and nothing else. Some programs in other places have moved with the times – notably many programs in Industrial Engineering had components on information systems, databases, computer integrated manufacturing, and computer graphics. However, most engineering programs outside of computer engineering appear oblivious to the increasing centrality of computing, software and the Internet in the life of engineers at almost all disciplines and levels of occupation. These programs continue to offer a single course on computer programming, maybe a general overview of computing on top of that, and little else. It is almost as if we were still in the 1970s.

There appear to be several reasons why leading schools in the United States do not feel that their engineering students need more than a single semester of structured instruction about computing.

- Many engineering educators see computing as an auxiliary skill, something you kind-of-need-to-know but can always learn on your own from a manual, or by using the help files that come with the software. (Every program manager in industry who has seen the charming "code" that amateur programmers produce would disagree.)
- Some engineering educators assume (quite erroneously) that due to the short shelf life of computers and software applications, the field of computing is too fluid and too ad hoc in nature to have any principles and theory worth studying and teaching. "Clearly" then, any theory associated with computing and computers is of much lower stature and need for exposure than, say, Maxwell's equations or the laws of thermodynamics.
- Relatively few engineering educators have observed first hand the dramatic shift in importance of software (and of managing of software) that was experienced by industry in the last fifteen years, most notably where research and development take place. Many members of the faculty in our schools of engineering have done their school work well before MATLAB and Mathematica. Of these, quite a few have never adopted modern tools as an integral part of what they (as opposed to their students) do personally on a daily basis. Since they do not use computing tools nor write software themselves, many of our faculty members fail to understand that serious computing work requires more than rudimentary knowledge, and that there is much more to com-

puter-aided design than clicking on boxes of prepared menus.

- In some engineering programs, computing and software are still seen as a foreign element that "does not belong here." The assumption is that deep understanding of software architecture and computer applications belongs with computer science majors, computer engineering majors, maybe some electrical engineers. Software is perceived not to be the province of "real" mechanical, or civil, or microwave engineers. Yet, increasingly, mechanical, civil and microwave engineers engage in expansive and complex modeling, simulation, data collection and data analysis using computers. Without proper education these engineers approach these tasks (at least initially) as amateurs.
- The engineering curriculum is already packed. The historical development of most curricula in engineering was evolutionary, which means that new course content was added at a rate that exceeded the rate at which old content was discarded. Many curricula continue to define as 'core' what in reality has long become a specialty (example: circuit design in electrical engineering). There are many additional stresses on the engineering curriculum (numerous calls to add material in business, economics and law; ethics; life sciences; systems engineering; personal communications; tracks and opportunities to specialize; interdisciplinary courses – the list is very long.) In this environment, introduction of a significant component of structured courses on computing appears impossible.

Regardless of the reason, it is clear that most engineering curricula are significantly behind in their computing offerings, and that IEEE's model curriculum efforts, among other reviews of the engineering programs, will have to address this deficiency. Collectively our community still fails to understand that for most engineers not being able to talk in the language of modern computing would be as devastating as not knowing basic math.

One also wonders if the path to improved economic competitiveness does not pass through the undergraduate engineering classes. Is it possible, one might speculate, that at least some of the outsourcing and migration-of-labor challenges that we have faced in recent years are related to the fact that aerospace engineers from the best schools in some countries compete in the global marketplace with a grand total of a single-semester class on computing in their arsenal…

Beyond … or Beneath … Innovation

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Innovation is the mantra of a globally competitive world. We are continually challenged to change in order to remain constant compared to our contemporaries who are themselves evolving.[1,2,3,4,5] Educators especially confront a confluence of fluid factors including the changing disciplines they profess, the experience of their students, and the teaching and learning tools available to them. But what do we find if we look beyond, or beneath, innovation?

Our changing disciplines require educators who are also researchers and can comprehend, synthesize, and transmit new knowledge to their students. As traditional disciplines broaden and deepen, they intertwine with other disciplines and create new ones that require insight and cleverness to be interpreted for novices and journeymen. New knowledge from research in education and new educational technology provide innovative possibilities for increasingly effective learning environments. Simultaneously, the experience of our students has shifted significantly with many already familiar with high technology learning environments in their K-12 years. Today's new college student comes trained on iPod instead of tripod, Smart Board in lieu of blackboard, and PDA's not paper organizers. Educators need to know … and grow. Our IEEE Education Society is a vehicle for growth.

Teaching and learning is a fundamental human activity. It is a universal experience yet unique to each individual. We engage in both formal and informal education throughout a lifetime of lifelong learning. The theme of the recent 35th International IGIP Symposium in Tallinn, Estonia was: Engineering Education – the Priority for Global Development. There we examined some of the concepts underlying recent advances in educational pedagogy in a keynote address titled Innovations in STEM Education where STEM stands for Science, Technology, Engineering, & Mathematics.

