

# The Institute

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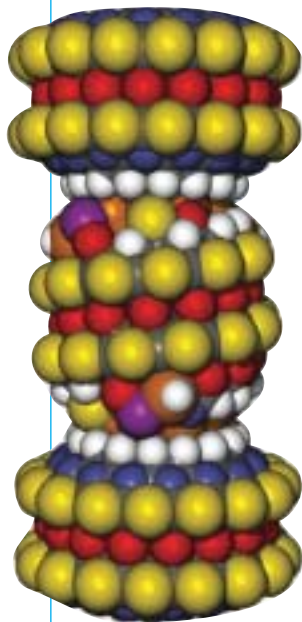
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## Next Big Thing Is Very, Very Small

BY ERICA VONDERHEID

THE IEEE IS PLAYING a big role in the burgeoning “small is beautiful” field of nanotechnology.

Nanotechnology cuts across many fields—electronics, chemistry, physics, and biology, for starters—and the IEEE two years ago pulled together efforts pursued in about half of its 37 technical Societies and formed the Nanotechnology Council. The Council has sponsored lectures, symposia, and workshops, produced several publications, and is now working on standards, all focused on nanotechnology.



*Nanoscale machines, such as the simple pump that can be used to deliver chemicals or drugs shown in this model from the Institute for Molecular Manufacturing, in Los Altos, Calif., USA, would be built atom by atom.*

“The Council serves as a focal point for nanotechnology inside and outside the IEEE,” says Cliff Lau, president of the IEEE Nanotechnology Council and deputy undersecretary of defense in the U.S. Department of Defense’s Office of Basic Research in Arlington, Va., USA. “Nanotechnology has a tremendous multidisciplinary community and the Council wants to pull that community together and advance the field.”

A Council is the IEEE’s precursor to a Society; its mem- [Continued on page 14]

# IEEE at 40

BY HELEN HORWITZ

IT WAS A SWELTERING AUGUST AFTERNOON in New York City and the air conditioning at the Engineers Club on West 40th Street provided welcome relief to two men who were embarking on a weighty discussion that would change the future of the world’s two preeminent electrical engineering societies.

The meeting on 1 August 1955 was informal, so few details are known of that historic lunch between John Ryder, president of the Institute of Radio Engineers (IRE), and Morris Hooven, who had taken office that morning as president of the American Institute of Electrical Engineers (AIEE). But that meeting marked the opening gambit in a process that led to the merger of the two organizations that formed the IEEE on 1 January 1963. This year, the IEEE celebrates the 40-year milestone of its founding.

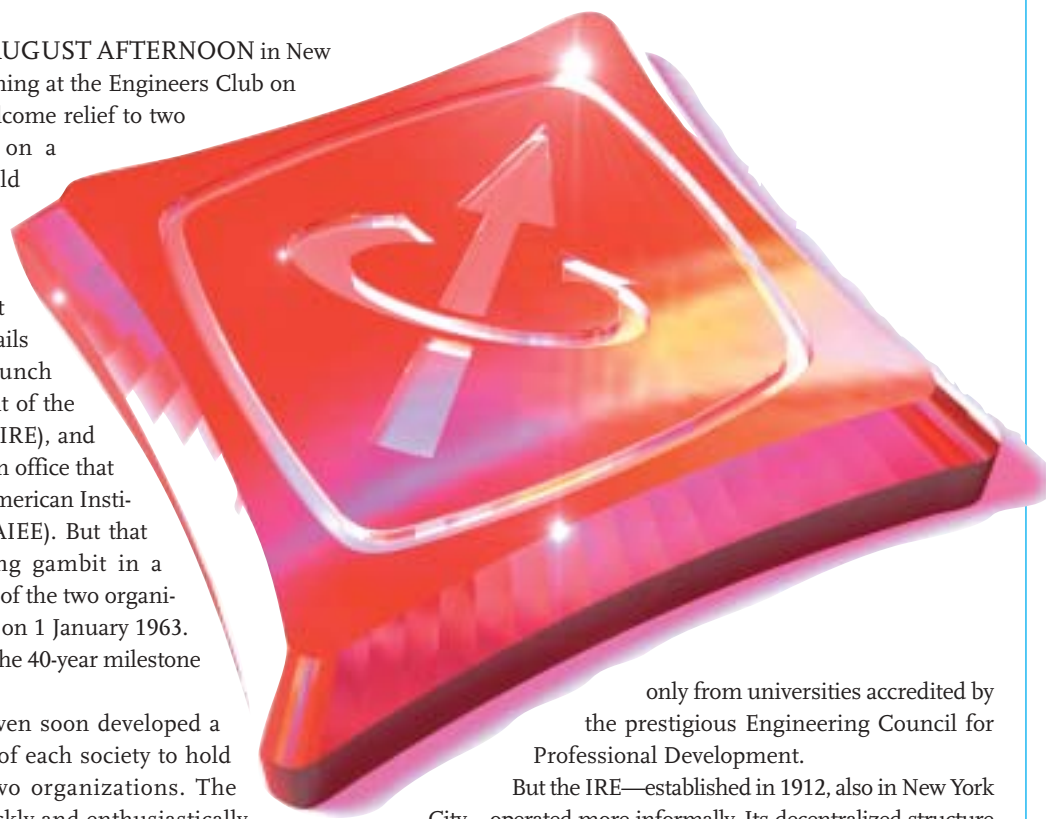
Together, Ryder and Hooven soon developed a proposal allowing members of each society to hold joint membership in the two organizations. The IRE’s Board of Directors quickly and enthusiastically approved the proposal later in 1955; their more reticent AIEE counterparts reached a similar consensus in 1958. The joint-membership scheme was a critical step in moving the two societies closer to their eventual merger.

Pages 10 to 13 of this issue present highlights of the IEEE’s last 40 years. An artist’s rendering of the IEEE logo appears on this page in red because in many Western cultures, a 40th anniversary is celebrated with a gift of rubies.

### The players

According to Ryder, who recounted his experiences to the IEEE History Center in 1979, the two presidents used the lunch to begin exploring how their societies could collaborate.

Founded in 1884 in New York City, the AIEE viewed itself as a national institution serving U.S. engineers—hence, the prominent “American” in the society’s name. Historically dominated by power engineers, the AIEE favored a highly centralized structure and had stringent procedures for approving papers before publication in the society’s three technical publications. And the AIEE’s strict membership requirements recognized degrees



only from universities accredited by the prestigious Engineering Council for Professional Development.

But the IRE—established in 1912, also in New York City—operated more informally. Its decentralized structure resulted from the society’s emphasis on rapidly emerging technologies, like electronics and telecommunications, that required a fast, flexible infrastructure to best serve members.

In contrast to the AIEE’s, the IRE constitution boasted of worldwide aims and geographical interests. The organization also compiled its own list of “schools of recognized sciences” that went well beyond those recognized by the AIEE for membership. The IRE’s one technical publication, *Proceedings of the IRE*, won early respect for the excellence of its peer-reviewed articles and their rapid publication. It also was a major revenue source for the organization because it ran paid advertising.

The AIEE and the IRE had flirted with a merger for many years but had never taken the next step toward serious discussions. Historians write that in the early 20th century, the AIEE—with its well-established electric power and wire communications activities—had difficulty accepting as an equal partner the fledgling IRE and the emerging fields it represented. However, the IRE thrived on its own, especially when electronics came of age shortly before the start of World War II.

After the war, the competition for [Continued on page 10]

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## 1 The IEEE is 40

**BY HELEN HORWITZ**

In four decades, the IEEE has launched dozens of publications, held scores of conferences, and more than tripled membership.

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**BY ERICA VONDERHEID**

The IEEE is leading the way in the fast-moving field of nanotechnology.

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**BY MICHAEL S. ADLER**

Corporate support for professional organizations like the IEEE has diminished, but steps can be taken to reverse this trend.

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**BY KATHY KOWALENKO**

Well-attended Section and Chapter meetings don't happen by chance. There are several things to keep in mind if you're to stage a successful event.