Models of student learning form the conscious or subconscious basis for our educational environments. The lecture model is one. Another might consider initial and final states of understanding with an active learning environment responsible for transition from the first to the second. Which models of education do we choose? The National Research Council commissioned a series of studies examining how people learn.[6,7,8,9] Some of their key findings include: 1) Students come to the classroom with preconceptions about how the world works. If their initial understanding is not engaged, they may fail to grasp the new concepts and information that are taught, or they may learn them for purposes for a test but revert to their preconceptions outside the classroom. 2) To develop competence in an area of inquiry, students must have a deep foundation of factual knowledge, understand facts and ideas in the context of a conceptual framework, and organize knowledge in ways that facilitate retrieval and application. 3)

A meta-cognitive approach to instruction can help students learn to take control of their own learning by defining learning goals and monitoring their progress in achieving them.

Cognitive research helps us understand how people learn and solve problems. Typical steps include acquisition of knowledge, organization and retention of knowledge in memory, and retrieval of knowledge from memory in appropriate situations including solving problems. All three are strongly coupled to each other. It also points out that there are crucial differences in problem solving between experts and novices[10] in how they handle the level and complexity of knowledge representation & rules and the relevant knowledge that must be brought from long term memory (LTM) to short term (working) memory (STM).

There are several implications for learning and teaching techniques. It is important to draw out and work with the pre-existing understandings. Programs should teach some subject matter in depth, and meta-cognitive skills should be integrated into the curriculum. Active engagement with quality time is important since usable knowledge is not automatically acquired by the amount of time on task. Limited memory capacity makes cognitive load high during problem solving but techniques can reduce it.

Learning is influenced by the context in which it takes place. Learner-centered and knowledge-centered classroom environments pay attention to what is taught (information, subject matter), why it is taught (understanding), and what competence or mastery looks like. A community-centered approach can be supportive and requires the development of norms for the classroom and school, as well as connections to the outside world, that support core learning values. Formative assessments are essential and help both teachers and students monitor progress. The inclusion of technology in the learning environment should build on cognitive research and provide value.

There are many innovations underway that may come under one or more headings such as active learning. We speak of inquiry-based learning, just-in-time teaching, and cooperative learning. There are student peer approaches including peer led team learning, peer tutoring, peer mentoring, and peer review. The technologies for interactive learning include classroom response systems, interactive homework systems, interactive Web-based materials, and sources such as the National Science Foundations National STEM Digital Library (NSDL). Many experiential learning situations for students may include research experience, internships, service learning, community building, or cohorts.

Assessment is necessary to determine if our learning model and techniques are effective. Our goal is to have valid research-based assessment that can differentiate variables to see what techniques contribute, make no change, or may be detrimental to effective learning.

Assessment of outcomes should be as rigorous as possible depending on the particular project or intervention and can include randomized controlled trials (RCT), well-matched comparison group studies, pre-post studies, or others. There are many tools available to assist including such things as concept test inventories for specific disciplines.

Innovation is one of the outcomes we seek from the educational process. Behind, beneath, or beyond the innovation are a host of innovative concepts, techniques, and systems. The IEEE Education Society through its publications, conferences, and networks continues to be a catalyst for innovation and a vehicle to carry our innovations to others worldwide.

Best wishes,

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1 *The Engineer of 2020*, National Academy of Engineering, The National Academies Press, (2004). Educating the Engineer of 2020, National Academy of Engineering, The National Academies Press, (2005).

2 *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future, Committee on Science Engineering and Public Policy*, The National Academies Press, (2006).

3 *Transforming America's Scientific and Technological Infrastructure: Recommendations for Urgent Action*, Project Kaleidoscope 2006 Report on Reports II, (2006).

4 *Engineering Change –A Study of the Impact of EC2000*, ABET (2006).

5 *American Competitiveness Initiative – Leading the World in Innovation*, Domestic Policy Council Office of Science and Technology, (Feb 2006)

6 *How People Learn: Brain, mind, experience, and school.* (HPL; John D. Bransford, Ann L. Brown, & Rodney R. Cocking, editors 1999), Washington, DC: National Academy Press

7 *How People Learn: Brain, mind, experience, and school: Expanded Edition*. (John D. Bransford, Ann L. Brown, & Rodney R. Cocking, editors, 2000), Washington, DC: National Academy Press.

8 *Knowing What Students Know: The Science and Design of Educational Assessment*. (Pellegrino, Naomi Chudowsky, and Robert Glaser editors, 2001), Washington, DC: National Academy Press.

9 *How Students Learn: History, Mathematics, and Science in the Classroom.* (M. Suzanne Donovan and John D. Bransford, Ann L. Brown, & Rodney R. Cocking, editors, 2005), Washington, DC: The National Academies Press.

10 Chandralekha Singh, *What every physics teacher should know about cognitive research*, Workshop, American Association of Physics Teachers Annual Conference, Salt Lake City, UT, August 2005.

ECETDHA Comes of Age

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Since to our knowledge this is the first submission to *The Interface* from the Electrical and Computer Engineering Technology Department Heads' Association (ECETDHA), a brief background on our group is in order. The Association began in California in the early 1980's when a small group of department heads got together for an informal meeting in a hotel room at the ASEE Annual Conference to discuss issues facing the electrical engineering technology community. A slightly larger group assembled again the next year at the ASEE conference and began at that time to consider formalizing their activities. Taking some cues from the Mechanical Engineering Technology Department Heads, they identified some goals and objectives for the group and drafted some by-laws.

From that start, the Association functioned for nearly twenty years on a relatively informal basis. The group typically met twice a year, once at the ASEE Annual Conference, and again at the Conference for Industry and Education Collaboration (CIEC). At the meetings, the group would discuss the important issues of the day related to electrical and electronic engineering technology. However, the group had no official resources to support actions, so they generally relied on individual members to follow up on key issues by promoting action through personal contacts and informal interventions within other organizations.

By the turn of the century, the group was looking for ways to increase its influence. So, in June of 2002, the group entertained a motion to "go formal." At that time, there were no accurate records of membership, nor were any dues being collected. There were just lists and email addresses of attendees at previous meetings. These were used to contact past attendees with a plan to formalize the group and establish a formal, dues-paying membership. This group of 'initial members' endorsed the idea and voted to begin collecting dues of $25 per year. That first year, 29 administrators joined the group as paid members, which was encouraging because there had not been 29 people at a single meeting in quite some time. By the next year, the membership nearly doubled to 54, and then expanded again to 84 members by 2005. This year the membership stands at 91. While the growth rate certainly will not continue, the Association has developed into a viable force in the engineering technology community, and funds provided by membership dues provide the group with some real resources to tackle important issues. *(Note: The above is based on recollections of several 'old-timers' with the Association. We are currently searching for records that will let us develop a more complete history. If you have historical information on the Association that would help in this effort, please contact Tom Hall <hallt@nsula.edu> or call him at (318) 357-3459.)*

So what are these activities? Most recently, the ECETDHA has undertaken several significant initiatives that should benefit the electrical and computer engineering technology community. Primary among these is an effort to investigate the potential of developing nationally-normed assessment tests for electrical/electronics engineering technology graduates. This effort was kicked off by the Past Chair of the Association, Dr. **Tom Hall** of Northwestern State University in Louisiana, and is being done in collaboration with the Society of Manufacturing Engineers (SME) and with strong support from IEEE's Committee on Technology Accreditation Activities (CTAA). At this point, the Association's efforts have concentrated on determining the interest and potential participation in nationally-based testing, if such testing were available. Many of you in the Engineering Technology community have seen and responded to these surveys via the Engineering Technology listserv. To date, the information from the surveys has provided a basis for working with the SME to assess the viability and potential success of a development effort to create, validate and evaluate a prototype electrical/electronics assessment test. The Association is relying on the SME in this activity because of their many years of experience managing certification testing in manufacturing, and more important, because they have developed procedures and staffing that can be offered to others to support standardized test development. A report on the results of this effort should be available by the time of the next meeting of the Association in February 2007 at the CIEC.

The Association is also working on another perennial problem faced by ET department heads, and that is the job of identifying qualified external reviewers to evaluate faculty seeking promotion and/or tenure. Historically, external reviewers have been identified through personal networking, private recommendations, and personal experiences, and as a result, the job of performing external reviews has typically fallen on the shoulders of a limited group of well-known and highly regarded leaders of the ET community. Members of the ECETDHA are convinced that there is a much larger group of ET faculty and administrators who are both qualified to perform these reviews and who are also willing to provide their service to the ET community. Thus, the Association has undertaken an effort to create a database, to be shared by the Association membership, identifying qualified reviewers who are available to review P&T dossiers. Clearly, users of such a database will require assurances that listed reviewers are thoroughly vetted and possess requisite credentials. Thus, the members working on this task have focused their efforts to date on developing a

set of qualifications for listed reviewers and drafting policies for nominating, choosing, and retaining reviewers in the database. They are also assessing the content and extent of background information that will be needed in the database and investigating questions related to security and sharing of database information. A progress report is expected from this group at the CIEC as well.

Finally, the recent growth of the Association, and more important, the financial underpinning provided by that growth, has permitted the Association to become much more involved with the IEEE's CTAA. The Chair of the ECETDHA has been an invited member to CTAA meetings for some time; however, prior to a few years ago, there were no funds to support the Chair to travel to CTAA meeting. Thus, actual attendance was, at best, sporadic. That is no longer the case. The ECETDHA now funds the Chair to travel to CTAA meetings each year. The immediate result of that has been a much greater involvement of the Chair in accreditation-related initiatives of the CTAA and a much stronger voice of the Association with both the CTAA and its parent group in IEEE, the Educational Activities Board. The CTAA is the key actor influencing accreditation issues related to electrical and computer engineering technology programs, and clearly more active involvement and representation from the ECETDHA can be nothing but positive. Further, the Association is frequently called upon to support CTAA actions and to act as a conduit of information to and from the field.

There you have it -- a brief recap of what the Electrical and Computer Engineering Technology Department Heads Association is, what it is up to, and where it is headed. I hope it makes clear that the group is working hard to carve out a dynamic and important role for itself within the electrical and computer engineering technology community. Further, for those of you who are not as yet members of the Association, I hope it encourages you to consider joining us. There is plenty to do, and there is always room for anyone who is willing to help and who has good ideas about where the community should be heading. All of you are welcome; we hope to see you at our next meeting. Finally, though this is our first time to appear in the *The Interface*, we do not intend it to be the last. We will plan to make this a routine, so you should expect to hear from us again in future issues.

What is CTAA & Who are the Members?