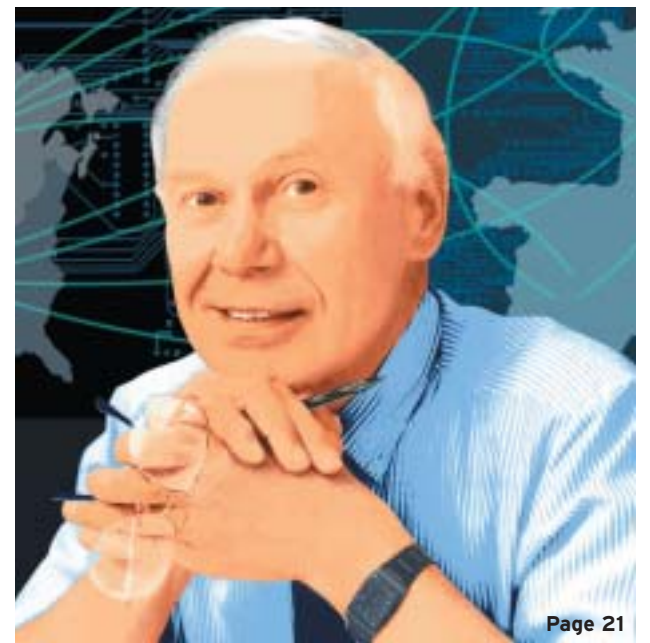
## 16 2004 President-Elect Candidates Face Off

**BY KATHY KOWALENKO**

W. Cleon Anderson and Michael R. Lightner discuss the value of membership, new technical products, and how to encourage more volunteer participation.



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## 21 Communications CEO Leads Canadian Academy

**BY THERESA POULSON**

IEEE Fellow Morrel P. Bachynski's goal is for the Academy of Engineering to grow in recognition and stature.

## THE INSTITUTE ONLINE

Find information on these topics and more at [www.ieee.org/theinstitute](http://www.ieee.org/theinstitute) on 5 September.

## What's Next for IEEE 802?

Several additions to the IEEE's popular suite of wireless standards are in the works.

## New Society Established

After 15 years of planning, Product Safety becomes the IEEE's 38th Society.

## PLUS

**News** Four new journals will roll off the presses next year and two others will adjust their editorial focus.

**Conference** Frontiers in Education Conference, 5 to 8 November 2003 in Boulder, Colo., USA.

**Education** Online technical courses for members are coming to IEEE Xplore.

**Products & Services** Find answers to your frequently asked questions about Member Services and Customer Services.

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# NEWS

From Around the IEEE & the World

## Show You Belong to the IEEE

THE IEEE IS ENCOURAGING members to put their IEEE affiliation and membership grade on their business cards and personal letterheads and in the signature block on their e-mail.

The membership designation should not include a dash or space. For example, use FIEEE for Fellow, SMIEEE for Senior Member, MIEEE for Member, HMIEEE for Honorary Member, AIEEE for Associate Member, SMIEEE for Student Member, LMIEEE for Life Member, and LFIEEE for Life Fellow.

John Vig, a member of the IEEE Board of Directors, introduced a motion to encourage such member identification at the June Board meeting, where it was

approved. In the motion, Vig notes that including such identification would give members the opportunity to show pride in the organization and could even lead indirectly to an increase in membership.

## Dues to Increase

THE BASIC DUES FOR 2004 ARE US\$113, an increase of \$3, which is about the rate of U.S. inflation.

For U.S. members, the assessment for IEEE-USA will increase by \$1 to \$34. However, this fee is not applicable to student members.

A new assessment of \$2 was established for all members residing in Region 3 (Southeastern United States). Student dues remain the same: \$30 for U.S. and Canadian students and \$25 for others.

## Durrani Awarded Order of the British Empire

IEEE FELLOW TARIQ S. DURRANI received the Order of the British Empire (OBE) from Prince Charles at a ceremony held at Buckingham Palace, London, on 10 July.

Bestowed by Queen Elizabeth for outstanding work and extraordinary service to the United Kingdom, the OBE was presented to Durrani "for services to electronics research and higher education."

Durrani is a professor of signal processing at the University of Strathclyde, Glasgow, UK.



Affiliate dues will be \$57. A Society affiliate is a professional who is not an IEEE member but belongs to another professional society and joins an IEEE Society. Affiliates may belong to any number of IEEE Societies but are not IEEE members and are, therefore, ineligible for benefits or services.

Renewal bills will be mailed out in October.

## Submit Fellows Nominations Now

DO YOU KNOW AN IEEE colleague who has made outstanding contributions to the electrical and electronics engineering profession? If you do, consider nominating him or her to be an IEEE Fellow. The deadline for nominations is 15 March 2004.

Candidates must be IEEE Senior Members who have completed five years of service in any grade of membership, excluding IEEE Affiliate Members, and whose dues are up-to-date. Candidates can come from any field, including academia, government, and industry.

Any person is eligible to be a nominator except for those involved in the management of the IEEE and the Fellow process. These comprise members of the IEEE Board of Directors; the IEEE Fellow Committee; the IEEE Technical Society/Council Fellow Evaluating Committees that review the nominations; the chairs of the IEEE Technical Society/Council Fellow Evaluating Committee, and IEEE staff.

The nominator prepares the IEEE Fellow Grade Nomination Form, soliciting at least five, but no more than eight, references from IEEE Fellows who can assess the candidate's contributions to his or her technical field, and identifies an IEEE Society or Council best suited to assess the candidate's technical qualifications and contributions.

The Fellow Committee selects potential Fellows based on significant contributions as an engineer-scientist, technical leader or educator; evidence of technical accom-

plishments; an evaluation by the IEEE Society or Council most closely involved with the field of the candidate; the confidential opinions of references; service to other professional engineering societies; and total years in the profession. The IEEE Board of Directors makes the final selections for the new class of Fellows at its November meeting.

The total number of members elevated to Fellow in any one year must not exceed 0.1 percent of the voting membership as of 31 December of the year preceding.

To learn more about the program and to find nomination forms, visit the Fellow Web site at [www.ieee.org/fellows](http://www.ieee.org/fellows) or send an e-mail to [fellow-kit@ieee.org](mailto:fellow-kit@ieee.org).

## New Journals Due Next Year

FOUR NEW IEEE journals will roll off the presses in 2004. Three are quarterlies:

- IEEE Geoscience & Remote Sensing Letters
  - IEEE Transactions on Dependable and Secure Computing
  - IEEE/ACM Transactions on Computational Biology and Bioinformatics
- The fourth will come out twice a year:
- IEEE Transactions on Automation Science & Engineering

Also in 2004, two monthly publications of the IEEE Circuits and Systems Society are adjusting their editorial scope and will be renamed. *IEEE Transactions on Circuits and Systems Part I: Regular Papers*, which will contain longer, more traditional content, will be the new moniker for *IEEE Transactions on Circuits and Systems Part I: Fundamental Theory and Applications*.

Its renamed sibling will be *IEEE Transactions on Circuits and Systems Part II: Express Briefs*, which will feature shorter papers on emerging research findings. It will replace *IEEE Transactions on Circuits and Systems Part II: Analog and Digital Signal Processing*.

Compiled by Theresa Poulson



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## This Month's Question

Different types of brain imaging systems are leading researchers to draw connections between brain activity and psychiatric diseases. Thus, one day in the future it might be possible to say if someone is, for example, predisposed to medical conditions like Alzheimer's, schizophrenia, alcoholism, and anxiety and post-traumatic stress disorders.

Would it be ethical to require employees to take such imaging tests if the test only finds a predisposition to disease? Or do the risks of stigmatizing an individual outweigh the risks of giving such tests to people who can affect the safety of the general public such as doctors, airline pilots, or government leaders?

Reader responses to the question above will appear in the December issue of The Institute.

To respond, use any of the following contacts: Mail: The Institute, IEEE Operations Center, 445 Hoes Lane, Piscataway, N.J., USA 08855-1331 Fax: +1 732 235 1626 E-mail: [institute@ieee.org](mailto:institute@ieee.org)

An e-mail response is preferred, although no written submission will be ignored. It is unlikely that space will permit publication of all responses, although we will try to draw a representative sample. Comments are subject to editing for brevity and libel protection. Suggestions for questions are welcome. Send them to any of these addresses.

## Responses to June's Question

Given the borderless nature of the Internet, can any government prevent cyber attacks?

### Protection Begins Locally

I don't see how any government can. For example, the U.S. Department of Homeland Security is responsible for what its name proclaims: security inside the "homeland." One cannot expect politicians to develop a plan that can secure a worldwide self-organized network like the Internet.

The best way to develop a secure Internet is to exploit its organization, or lack thereof. Any centralized approach would fail sooner or later, because the structure and inherent interconnectivity are too complex and too diverse to establish a common frame of reference. Instead, each segment—user, group, organization, country—can formulate its own means of securing its own infrastructure.

For example, if a bank aims to protect itself against electronic attacks, it should focus on implementing sealed environments with multiple layers of strong local security, rather than trying to identify every single bit of traffic going through its network throughout the world. This could make any attacks virtually harmless.

As the global network and its internal interconnections become increasingly complex, security

must focus on the local level. This principle applies to both end users and government policies.

*Harris Georgiou  
Athens, Greece*

### Strike a Balance

The Internet is a cheap, powerful, and lucrative communications medium. People and organizations want to use it in the most flexible way, since its flexibility is the basis of its success. However, like almost everything else in life, security can become an issue. Legislation imposing restrictions and penalties could sacrifice flexibility to increase security.