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The Committee for Technology Accreditation Activities (CTAA) was established by IEEE for the purpose of overseeing the accreditation of engineering technology programs. For several years, the most common name for programs that were of concern to IEEE was EET (i.e., "Electrical Engineering Technology" or "Electronic/s Engineering Technology"). Today most of these programs are known as "Electrical and Computer Engineering Technology". The CTAA is responsible for developing and maintaining program specific criteria for a variety of programs, namely, Computer Engineering Technology (CET), Electrical/Electronics Engineering Technology (EET), Electro-Mechanical Engineering Technology (EMET), Information Engineering Technology (IET), Laser Engineering Technology (LET), and Software Engineering Technology (SET).

As stated in the CTAA charter, the Mission of CTAA is "To identify and meet the accreditation needs of the profession by assisting in the establishment and implementation of systems that assure and improve the understanding and quality of accreditation in technology within the United States." The complete charter can be found by logging onto *IEEE.org* then clicking on Education, Accreditation, CTAA, and Charter.

Space does not permit a complete listing of the history of CTAA membership, but a listing of the chairs is possible. The first chair was **Ludvik Burgar**. He was followed by **Mike Kavanaugh, Arnie Peskin, Peter Rusche, Bill Grubbs, Dick D'Onofrio, John Miner, Bob Reid, Jim Hurny, Walter Buchanan, Joe Tamashasky**, and **John Sammarco**. The current chair is this writer, **Larry Hoffman**.

The composition of the CTAA, as specified in the charter, consists of 15 voting members and two non-voting members for a total of 17. Sometimes a voting member 'wears more than one hat', so to speak, so the total membership in that case will be less than 17. This is the situation at the present time as can be seen below in the listing of committee members. Voting members are as follows: Chair, Vice-Chair, Program Evaluator Coordinator, seven at-large members, three members of the Technology Accreditation Commission (TAC), one IEEE representative serving on the ABET Board of Directors, and the IEEE Accreditation Policy Council (APC) chair. The two non-voting members of CTAA are the Chair of the Electrical and Computer Engineering Technology Department Heads Association (ECETDHA) and the IEEE Educational Activities Vice President.

The current membership of CTAA is provided below.

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IBM Global Business Services
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Program Chair Manufacturing Engineering Technology
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System-wide Coordinator of EMET programs
Penn State University – New Kensington

Vice President, Educational Activities
Dr. Moshe Kam
Vice President, IEEE Educational Activities
ECE Department
Drexel University

ECEDHA News: Making Plans for Next Year

Jon Bredeson   Jon.Bredeson@ttu.edu
Ken Connor   connor@ecse.rpi.edu
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North American ECE programs are facing new challenges as competition from universities abroad for international students increases, industry employers continue to expand as global enterprises and students feel uneasy about the future ECE job market. National Academy of Engineering (NAE) publications like the *The Engineer of 2020* and the popular book by Thomas Friedman *The World is Flat: A Brief History of the 21st Century*, underscore the need for ECE programs to adapt to a flatter landscape. These along with other challenges will be addressed by ECEDHA members during the annual meeting in March 2007 as discussed below.

Without a doubt, the electrical and computer engineering profession is evolving in noticeable ways and educational institutions are being affected. For decades companies have partnered with American universities, sponsored university research centers, funded university research projects and supported student internships. While that engagement still continues, these industry resources are beginning to be dispersed selectively among international and North American universities. Many companies are beginning to support research in countries abroad, such as China, India, Ireland and Singapore. Moreover, a number of countries are at present more actively investing in their own university research programs, enabling them to retain their top student talent, and in a growing number of cases attract international students from elsewhere. Many of the graduate programs represented in ECEDHA have felt the effects of this globalization and recognize the importance of adapting to compete.

Similar to the changing pattern of industry-university research support, many companies are shifting their previous patterns of employment. In the past, research and development centers located at central facilities were often tasked to create and design new products. Such a model was effective during a time when it was necessary to have skilled employees collocated. Now with advances in internet collaboration tools and communications technology, groups scattered over the globe can work together effectively on common projects. Such capability allows companies to create focused centers of strength in many regions throughout the world in a way that optimizes cost and talent, while at the same time delivering the connectivity necessary for global team interactions. With companies expanding their globally distributed research, product development and manufacturing, and with maturing tools for telecollaboration, the entire world is gaining access to high technology opportunity—a growing reality captured succinctly by Thomas Friedman's notion of the world becoming flat.

Coincident with industry trends toward global operations is a changing perception among young students who are selecting majors and making career choices. The messages communicated in the mass media arguably paint a gloomy picture of ECE. The perceptions among many are that information technology jobs are moving off shore and engineering salaries are or soon will be, declining, perhaps fueled by the anecdotal accounts in the news of U.S. engineers who have lost their jobs to outsourcing. To obtain an accurate perspective, one must look carefully at the data. When one does look at the facts these misconceptions become clear, as presented by Professor **Terri Fiez** in the Fall *2006 ECEDHA Newsletter*.

Quoting from the March 9, 2006 issue of *ACM CareerNews* "Despite negative publicity in the mainstream media about jobs being lost to India and China, the number of U.S.-based technology workers is higher today than it was at the peak of the Internet boom." And the positive job growth is projected to continue throughout the next decade and beyond. Prospects for ECE graduates are quite promising according to the National Association of Colleges and Employers (NACE) *Job Outlook 2006 Fall Preview Report*. NACE projects a 14.5% increase in hiring of new college graduates. In particular, employers reported Electrical Engineering, Computer Engineering and Computer Science as three of their top 10 degrees in demand. Furthermore, recent 2005 survey data from NACE revealed that ECE salaries remain high. At the bachelor's degree level, average salaries for Computer Engineers (CEs) and Electrical Engineers (EEs) were $52,464 and $51,888. Of all the engineering disciplines only Petroleum Engineers averaged more. The picture is similar at the Master's and PhD levels. Starting salaries for EEs are the highest at $64,416 for Master's degree students and second highest for PhD students at $80,206.

In addition to addressing misconceptions, we need to make major revisions to the ECE curricula across North America. Instruction needs to be more exciting and the curriculum more appealing to today's students to attract new undergraduates and retain them in ECE programs.

ECE graduates will need to have a broader set of personal skills to be effective. Future graduates should naturally have a solid grounding in fundamental science and engineering design principals but also an awareness of business operations and an understanding of management principles, economics, and commercialization to allow them to excel in both large corporate and small start-up company environments.

ECE programs should include increased emphases on multidisciplinary skills to allow graduates to better adapt to

new job opportunities. The ability to quickly expand into tangential disciplines such as biotechnology and energy technology and the culture of self-motivated learning to retain life-long employment will be increasingly more important. In addition to being able to adapt and function well independently, ECE students of 2020 will need to be highly proficient in a team setting. In particular, they should know how to lead and how to follow, have good verbal and written communications skills, have high ethical standards, and exercise good judgment. The preparation we provide to address teamwork should not be limited to on-campus interactions, but should encompass exposure to "design at a distance" paradigms, which are becoming more and more common in industry. Thus, students should be exposed to global issues, cultural values and international economics. Opportunities for students to partake in study and work abroad experiences should be encouraged on a large scale.

Now that ECE programs have been overtaken by Mechanical Engineering in size, we should no longer have to struggle with over flowing classrooms and generally too many students who want into our programs. Our lower enrollments are a problem for most of us, especially when it comes to convincing our deans that we need more resources. However they are also a big opportunity, since we now have manageable numbers to deal with. In addition to allowing us to consider significantly new ideas in our curricula, we may also be able to decide what might be the appropriate size for our programs. We have gotten used to the fact that we are, with Mechanical, always the biggest department, many times with 1/3 to 1/2 of all engineering students. Does this make sense in the future? We have to remain large, but there are counter arguments, especially with Biomedical programs growing so rapidly.

We now also have the incentive to develop a real multi-and/or inter- disciplinary learning environment. Our smaller size permits and encourages us to consider joint programs with other departments. We have historically worked with computer science and physics (activities that should probably increase) offering joint courses and developing joint research activities. There is also now a big push to move into biotech so offering joint course sequences with Biomedical programs is also a good idea. With the huge increase in Mechanical, we should be looking for more synergies with them. Obvious areas include robotics, MEMS, nano, and manufacturing. Finally, industrial engineering has always been largely ignored by most of us. As more and more employers look for systems level thinkers, we should also be developing our relationship with our IE colleagues, with special interest in service engineering.

The swing away from student interest in ECE programs will cycle back. However, rather than waiting for it to happen and ignoring the interests of our students (who don't seem to know that there are so many jobs for EE and CpE grads), it is our responsibility to take the initiative and help determine what the engineering school world will be like when our enrollments start shooting up again. ECEDHA intends to facilitate this process by providing an online resource on our website for sharing best practices and exciting new ideas as ECE programs move into the global world.

Recognizing the growing importance of these issues, the ECEDHA Twenty-Third Annual Meeting at the World Golf Renaissance, St. Augustine, FL on March 16 – 20, 2007, will focus on the future ECE program. The theme for the 2007 annual meeting will be *ECE 2020: Transforming the Image*. Given the magnitude of the issues we will begin to address, we anticipate that the ECE 2020 theme in some form or another will continue over the next few years. For 2007, a number of special sessions are planned, including recruiting and retention, revitalizing the ECE curriculum, infusing business and entrepreneurship into the program of study, creating innovations in technology-enhanced education and defining the role of energy technology in ECE.

ECEDHA provides important services to ECE program heads, such as facilitating the activities mentioned above. However, these services also include long standing activities like ABET workshops, workshop sessions for new department heads and the department heads survey. The survey has been in place for many years and provides useful and relevant information to ECEDHA member schools. During this next year, the ECEDHA survey will undergo a major upgrade both in terms of improving data entry and the reporting of results. It is our hope to make the ECEDHA survey the most comprehensive source of ECE program data currently available in an effort to assist heads and chairs in their reporting and benchmarking and in turn help them realize the ECE 2020 vision.

The challenges facing ECE programs are formidable but by no means are they insurmountable. Without a doubt, the world is changing as are perceptions about the ECE profession. We hope to take major steps this year toward addressing issues related to perception and stimulating curricula revisions that will result in more well-rounded future engineers for a world that has become flat.