Each Internet service provider should find a level of flexibility that still keeps people interested, but is also sufficiently secure. In my view, legislation can help to define how variables, such as the information's value or nature of the application, affect security. But this will have little effect on the final decision of the service provider as to whether to implement a particular service.

*Henrique Santos  
Salvador, Brazil*

## LETTERS

### One Year Too Many

I disagree with many of the conclusions in James M. Tien's article, "Time to Think about a Master's of Engineering," [June, p. 15]. There are better solutions to the problems of engineering education than adding a fifth year to engineering studies. One is improving the quality of primary and secondary education to prepare students to stay in college and finish in four years. Extending the length of undergraduate studies to compensate for the deficiencies of earlier schooling seems very wasteful. Not only is it an extra year of tuition, but also an additional year of opportunity lost for the students, and for society as a whole.

Moreover, I doubt that the "higher salaries" that Tien hopes for will materialize by adding a fifth year. Much has been written recently about companies moving U.S. engineering jobs to cheaper overseas locations, and bringing in H-1B and L-1 visa holders at lower-than-average salaries. An attempt to drive U.S. engineering salaries higher would probably accelerate these trends, unless justified by a real competitive advantage.

Tien quotes a report stating, "Industry is no longer willing to take on the role of being an engineering finishing school." This seems to be more of an issue of money than of principle. I am willing to

bet that at the right price, or for supply-and-demand conditions as during the recent tech bubble, industry will be more than willing to take on the role of being an engineering finishing school.

Finally, Tien refers to "moving engineering education to a level on a par with doctors and lawyers." The legal and medical professions have strict protections, enshrined in law, that limit who can practice those professions. With few exceptions, these job requirements do not exist for engineers. Simply adding a fifth year of schooling seems to be a pale substitute for those legal barriers to entry.

*Ayal Sharon  
Arlington, Va., USA*

I share James Tien's viewpoint. At the American Society of Engineering Education's annual convention in 2000, I proposed a five-year program in a paper, "For a New Type of Engineering Program."

I tried to implement this at the Albert Nerken School of Engineering at the Cooper Union in New York City, where the U.S. Department of Education Fund for the Improvement of Post-Secondary Education proposed to sponsor a pilot project. Unfortunately, the administration there turned the offer down. Nevertheless, I think someone somewhere should implement it. Such a program would go some way to attracting students who do not necessarily gravitate toward engineering in their teens but see the light later. It would also buck the trend

observed in the last few years of decreasing numbers of candidates for the master's level in engineering.

*Jean Le Mee  
New York City, USA*

### Flaws in an Article

"Answering a Wake-Up Call" [June, p. 1] quotes Abhinav Aggarwal as saying that he "can apply systems dynamics processes to

[Continued on page 6]

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# Wanted: Greater Relevance to Industry

BY MICHAEL S. ADLER

**T**his month, I want to address another vital issue: improving the IEEE's relevance to industry. Two years ago, this was a very important plank in my platform when I ran for President-Elect. Since then, the need for better industry relations has only accelerated.

Let me offer my perspective. As recently as 20 years ago, industry supported a great many programs and organizations, including the IEEE. Most of us working in industry at the time clearly recall those halcyon days. Business was booming, and top management enthusiastically supported programs of all types—no matter whether these programs were directly associated with a company's strategic goals or not. For example, labs were equipped and encouraged to carry out cutting-edge scientific research. At most companies, this research might find its way into a product application. "Research" was the corporate touchstone, and labs—and the engineers who worked in them—were revered. Support for an organization like the IEEE involved such things as paying annual membership dues, granting time off to attend meetings, and reimbursing employees for conference fees and expenses.

No more. In recent years, the business environment has changed dramatically. Whether this is the result of the global economic downturn or other factors, we all can agree that industry is much more stressed than it was. The glory days of most corporate labs are probably gone forever. In every company today, research is closely aligned with the company's business and its bottom line.

As a result, corporate support for professional organizations like the IEEE has greatly diminished. Many companies that formerly supported the IEEE no longer do so. Moreover, everyone working in industry is expected to do more and increase their productivity.

Of course, when it comes to encouraging engineers to work on developing standards and to sponsor industry

awards, industry leaders continue to lend their support. We appreciate this—but we must regain the less tangible contributions, including flexible work time to participate in IEEE activities.

Part of the problem is that industry leaders don't know what the IEEE offers, and they should be made aware.

## Critical management skills

As a first step, I suggest that IEEE volunteers take a step back and consider what they receive for their volunteer service, and then let their employers know what that experience includes. For example, every IEEE volunteer can't help but learn critical management skills. Whether planning programs for a Section or a Chapter, participating in an IEEE Standards Association working group, becoming involved with editing or reviewing articles for an IEEE journal, or taking part in any of the myriad other opportunities this organization offers, you are gaining essential management skills.

At the same time, we must make industry leaders more aware of the value of the IEEE's products and services to industry and its employees (who are our members). This involves ensuring that our publications and technical conferences deal with issues that engineers find relevant. We should also let industry leaders know how much the IEEE does for continuing education, especially since they cite this as one of the most important issues that the IEEE can



address. While part of the solution here is to add electronic courses to education programs, the IEEE should also deliver information through our extensive worldwide network of Chapters and Sections. Not only can this make for interesting Chapter and Section meetings, but it also provides people working in industry with a means of acquiring knowledge without extensive travel.

## Industry forums

On 10 October, the IEEE will be conducting an Industry Forum that will bring together a small group of senior North American executives with the IEEE's volunteer and staff leadership. We want to convince them that there is value delivered to their companies and to their employees when their employees participate in IEEE activities. And we also

want to listen to what these executives believe are the most critical issues facing their companies so that we better understand how the IEEE can help. General Electric Co. has generously agreed to host the first event in North America at their corporate headquarters in Fairfield, Conn., USA. A similar forum is scheduled for later this year in the Far East, and we hope to schedule another in Europe next year.

If you have ideas on how we can strengthen the IEEE's relevancy to industry, please send them to me at [president@ieee.org](mailto:president@ieee.org). ●

## [ LETTERS from page 5 ]

human problems because of two universal laws." But the first law he cites as "Newton's First Law of Thermodynamics," which he states as "for every action, there is an equal and opposite reaction," is actually Newton's Third Law of Motion. The First Law of Thermodynamics states "the total energy of the system plus the surroundings is constant," or all energy is conserved.

He then states his second universal law as, "The Bible teaches that as you sow, so shall you reap." How, when, and in what sense has that phrase become a universal law? Instead, it's a teaching that is in almost all cultures and religions or religious books, some of which are much more ancient than the Bible.

Why has a religious flavor been added here? I feel that such a religious quotation should be avoided in a global educational platform like *The Institute*. It could drive people toward narrow thinking,

which will eventually defeat the purpose of education and of the IEEE. For example, there are some religions where people claim that Newton's law and Einstein's law were stolen from their religious books, which is quite ridiculous.

Tarun Podder  
Santa Cruz, Calif., USA

## Technology Showcase

I applaud the article on "Homeland Security" [June, p. 1]. The subtitle says it all: "It's Nothing New for the IEEE." The article pointed out the critical role that our profession plays in making the world a better place to live. In particular, I liked the emphasis on advanced sensor technologies that can detect nuclear, biological, and chemical agents.

The article also publicizes the fact that the IEEE has sponsored a premier conference, the IEEE Carnahan Conference on Security Technology, for over 35 years, and

that there is now a specialized publication, *IEEE Security & Privacy*, which was launched earlier this year. As with other engineering achievements, technologies related to homeland security are expected to be useful in areas that go beyond their original intent.

M. E. El-Hawary  
Halifax, N.S., Canada

## Say No to Politics

I was offended by U.S. President George W. Bush's photograph on the front page of *The Institute* in June. The "biohazard demonstration" pictured is a political event, not for publication in a technical society's members' newspaper. All of the photos supporting the article are loaded with political content—a big mistake in my opinion. Political images should not be identified with the IEEE or its members' work.

The article is also insensitive. It identifies the IEEE with feeding at the trough of the contentious U.S. Department of

Homeland Security's US\$36 billion budget. It identifies the IEEE with political agendas concerned with globalization, selective terrorism, and "Bush-ism," which I believe will offend many members, whether living in the United States or outside. It completely ignores the IEEE's transnational purpose, membership, and readership.

Roland Saam  
London, UK

*Note: The Institute does not take positions on U.S. domestic or international political issues. However, there are times when the publication will cover stories that have politics embedded in them, such as the involvement of IEEE members in homeland security activities. When covering such stories, we will make every effort to pay particular attention to issues of bias and balance, and to present different points of view whenever possible.* —Editor

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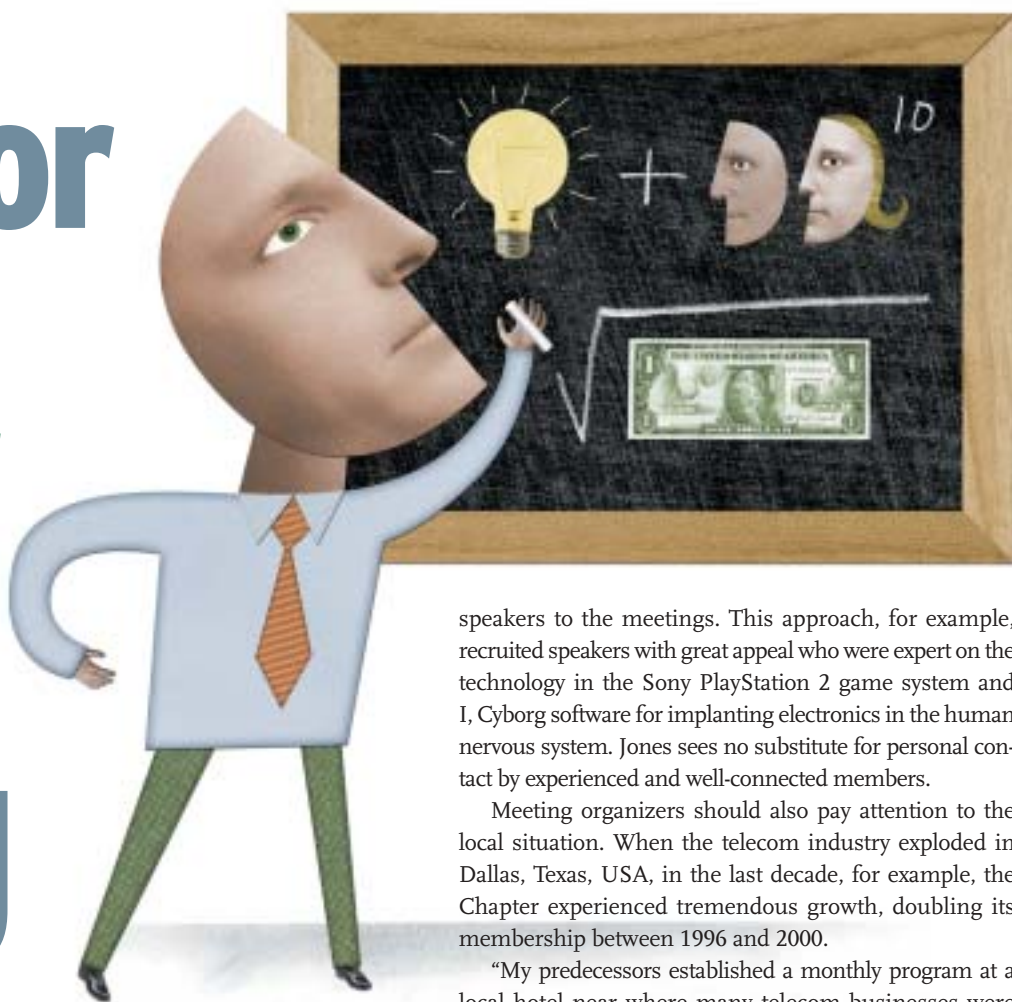
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# Formula For A Great Section Meeting

BY KATHY KOWALENKO



Well-attended Section and Chapter meetings don't happen by chance. There are a number of things to keep in mind if you're to stage a successful event

Want your meetings to be well attended and even draw crowds? Then you must pay attention to several things, including organizing networking opportunities, choosing an interesting topic, and holding your meetings at a time when there are as few conflicts as possible.

## The biggest incentive: networking

Choosing an interesting topic is, of course, mandatory; it's the reason members will be drawn to a Section or Chapter meeting in the first place. But after that, the chance to network is perhaps the biggest incentive if they're to come another time.

Meeting organizers should not underestimate the importance of networking opportunities, says Simon Jones, chair of the IEEE United Kingdom and Republic of Ireland Section (IEEE UKRI).

"IEEE events get attendees to meet engineers from other companies and organizations they would not usually meet," Jones says, and this could be important to their careers.

Section and Chapter officers and senior people can play a big role here. They know who does what within their own group; their goal is to connect them to like-minded newcomers. They should mingle with newcomers to find out their interests, and then introduce them to others in similar areas. It's also useful to gauge what particular IEEE activity might interest a new person, and then ask that person to volunteer for it.

Asking people flat out to volunteer can prove more rewarding than you might realize. Many people won't volunteer on their own; they need a little push, Jones explains. "It's not that people don't want to volunteer, but they often need to be asked," he says. "When asked, they often go on to make a great contribution."

There's no better way to network than with the people you're working with on a committee. Jones also established a mentoring system that pairs experienced volunteers who can offer advice, information, and support with members just becoming involved.

"Our mentoring system makes sure new people can make an impact as volunteers early on," Jones explains. "Often when members join, they have a lot of enthusiasm, and it's important to use it effectively."

## Add a cutting-edge lecture

Many engineers join the IEEE to enhance their technical skills, a fact to keep uppermost in mind.

"The main activity of a Section is to ensure a vigorous program of technical lectures so that people can keep their skills current," Jones says. "The key to drawing interest to the IEEE, and refreshing the volunteer base, is hosting high-profile speakers who will attract a wide audience, including young people, practicing engineers, and others interested in electronics."

Jones recommends personally contacting and inviting

speakers to the meetings. This approach, for example, recruited speakers with great appeal who were expert on the technology in the Sony PlayStation 2 game system and I, Cyborg software for implanting electronics in the human nervous system. Jones sees no substitute for personal contact by experienced and well-connected members.

Meeting organizers should also pay attention to the local situation. When the telecom industry exploded in Dallas, Texas, USA, in the last decade, for example, the Chapter experienced tremendous growth, doubling its membership between 1996 and 2000.

"My predecessors established a monthly program at a local hotel near where many telecom businesses were located," says Bob Shapiro, chair of both the IEEE Communications Society and the Vehicular Technology Society Chapters in Dallas. "And, because Chapter officers worked to build up a relationship with the community, meeting attendance averaged between 80 and 100 people."

When the telecom industry turned down in 2001, attendance at Chapter meetings did not flag. Instead, it increased to nearly 150 people because the programs were tailored to members' changing needs, Shapiro reports.

"Members without jobs needed a place to go, network, and get information," he says.

The Dallas Chapter became a hotspot for networking and education programs, Shapiro continues. It offered networking time and monthly meetings on such topics as entrepreneurship, taxes, and what a venture capitalist looks for in a business plan. A jobs bulletin board, available only at the meetings, contained qualified leads and résumés.

Shapiro suggests that meetings be scheduled during lunch and in a central location. He avoids evening meetings when people may have responsibilities at home and elsewhere. Sending e-mail reminders of upcoming meetings is a method that the UKRI Section's Jones has found effective in building an audience. His Section also sends meeting notices to every institution of higher education within its geographic area to encourage students to come.

## And finally, consider finances

You can't organize and fund worthwhile programs without money. Shapiro's Chapter, for example, relies heavily on corporate sponsors and takes no money from the IEEE. When funds from large companies became scarce, the Chapter approached smaller organizations and successfully raised money for its events, paying, for example, for a meeting room and the expenses of a speaker.

Following these suggestions may be just what you need to boost attendance at your meetings. If you try any of them, let *The Institute* know how they turn out. ●



# Wireless Rides on IEEE 802's Success

Timing and dedication of volunteers prove key factors in the launch of wireless networking standards

BY KATHY KOWALENKO

The world is going wireless and the IEEE 802 suite of networking standards is helping to make it happen.

From wireless local-area networks in homes and fast-food joints, to broadband and fiber-optic wireless connections in office buildings, IEEE 802-based standards are the reason people are communicating more and more through high-speed Internet connections anytime and from nearly anyplace.

Among the standards leading the way is IEEE 802.11b, better known as Wi-Fi, which has become one of the most widely adopted standards. Operating at 11 Mb/s, it allows computer users to surf the Internet wirelessly using IEEE 802.11b-compatible equipment. Just last June, an amendment to IEEE

since 1990. At that time the first IEEE 802 standard, called the IEEE 802 10BASE-T Ethernet wired standard, was introduced to meet the emerging demand for high-performance, low-cost networking technology.

Similarly, low-cost chips and wireless products based on the IEEE 802 extensions coupled to consumer demand and volunteers' hard work all came together in the last few years to make the IEEE 802 suite of wireless standards one of the most widely accepted in the marketplace, says Senior Member Paul Nikolich, the IEEE 802 Working Group chair. He is a partner in YAS Broadband Ventures, a consulting company in Andover, Mass., USA, that provides advice on standards, technology, and investing.