ECEDHA also promotes regional department meetings which are valuable since they are smaller groups allowing close interactions with most in attendance. The eight regions (seven in the US plus one in Canada) and their activities are listed on the ECEDHA Activities webpage. Some regions, like the Southwest and Southeast, have been very active for many years. Some like the Northeast have only recently begun to meet again on a regular basis. Most regional meetings take place on campus, which gives the host department a great opportunity to show off its programs and facilities. We strongly encourage all members to attend their regional meetings which, for the first time in a few years, will be held in all US regions. The Canadian Heads Association meets twice each year.

Global Connectivity

Education Society,
ASEE ECE Division,

S. Hossein Mousavinezhad, Education Society MD Chair
hossein.mousavinezhad@ieee.org

Satish Udpa, Dean of Engineering, Michigan State University
udpa@egr.msu.edu

Recently one of us had an opportunity to visit R10 (India) and, in addition to attending a conference, interact with our colleagues overseas. In a presentation to IEEE members in Bangalore, attended by engineers from Central Power Research Institute (CPRI) and faculty members from Indian Institute of Science (IISc), discussion followed the talk which focused on engineering workforce issues and engineering accreditation process (ABET). It was interesting that some of the questions during the Q&A session concentrated on learning outcomes ("A-K"), specifically those dealing with "multi-disciplinary teams", "professional and ethical responsibility", "life-long learning", "global, …, societal context", and "contemporary issues." It sounded exactly like the debate that faculty members and people from industry have regarding these learning outcomes in universities residing in Regions 1-6. This should come as no surprise because engineering and technology education are global in nature and many countries use similar approaches when it comes to the teaching and learning of subjects and courses in different curricula in science and engineering. We want to thank Dr. **H. P. Khincha**, Chairman, Division of Electrical Sciences (IISc) and Mr. **A. K. Tripathy**, Director General (CPRI) for arranging this seminar and facilitating the discussion and exchange with our international colleagues.

Mousavinezhad also presented a keynote lecture (Digital Filter Theory and Implementation) at the International Conference on Intelligent Systems & Control (ISCO2006), hosted by Karpagam College of Engineering, Coimbatore. Mr. **Phares A. Noel II**, Senior Manager of DaimlerChrysler, also attended this conference and delivered his talk on "An Approach to Meeting the Challenge of Testing Today's Complex Passenger Vehicle On-Board Electronic Systems." This was a good forum for exchanging information and to discuss the "Emerging Global Technologies in the e-era." Participants included engineering faculty and graduate students. It was also a good opportunity for talking about IEEE, ASEE and other professional societies and potential benefits of membership. Another presentation was in Chennai (Madras) at the Bharath Institute of Higher Education and Research at the invitation of Dr. **S. Renganathan**, Vice Chancellor. Drs. **Renganathan** and **Mousavinezhad** were on a Ph.D. dissertation committee of a doctoral student in Madras Institute of Technology, Anna University. This is again another collaboration example with our international colleagues.

Udpa took over as Dean of Engineering at Michigan State University and continues his activities in the ASEE ECE Division. MSU also was host to the sixth IEEE International Conference on Electro/Information Technology (e IT). 2007 e IT conference is hosted by Illinois Institute of Technology, May 17-20, 2007 (www.eit-conference.org/eit2007).

ISCO 2006 Opening Ceremony (Mousavinezhad lighting the candle)

Noel, Mousavinezhad and other ISCO 2006 organizers

IEEE-RITA
Revista Iberoamericana de Tecnologías del Aprendizaje del IEEE

El tema principal de IEEE-RITA es el de las "aplicaciones tecnológicas a la educación", entendiendo desde su aplicación concreta a la enseñanza de disciplinas dentro de las áreas del IEEE (que suelen ser fundamentalmente las áreas de Ingeniería Eléctrica, la Tecnología Electrónica, Ingeniería de Telecomunicación e Ingeniería Informática), incluyendo experiencias y métodos pedagógicos, hasta la investigación y diseño de herramientas y materiales para la enseñanza y el aprendizaje. IEEE-RITA se dirige en primer término a la comunidad iberoamericana, pero también incluye a toda la comunidad internacional de habla española-portuguesa. Las lenguas en las que se publicarán los artículos serán el español y el portugués.

La distribución de la revista es electrónica, a través de su sitio web

http://webs.uvigo.es/cesei/RITA

donde se puede encontrar más información.

El primer número está previsto para *NOVIEMBRE del 2006*

LLAMADA A LA PARTICIPACIÓN:

Le invitamos a enviar su artículo por correo electrónico a Martín Llamas (martin at uvigo.es)
Las normas de envío las puedes encontrar en el sitio web de la revista:
http://webs.uvigo.es/cesei/RITA
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Recibe un cordial saludo,

Martin Llamas

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RITA

Revista **I**beroamericana de **T**ecnologías del **A**prendizaje
IEEE-RITA es una publicación de la Sociedad de la Educación del IEEE (IEEE EdSoc), centrada en la comunidad iberoamericana, no sólo en el sentido geográfico, sino también en todos los investigadores de habla española y portuguesa de todo el mundo.

El estado actual de **IEEE-RITA** es que ha sido aprobada por el **Comité Administrativo** de la Sociedad de la Educación del IEEE, en su reunión celebrada el 19 de Junio de 2006, como un proyecto piloto de nuevas vías de transmisión de la información y el conocimiento, estando pendiente de la aprobación final del Comité de Publicaciones del IEEE.