"One of the biggest factors in the stan-

there is more competition among chip and equipment manufacturers."

Nikolich adds that low-cost broadband access through digital subscriber lines and cable modems also has created new markets for wireless applications. Consumers with multiple home computers can now wirelessly network their equipment. AT&T Corp. recently announced that it will offer more than 2000 Wi-Fi access points, otherwise known as hotspots, in Asia, Europe, and the United States. Other companies already offer hotspots in public locations like airport lounges, Starbucks coffee shops, and McDonald's restaurants.

## Dedication and reputation

Many people toiled behind the scenes to make the wireless standards a success. As with other standards working groups, the volunteers for IEEE 802 consist of many individuals, some representing their companies and some just interested in advancing the technology.

"Hundreds, on into thousands, of people contributed to the work of IEEE 802 over the past 23 years," Nikolich says. "The work wasn't done by the IEEE itself or by the IEEE 802 Working Group alone, but by many engineers who dedicated a huge amount of time."

The IEEE's reputation in the standards development arena also can't be underestimated, according to Edward Rashba, manager for new technology programs at the IEEE, in Piscataway, N.J., USA.

"One of the unique things about the IEEE is that we are neutral and provide a level playing field," Rashba says. "We try to include as many folks in the standards development process as possible, because then you have a bigger, broader acceptance at the outset. When you have the interest of the user community, the manufacturers, and the general public all reaching an agreement, then you are more likely to get a standard that will be adopted."

Read about what's next for IEEE 802 at [www.theinstitute.ieee.org](http://www.theinstitute.ieee.org).

**"ONE OF THE BIGGEST FACTORS in the IEEE 802 suite of wireless standards' success was being in the right place at the right time coupled with excellent execution."**

802.11 was introduced, known as IEEE 802.11g, that operates in the same 2.4 GHz band as IEEE 802.11b but transmits data at up to 54 Mb/s.

Another standard extension, IEEE 802.16a, was introduced last January. For so-called fixed wireless, it is meant for high-speed wireless access to businesses and residences over large metropolitan areas. Fixed wireless refers to a system in which client stations must stay within range of their designated base stations; there's no handing over of calls from one base station to another, as in an ordinary cellular system. Fixed wireless users can communicate over distances of up to 50 km at bit rates as high as 74 Mb/s. Sriram Viswanathan, a director of Intel Capital's Broadband and Wireless Networking Investments group, calls IEEE 802.16 "the next big thing after IEEE 802.11-based wireless LANs."

Although it appears that the IEEE's wireless standards have burst on the scene out of nowhere, they have been in the works

dards' success was being in the right place at the right time coupled with excellent execution," Nikolich says. "There was a tremendous increase in demand for communications technology throughout the 1990s, and IEEE 802 happened to be focused on providing the standards necessary to meet the needs of that market."

## Breaking the price barrier

Another factor contributing to the standards' success is that while the transmission speed and performance of IEEE 802-based products increased, their costs stayed low. Or, as Nikolich says, the "technology breached the magical price-performance barrier."

According to Nikolich, while the speed of IEEE 802 wired and wireless standards continues to increase significantly, the price of products using these standards goes up modestly. "Prices continue to stay low because we've standardized the technology," he says, "plus

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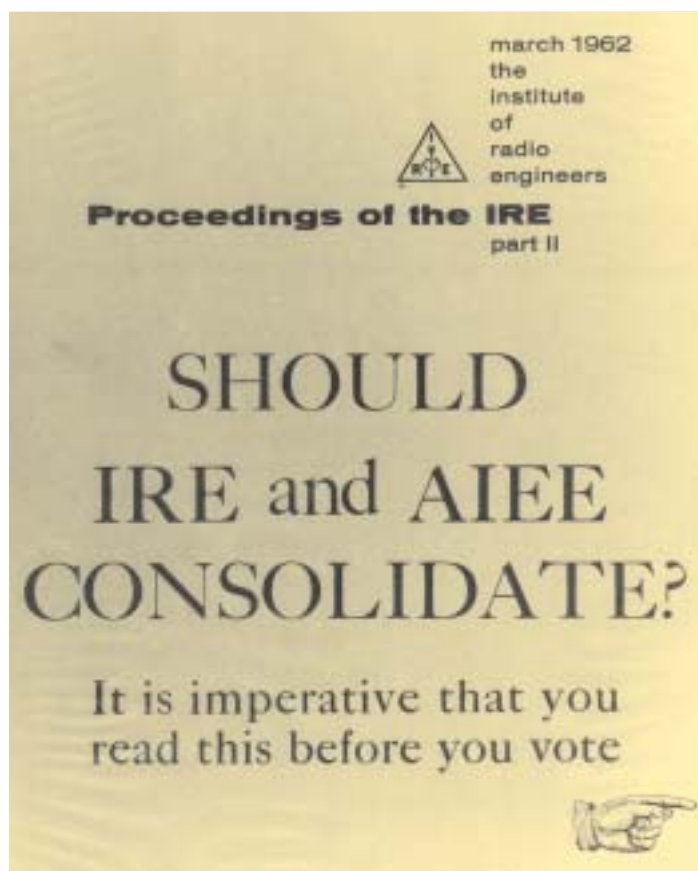
# IEEE at 40



*The Brokaw Mansion, at Fifth Avenue and East 79th Street in New York City, was the IRE's headquarters from 1946 to 1963. The property was sold for US\$1 650 000 in 1965. Lavishly decorated, it was built for clothing mogul Isaac V. Brokaw in 1888.*



*In 1963, the IRE and AIEE staffs merged at the United Engineering Center, on East 47th Street in New York City, across the street from the United Nations. Sold to developer Donald Trump in 1998, the center was razed and is now a high-rise, luxury apartment building.*



*The cover of the March 1962 issue of the Proceedings of the IRE wanted informed members to vote on the merger. Articles inside explored the logistics of the 95 500-member IRE merging with the 57 000-member AIEE. Nearly 20 000 people already belonged to both societies.*

*Clarence Linder, 1961 AIEE President [left] and Patrick Haggerty, 1961 IRE President [right] were instrumental in persuading members of the two societies to endorse the merger.*



membership heated up. In 1947, the AIEE had almost 35 500 members—compared to 21 000 in the IRE. By 1956, each society had 50 000 members, but the AIEE clearly was growing more slowly.

### To merge or not to merge

With joint membership proving of interest to members, serious talks about a merger began in 1961 when an AIEE–IRE Merger Committee was formed and started exploring the challenges of uniting the two

societies. They shared a common objective—serving qualified members—but their different philosophies with respect to their fields and modes of operation posed major stumbling blocks.

It was a basic tenet of the AIEE that engineering reflect the application of scientific knowledge to human needs. The IRE did not make such a distinction, and it welcomed physicists, chemists, and others from related scientific disciplines, provided they were working in electronics-related fields.

Two factors helped accelerate efforts leading to the merger: the IRE's successful Professional Group System, a precursor to the IEEE's Societies, and growing numbers of students involved with the AIEE–IRE joint student branches on U.S. college and university campuses.

### The structure

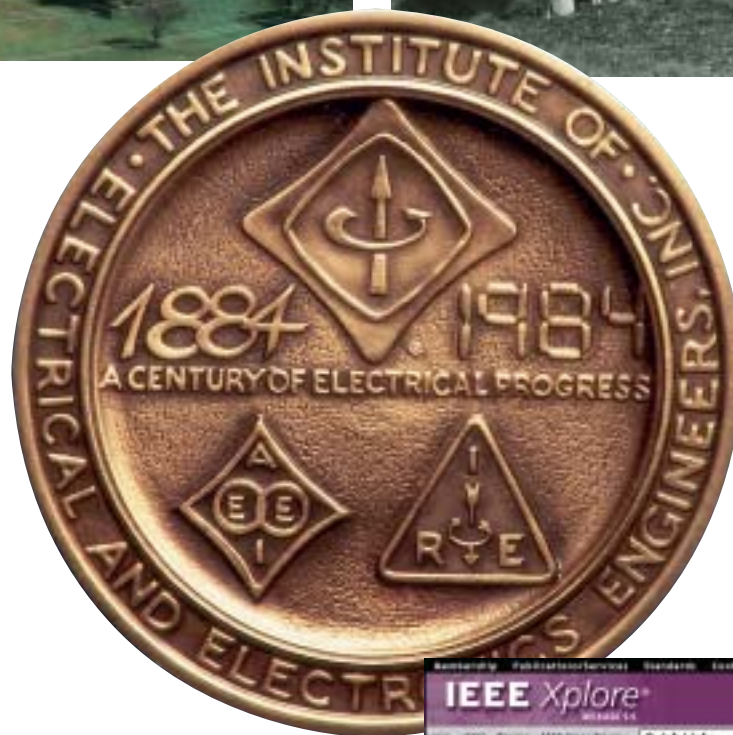
In 1948, Raymond Heising of Bell Telephone Laboratories had proposed that the IRE establish technical interest groups to help meet members' needs [ *Continued on page 13* ]



In 1973, ground was broken for the IEEE's Operations Center in Piscataway, N.J. USA, to accommodate a staff that had outgrown its three floors at the United Engineering Center. Completed in 1975, the Piscataway complex has been expanded twice to reach its current size of 49 682 square meters (163 000 square feet) [left].



1993 IEEE President Martha Sloan, along with other IEEE dignitaries, cuts the ribbon to the new IEEE Asia Pacific Operations Center in Singapore.



To commemorate the 100th anniversary of the founding of the AIEE, the IEEE's oldest predecessor society, 1984 members were awarded this special Centennial Medal.



IEEE publishes 30 percent of the world's technical literature and holds 300 conferences annually; these publications are just a sample of what the IEEE offers. Today, nearly all of the IEEE's literature is available in the IEEE/IEE Electronic Library and accessible from IEEE Xplore, a publication delivery system.



1963 ERNST WEBER



1964 CLARENCE LINDER



1965 BERNARD OLIVER



1967 WALTER MACADAM



1968 SEYMOUR W. HERWALD



1969 KARL WILLENBROCK



1970 JOHN V. N. GRANGER



1971 JAMES MULLIGAN



1972 ROBERT TANNER



1973 HAROLD CHESTNUT



1974 JOHN GUARRERA



2004 ARTHUR W. WINSTON



2003 MICHAEL S. ADLER



2002 RAYMOND D. FINDLAY



2001 JOEL B. SNYDER



2000 BRUCE A. EISENSTEIN



1999 KENNETH R. LAKER



1998 JOSEPH BORDOAGNA



1997 CHARLES K. ALEXANDER

# Catching Up with Past Presidents

BY HELEN HORWITZ

Every year since the IEEE's creation, members have elected a President to lead the organization for one year. *The Institute* recently caught up with five Past Presidents to learn about what they consider to be their most memorable activities during their term and about their professional lives since leaving office.

Space limitations prevent us from including more Past Presidents in this article.

**1966:** William G. Shepherd recalls dealing with no major issues when he served as President, allowing him to focus on developing the new combined organization. "We were seeing the benefits of being one, unified electrical sciences organization, not two," he says, alluding to the IEEE's two predecessor societies: the AIEE and IRE. At 92, Shepherd is both the oldest and the earliest living IEEE Past President.



1966 WILLIAM SHEPHERD

He spent almost his entire career at the University of Minnesota in Minneapolis, USA, first as a professor of electrical engineering, then as department head and associate dean of the university's Institute of Technology. For a decade before retiring in 1979, he was vice president for academic affairs. He then raised funds for the university's Frederick R. Weisman Art Museum and traveled extensively until health problems slowed him down.

**1978:** Ivan A. Getting wants to be remembered as "the person who led the IEEE through diffi-

cult times during his tenure." A recession in the defense and aerospace industries in the 1970s created high unemployment among electrical engineers. Getting led the IEEE's efforts to resist pressures from within the organization to unionize and then to form, in his words, "a political organization instead of a learned society."

As founding president of The Aerospace Corp., El Segundo, Calif., USA, he oversaw its strategic role in the U.S. Mercury and Gemini space programs in the 1960s and 1970s. In the early 1940s, he and colleagues at the Massachusetts Institute of Technology's famed Radiation Laboratory in Cambridge, USA, developed radar systems that helped save London from destruction by enemy V-1 rockets during the blitzkrieg. Now 91, Getting is one of this year's recipients of the U.S. National Academy of Engineering's Draper Prize for his work on global positioning systems.

**1989:** Emerson W. Pugh considers creating the IEEE Code of Ethics his most memorable achievement. "The code wasn't formally adopted until 1990, but it survives today," he notes. "The code's preamble and 10 succinct statements offer principles that every IEEE member can aspire to."



1989 EMERSON W. PUGH

Retired since 1993 from R&D management at IBM's Thomas J. Watson Research Center in Yorktown Heights, N.Y., USA, he wrote his fourth book in 1995 about IBM and the computer

industry, *Building IBM: Shaping an Industry and Its Technology*, (MIT Press). His interest in history led to positions as chair of the Friends of the IEEE History Center Committee, beginning in 1991, and then chair of the organization's History Committee. He's been a director of the IEEE Foundation since 1996; 2003 marks his fourth year as its president and director.

**1993:** The first woman to lead the IEEE, Martha Sloan recalls her focus on members living in Asia during her presidency. "Visiting Manila, Taipei, and Bangkok—where an IEEE president hadn't visited for some years—helped many Pacific Rim engineers realize their desires for fuller IEEE participation," she says. Today, she frequently travels to Europe for her work on a NATO advisory panel that looks at the military potential of information technologies.



1993 MARTHA SLOAN

Sloan also is a professor of electrical and computer engineering at Michigan Technological University in Houghton, USA, and coordinates the campus-wide, first-year seminar program to orient incoming students to the university and academic life. She is on the IEEE Credentials Committee and sits on the Society of Women Engineers' Board of Trustees.

**1999:** "I wouldn't trade being IEEE President for anything," says Kenneth R. Laker. "Besides the personal growth, I was in a unique position to help realize some strategic goals for the

organization." Laker is proud of his efforts to nurture the IEEE's transition to electronic publishing, enhance its Web presence, and encourage the use of information technologies to improve the IEEE's business practices.

Committed to education—Laker is the Alfred Fitler Moore professor of electrical engineering at the University of Pennsylvania in Philadelphia, USA—he established the IEEE Presidents' Scholarship, which awards US\$10 000 annually from funds provided by the IEEE Foundation to a contestant in the Intel International Science and Engineering Fair. Laker also was the impetus behind the IEEE History Center's Virtual Museum, which was launched in 2002.

"Bitten by the entrepreneurial bug," as he puts it, in recent years he has helped to start up—and sell—a semiconductor company, AA Netcom, and has taken time off to secure financing for DFT Microsystems, a semiconductor testing company, admittedly a difficult task these days.

And what about the IEEE's three most recent Past Presidents? All are continuing their careers and IEEE activities. Bruce A. Eisenstein, 2000 President, is the Arthur J. Rowland Professor in the Electrical and Computer Engineering Department of Drexel University in Philadelphia, USA.

Joel B. Snyder, President in 2001, is a consulting engineer and principal of Snyder Associates in Plainview, N.Y., USA.

Raymond D. Findlay, 2002 President, is a professor of electrical engineering at McMaster University, Hamilton, Ont., Canada. ●



1975 ARTHUR STERN



1976 JOSEPH DILLARD



1977 ROBERT M. SAUNDERS



1978 IVAN GETTING



1979 JEROME SURAN



1980 LEO YOUNG



1981 RICHARD DAMON



1982 ROBERT LARSON



1983 JAMES OWENS



1996 WALLACE S. READ



1995 J. THOMAS CAIN



1994 H. TROY NAGLE



1992 MERRILL W. BUCKLEY JR.



1991 ERIC E. SUMNER



1990 CARLETON A. BAYLESS



1988 RUSSELL C. DREW



1987 HENRY L. BACHMAN



1986 BRUNO O. WEINSCHEL



1985 CHARLES A. ELDON



1984 RICHARD GOWEN

# The Name Game

As with any merger, one of the most important decisions to be made is what to call the new organization. This slightly edited excerpt from the 1984 *Engineers and Electrons* book, by John D. Ryder and Donald G. Fink, (IEEE Press, Piscataway, N.J., USA) details the discussions within the 14-member merger committee that led to the IEEE's name and its signature kite-shaped "badge."

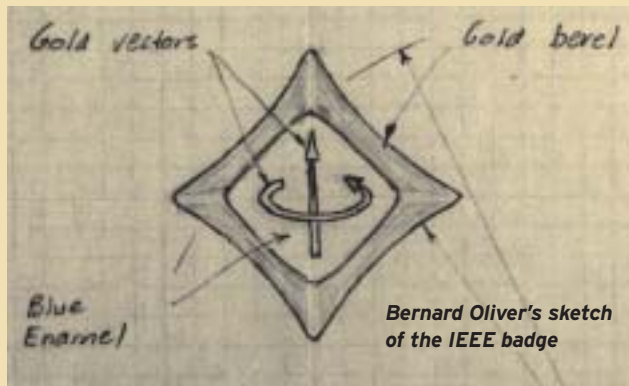
## The Name

It was agreed that the proposed institute would be transnational in character, serving electrical engineers around the world, so the "A" [for American] in AIEE was removed. That left "Institute of Electrical Engineers," but the initials IEE already had been preempted by the British Institution of Electrical Engineers.