ISSN: en trámite

La frecuencia inicial prevista es cuatrimestral (Febrero, Mayo, Agosto y Noviembre): cuatro números por volumen, y un volumen por año. Sin embargo, **en la etapa inicial de lanzamiento su frecuencia será semestral** (Mayo y Noviembre): dos números por volumen y un volumen por año. Cuando el número de artículos recibidos así lo aconseje, se cambiará a la frecuencia cuatrimestral inicialmente prevista.

Cada número contendrá aproximadamente 5 artículos, (10 como máximo)

IEEE-RITA es una publicación lanzada por el Capítulo Español de la Sociedad de la Educación del IEEE (CESEI), a través de su Comité Técnico, de Acreditación y Evaluación (CTAE), y apoyada por el Ministerio Español de Educación y Ciencia a través de la acción complementaria TSI2005-24068-E, Red Temática del CESEI.

Letter to the Editor

Dear Professor Sayle,

I was in touch with you some time ago regarding the Factor Ten Engineering (10xE) project that I am working on at Rocky Mountain Institute (RMI) with **Amory Lovins**. We aim to change how engineers think about design by showing them principles, examples, and benefits of whole-system, integrative design. I wanted to follow up with you to see if you have any further thoughts on this project, and also make you aware of our new website (www.10xE.org), where you will find sample cases, a summary of the project, and magazine and journal articles about 10xE. We plan to continually add more cases, content, and articles as they are published, so please check back periodically.

Please continue to help us build our network of teachers and practitioners with experience in whole-system design, by forwarding this message to them, pointing them to www.10xE.org, or sending me their contact information. If you come across any cases that would be good candidates for the casebook, please send me a brief description. Thanks for your interest in 10xE.

Best regards,

Imran Sheikh
Research Fellow
Factor 10 Engineering (10xE)
Rocky Mountain Institute
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Snowmass, CO 81654 USA

IEEE'S Efforts for Providing Effective EAC Program Evaluators

Franc Noel, Chair
IEEE EAB Committee on Engineering Accreditation Activities
f.noel@ieee.org

As I settle into the "chair" of IEEE's CEAA committee, I am struck by the massive amount of effort that goes into supporting our highly successful ABET PEVs. Of course, if I am going to make a statement as bold as this I better have some figures to back up my claim! At a recent ABET meeting on improving the quality of the ABET volunteer community several facts came to light. First, ABET indicated that in the 2005-2006 cycle there were 521 PEVs engaged in the accreditation process. My files show that 123 were from the IEEE supporting the EAC.

Providing approximately 24 percent of the EAC's PEVs shows quantity, but doesn't show quality. The other piece of data from ABET, for the 2005-2006 cycle, was that some societies had greater than 10 percent failure rate of their PEVs. By itself, this figure clearly justifies the ABET activity to improve the overall quality of the PEVs and that while I may not personally agree with some of the actions ABET is taking, I certainly applaud their overall effort to address this issue.

By my calculations, IEEE's EAC PEVs had approximately a 1.6 percent failure rate during the same period. Certainly not perfect, but by comparison, it shows that we have a system that is highly effective for providing successful PEVs. I'd like to share with you our process and ways we are looking at to improve our efforts. Before that, however, I'd like to make a couple of overall observations.

The first is that the tendency of most process improvement efforts, in this area, is to focus on recruitment and initial training. My anecdotal information says that about half of our failures are not new PEVs, but ones with several years of successful visits! The second is that the ABET data indicate that the percentage of PEV failures has grown most significantly since 2000. Given that, one has to look at the major change in the accreditation process during that same period, the introduction of EC2000.

While I am a fervent supporter of EC2000, one must admit that it gives institutions more flexibility and latitude, and at the same time leaves more room for judgment on the part of the PEVs. Without being a sociologist, it stands to reason that the transition to a more flexible system requiring more judgment on the part of the PEVs will increase the likelihood for issues between evaluators and the institutions being evaluated. In addition, introducing a new process is likely to provide more opportunity for issues, especially involving experienced PEVs.

With that being said, here is an overview of our PEV training process:

Step 1: Recruit and select PEV candidates. The primary vehicle for this is the application form which focuses on experience in the individual's profession and experience on the "other side". We are looking for balanced PEV's, so if the individual is from industry, we want to know about their academic experience/knowledge and vice-a-versa if they are from academia.

Step 2: Train the selected candidates in a one-day training session. This training is provided free, but travel expenses are covered by the individual. We generally hold three training sessions around the country each year to help minimize this cost.

Step 3. Assign the new PEV to a visit. This step in my opinion is the key step in our process. Our visit assignment coordinator, Bill Sayle, carefully assigns our PEVs, with 0 or 1 previous visits, to a campus visit where there is either another program with an IEEE PEV or where the Team Chair is from the IEEE. This way the new PEV has an IEEE experienced contact on the visit team. This is not unlike the process of what some societies call "observer visits", but with a higher level of involvement.

Step 4. Assign all PEVs mentors. New PEVs in particular are assigned two CEAA mentors as a resource for their use before, during, and after the visit.