Some of the members of the IRE contingent suggested that "electronics" should be recognized in the name, despite the general awareness that electrical engineering included electronics—albeit as a most active and exciting subdivision. There was thought that the IRE's devotion to scientific principles should be recognized so the "Institute of Electrical Science and Engineering" was suggested. IESE found

some favor as descriptive of the field, but "Institute of Electrical and Electronic(s) Engineers" was the final choice.

The use of the "s" on electronics in the name was not decided until February 1963 [the formal unification took place in January 1963], following argument that an



electronic engineer could only be a robot, operating by internal tubes or transistors. It was also noted that in English usage, fields of knowledge are designated by plurals as are mathematics, physics, and economics; thus, the profession practiced by the members was electronics. And so the inclusion of the "s" was decided.

## The Badge

In contrast [to the naming of the organization], the design of the badge was settled in less than 15 minutes. It was per-

ceived that the AIEE and IRE badges had features that could be combined. The four-sided "kite" outline of the AIEE badge was retained, with minor adjustment. The central feature of the IRE badge, the straight and curved arrows symbolizing the right-hand rule of electromagnetism, was recognized as basic in electrical theory from megawatt power generators to radio waves. One change was to have the central arrow point upward rather than down as in the IRE symbol.

All this discussion was quickly absorbed by one artistic member of the committee, Bernard M. Oliver, vice president of the Hewlett-Packard Co. and IEEE President in 1965. He sketched out the badge as it had been described to everyone's satisfaction.

One notable difference between the proposed badge and its predecessors was the absence of lettering. Nelson Hibshman urged this change, and it was taken up in the merger committee by John Ryder, who pointed out that a badge without letters would be understandable regardless of the member's native language. Oliver added that letters would clutter the design.

Beneath this light-hearted banter was an implied hope that, in time, the outline of the badge would become so familiar in engineering and scientific professions that further identification would not be needed.

## [ IEEE AT 40 from page 10 ]

in established fields while attracting new members from among the technical professionals entering emerging fields. Shortly after Heising's recommendation, the IRE established its first Professional Group, the Group on Audio Engineering, which later became the IEEE Signal Processing Society. By 1955, there were 21 IRE Professional Groups; today all continue as IEEE Societies. The IEEE has grown to 38 Societies and four Technical Councils, all with roots in the IRE Professional Group System.

Meanwhile, it was realized that college and university students needed a more affordable way to participate in AIEE and IRE activities because each levied separate membership dues. So in 1950 the AIEE and IRE merged their student branches and charged a single combined fee. *IRE Student Quarterly*, launched in 1954, proved so popular that its circulation nearly equaled that of the *Proceedings of the IRE*. By 1962, there were 130 joint student branches, paving the way for the 1158 IEEE Student Branches that existed around the world at the end of 2002.

Historians primarily credit two men—Clarence Linder, 1961 AIEE President and a General Electric Co. executive, and

Patrick Haggerty, 1961 IRE President and chairman of Texas Instruments Inc.—with smoothing the deliberations of the AIEE-IRE Merger Committee. Linder and Haggerty not only were respected leaders, but they were considered by many as visionaries. In particular, Haggerty was a persuasive speaker, and the strength of his convictions "spread through the IRE camp and spilled over into the AIEE," according to John Ryder and Donald Fink in their 1984 book, *Engineers and Electrons*.

## The new organization

The merger committee agreed that the new organization would be international in scope and include more professional disciplines, use the IRE Professional Group system, and have a geographic structure that encouraged members of both organizations to participate.

In *Engineers and Electrons*, Ryder and Fink suggest that the real reason for the merger was that "both societies were incomplete. Neither could claim on its own to cover the professions of electrical engineering and electronics, to serve the industries involved, or to hold the allegiance of academia. Together, they could cover the ground, but separately they could only

engage in destructive competition."

AIEE and IRE members—57 183 and 103 555, respectively—agreed in 1962 to merge. More than 60 percent of all eligible members voted, and some 87 percent of these voters cast ballots favoring the merger.

On 1 January 1963, the formal unification took place and established The Institute of Electrical and Electronics Engineers Inc. In 2002, the IEEE had more than 382 000 members, including 145 237 outside the United States. It publishes one-third of the world's technical articles as well as some of the most highly cited scientific research. And the IEEE has become the world's largest, and perhaps the most influential, of technical professional societies. ●

*Thanks go to Eric Herz, IEEE Executive Director Emeritus; and Robert Colburn and the IEEE History Center staff for their help in the research for this historical overview. Space limitations made it impossible to cover every milestone and pay due respect to every member whose contributions were of importance to the IEEE. The background of IEEE's predecessor organizations is based largely on Engineers and Electrons published by the IEEE Press for the 1984 IEEE Centennial, marking the formation of the AIEE 100 years before.*

# IEEE Timeline

**1963** The IEEE opens its corporate offices in the United Engineering Center building on East 47th St. in New York City. It has 159 519 Members, 182 Sections, 346 Chapters, and 30 120 pages in its publications

**1964** First issue of *IEEE Spectrum* published

**1966** Computer Society formed

**1969** Oceanic Engineering Society formed

**1971** IEEE Press formed

**1972** Constitutional amendment passed to form U.S. Activities Board, later renamed IEEE-USA

**1973** 167 815 Members, 217 Sections, 509 Chapters, 57 963 pages

**1975** IEEE opens its Operations Center in Piscataway, N.J., USA

**1978** First Issue of *The Institute* published

**1979** IEEE Communications Society hires its first full-time employee to be editor of *IEEE Communications* magazine

**1980** History Center is set up, in part to help prepare for the 1984 IEEE Centennial, which celebrated the formation of the AIEE

**1983** Consumer Electronics, Power Electronics, and Robotics and Automation Societies formed

**1983** 248 275 Members, 249 Sections, 668 Chapters, number of pages published grows to 121 132

**1984** IEEE celebrates 100th anniversary of founding of AIEE

**1988** Worldwide membership hits 300 000 mark

**1990** The IEEE Standards Press launched, now known as the IEEE-SA Standards Information Press

**1991** Technical Council on Superconductivity formed

**1993** 316 626 Members, 288 Sections, 946 Chapters, 285 775 pages published; IEEE Executive Committee holds its first paperless meeting; Financial Advantage Program launched

**1995** IEEE Web site launched

**1998** IEEE-USA begins publication of *Today's Engineer*; IEEE moves its corporate offices to Park Ave. in New York City

**2000** IEEE Xplore launched

**2001** First IEEE Dean's Summit is held, bringing deans of education and deans of engineering together to prepare technical courses for future teachers

**2002** 382 483 Members, 298 Sections, 1313 Chapters, 37 Societies, 449 133 pages published; Neural Networks Society, Nanotechnology Council formed; IEEE Virtual Museum launched

**2003** Product Safety Engineering Society formed

[ **NANOTECHNOLOGY** from page 1 ]  
bership consists of representatives from sponsoring Societies. Lau says the Nanotechnology Council could become a full-fledged IEEE Society within a few years.

Nanotechnology refers to the development of materials, devices, and structures at the nanoscale—100 nanometers or less—and their engineering applications, according to Lau. Europeans define it more broadly: anything under 1000 nanometers, or one micrometer. A nanometer is one-millionth of a millimeter or approximately one fifty-thousandth the diameter of a human hair.

improve on existing technology. For example, some power engineers envision the power lines in electrical grids composed of graphitic nanotubes that do not lose as

#### A nanotube is born

The nanotube's parentage can be traced to the discovery of fullerenes and carbon nanotubes in the 1980s. Fullerenes are

sive, yet precise, microscopes became available in the late 1990s. Researchers could move one atom at a time and take accurate measurements by using scanning tunneling microscopes and atomic force microscopes that cost significantly less than traditional electron-scanning microscopes.

#### Pushing the edge

Research on nanotechnology has taken off, thanks to government funding and company support. The Japanese government spent about US\$650 million on nanotechnology research, and countries in Western Europe invested approximately \$400 million in 2002. The United States spent \$600 million on nanotechnology last year, according to the National Science Foundation.

The U.S. House of Representatives in May passed the 21st Century Nanotechnology Research and Development Act, authorizing \$2.36 billion over three years for the National Science Foundation for nanotechnology research. The bill is now before the U.S. Senate and is expected to become law later this year.

"You have to push the edge of nanotechnology because if you step out of the game, it is difficult to catch up, and the only way to do that is with a massive infusion of government funding," says Walt Trybula, IEEE Fellow and a senior fellow at International Sematech, a semiconductor industry research consortium in Austin, Texas, USA, who participated in an informational briefing about nanotechnology organized in June for U.S. Senate staffers by IEEE-USA.