Step 5. Evaluate PEVs and the visits. Here the mentors review the documentation and evaluate the results of the visit and the performance of the PEV.

Step 6. At the January CEAA meeting we examine the mentor's review data and take any actions needed to improve our process. In cases where we feel that the visit was not successful, we may recommend that remedial training or other actions are required to improve the PEV pool for the next accreditation cycle.

Finally, we send out appropriate letters thanking the PEV's for their contribution. Room for improvement… yes! The thing I have seen most clearly this year, is the squeeze on the early visits. That is the time we get between notification from the Team Chair that an individual has been accepted and approved by the university, and the time for us to contact the PEV and assign the mentors so that there is opportunity for the mentors to help before the visit. So that's a summary of our process. If you have suggestions for improvement, please contact me.

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2007 IEEE INTERNATIONAL CONFERENCE on ELECTRO/INFORMATION TECHNOLOGY

Call for Papers

General Information

The 2007 Electro/Information Technology Conference, sponsored by the IEEE Region 4 (R4), is focused on basic/applied research results in the fields of electrical and computer engineering as they relate to Information Technology and its applications. The purpose of the conference is to provide a forum for researchers and industrial investigators to exchange ideas and discuss developments in this growing field. In addition to technical sessions, there will be exhibits where the latest electro/information technology tools and products will be showcased. This also offers an opportunity to engage in professional activities development, workshops and tutorials.

Topics of interest include but are not limited to:

- Micro Electromechanical Systems & Mechatronics
- Power Electronics
- Solid State, Consumer and Automotive Electronics
- Nanotechnology
- Biomedical Applications, Telemedicine
- Biometrics and Bioinformatics
- Wireless communication
- Ad Hoc and Sensor Networks
- Cyber Security
- Signal/Image and Video Processing
- Reconfigurable and Embedded Systems
- Software Engineering and Middleware Architecture
- Electronic Design Automation
- Intelligent and Multi-agent Control Systems
- Distributed Data Fusion and Mining

Authors of presented papers will be invited to submit an extended version of their manuscripts for publication, subject to editorial review, in an upcoming issue of the journal **Integrated Computer-Aided Engineering**.

Submission Procedures

Please submit the full paper in electronic form as a PDF file to the EIT-Conference Website(http://www.eit-conference.org/eit2007). The full paper should not exceed six(6) pages and it should comply with the standard IEEE conference format. The title page should include the names of author(s), their affiliation including IEEE membership; mailing address as well as the phone number, fax number and email address of the primary contact author. All the submitted papers will be peer reviewed with respect to their quality, originality and relevance. All presented papers will be published and archived in the IEEE-Xplore database. For details on submission and registration, please refer to the conference web page.

Important Dates

Submission of full papers PDF form: February 16th, 2007
Notification of acceptance: March 23rd, 2007
Final manuscript in PDF form: April 16th, 2007
Early registration: March 30th, 2007

From your Editor

Bill Sayle
sayle@gatech.edu
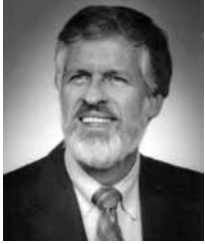
In this issue of *The Interface*, we welcome an article from **Ron Land** and **Tom Hall** of the Electrical and Computer Engineering Technology Department Heads Association (ECETDHA). We hope to have regular articles from this leadership group in engineering technology education.

We also feature several other interesting articles on a variety of topics. We have the usual entertaining/controversial submission from IEEE Vice-President for Educational Activities **Moshe Kam**. Moshe usually generates significant responses to his articles and told me that's what he wants. "The more controversy the better!"

Given the topics featured in the Electrical and Computer Engineering Department Heads Association (ECEDHA) column this issue and Moshe Kam's article, I am reminded of something my colleague at Georgia Tech, **Joseph Hughes**, once said about what we do in engineering education. He noted we in ECE education teach our students "to learn how to learn". There is no way we can arm them with every "latest technology", especially the technology that will be developed five, ten, or twenty years from now. With that comment, the woeful lack of software education in engineering disciplines other than EE and CmpE is noted.

For those of you new to engineering accreditation, I urge you to read the historical article by regular contributor **Frank Splitt**. He traces the origin and evolution of Engineering Criteria 2000 from the middle 1980s to the present, from the ABET industrial advisory board perspective. I found the article to be fascinating reading.

For those of you who can read Spanish and Portuguese, you have a new publication, *IEEE-RITA*. This issue marks the first time, during my editorship, that we have featured an article completely in a language other than English. As a transnational society, IEEE welcomes such contributions. Thanks to **Manuel Castro** and his colleagues for all their hard work.

And, now, it's time for another **correction**! In the August issue of The Interface, I mixed up photos and used **Ken Jenkins**' photo in place of **Larry Hoffman**'s photo. Several of Larry's friends kidded him about substituting that "handsome man" for him. I hope I got it right this issue. If not, I'm sure I'll hear. And, I am glad to see folks are paying attention and reading *The Interface*.

As a reminder, you can usually read the latest issue, along with recent back issues, of *The Interface* on the IEEE Education Society web site: http://www.ewh.ieee.org/soc/es/

I hope this issue of *The Interface* finds each of you in good health.

Bill Sayle
sayle@gatech.edu