Even with increased funding, Western Europe and Japan will still have a leg up on the United States, says Trybula. In the United States, nanotechnol-

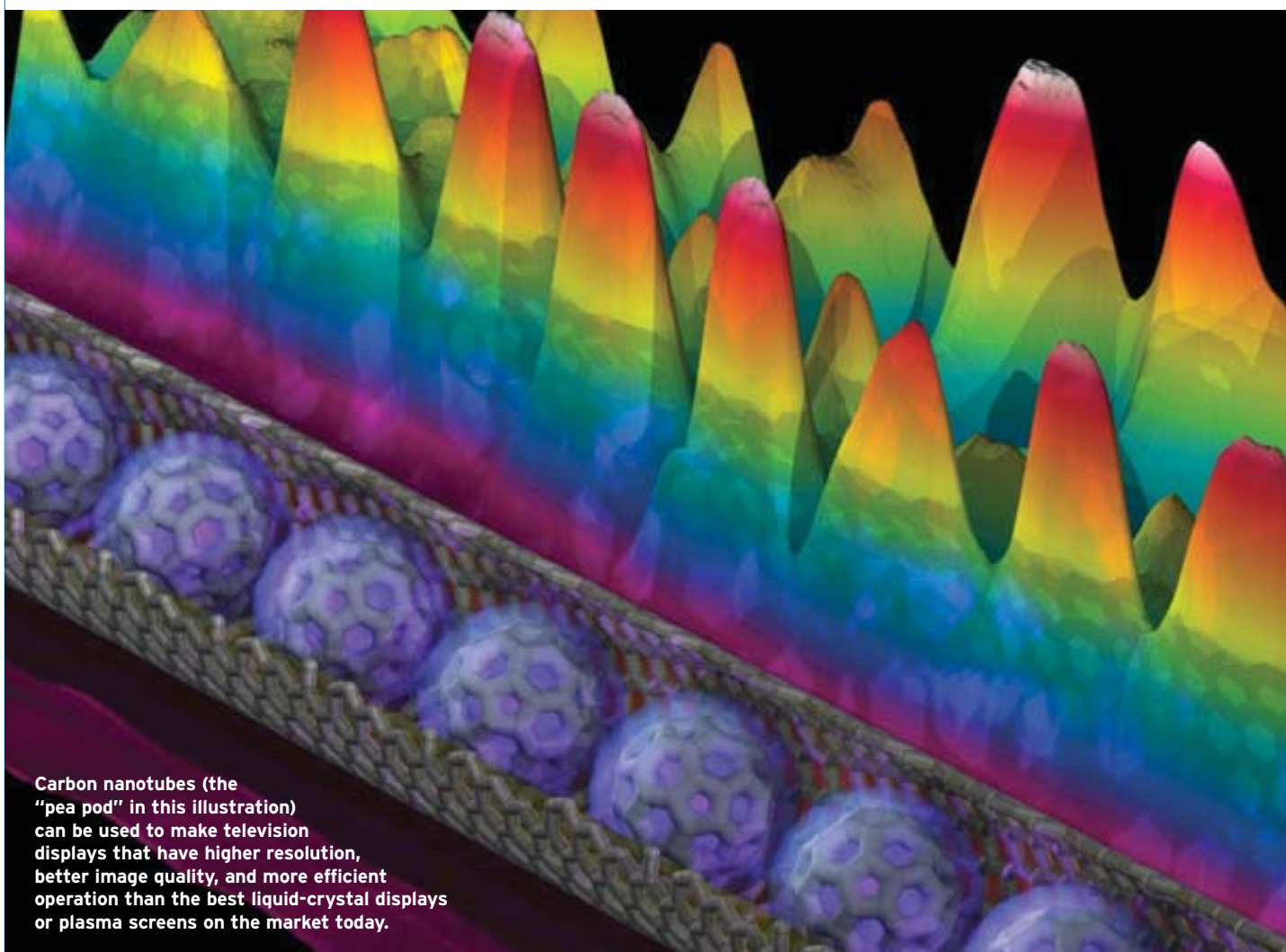
ogy research efforts are scattered among individual organizations, while in Japan and Western European countries, government-funding organizations encourage collaboration to avoid overlap. The IEEE and its Nanotechnology Council hope to add focus and organization to all these efforts by serving as a central repository for worldwide nanotechnology information.

#### Providing a frame of reference

Before any technology can move ahead engineers and scientists pursuing its development need a common terminology and standards for procedures, which nanotechnology does not yet have and which the IEEE hopes to provide.

"It all starts with standards," says Dan

## NANOSCIENCE COULD LEAD to unprecedented control over the basic building blocks and properties of natural and human-made things.



Carbon nanotubes (the "pea pod" in this illustration) can be used to make television displays that have higher resolution, better image quality, and more efficient operation than the best liquid-crystal displays or plasma screens on the market today.

"The road to miniaturization in electronics devices has been based on scaling down," notes Jim Hungerford, CEO of Electronic Conventions Inc., Manhattan Beach, Calif., USA, the firm that organized the 2003 Wescon Nanotechnology Pavilion at the IEEE Nanotechnology Conference, which took place on 12 to 14 August in San Francisco, Calif., USA. "Nanotechnology achieves it by designing from the atom up."

The ability to work at the atomic level to create structures with fundamentally new properties and functions could lead to unprecedented control over the basic building blocks and properties of natural and human-made things.

In addition to being used in new technologies, nanotechnology will be used to

much energy as traditional grids. Others envision nanodevices delivering drugs on a molecular level to treat diabetes or cancer; detect biological or chemical weapons; allow paint and coatings to change color like a chameleon; or, as with carbon nanotubes, make a material stronger or have different properties.

And as reported in the September 2003 issue of *IEEE Spectrum*, Samsung Group, Seoul, South Korea, has demonstrated a full color 38-in. (96.5-cm) display using carbon nanotubes that can handle normal video frame rates. Such a display promises higher resolution, better image quality, and more efficient operation than the best liquid-crystal display or plasma screens on the market today.

also known as buckyballs because they resemble the geodesic domes of architect R. Buckminster Fuller. Composed of 60 carbon atoms, a buckyball is a third form of carbon after graphite and diamond. When this material is formed into a flat sheet and rolled into a cylinder, the result is an extremely strong material of nanoscale dimensions: a carbon nanotube.

Nanotechnology has led to the development of nanowires, similar to a nanotube in strength but solid, not hollow, and quantum dots, semiconductor crystals that display different colors, depending on their size, a phenomenon that has opened the door for new optical applications.

Developments in nanotechnology began in earnest after relatively inexpen-

Gamota, a senior manager at Motorola, and chair of the IEEE Standards Association's (IEEE-SA) group working on nanotech standards, the P1650 Nanotechnology Standard Working Group. In June, IEEE-SA announced that work would begin on the first nanotechnology standard to define testing methods for carbon nanotubes and to establish common methods of presenting data. Gamota expects the Working Group to release the standard within three years.

This standard is necessary for nanotechnology's growth because many fundamentals are still being worked out, according to Gamota.

"An engineer needs a strong fundamental understanding of the electrical properties of the basic materials before one can fabricate devices and integrated circuits made from them, but we don't have that in carbon nanotubes yet," he explains.

Many researchers now use their own procedures for experimentation and their own terminology for presenting data, which makes it difficult for other researchers to verify and reproduce results, slowing the development process.

"This standard would help accelerate the transfer of nanotechnology from the research and development environment to manufacturing," Gamota says.

Reflecting worldwide interest in nanotechnology, this year's IEEE nanotechnology conference in San Francisco in August was the largest single conference ever held on the topic. It included more than 300 papers and poster presentations, almost 60 percent more than at the 2002 conference, says Meyya Meyyappan, general chair of the 2003 IEEE Conference on Nanotechnology and director of the Center for Nanotechnology at NASA Ames Research Center in Moffett Field, Calif., USA. He is also the IEEE's Distinguished Lecturer on Nanotechnology and co-editor of an upcoming book on nanotechnology from IEEE Press.

The August conference focused on subjects such as electronics, computing, and data storage at the nanoscale. No matter which application electrical engineers develop, Meyyappan says, the starting point is materials, which is why the conference held several special sessions on novel nanoscale materials. To design with different materials, engineers need better modeling methods, and, for this reason, the conference hosted several sessions on simulation and modeling.

Panel discussions focused on less technical, but no less important, topics, such as how to start a nanotechnology

business and how to obtain government funding for research.

"This conference was tremendously important to the IEEE because its members are the ones who can make nanotechnology useful through applications," Meyyappan says.

The IEEE Nanotechnology Council also cosponsored a nanotechnology pavilion at the 2003 conference that focused on commercial products and technical innovations and gave a sneak peek at NanoWorld 2004, a new conference that will be held in September 2004, in Anaheim, Calif., USA. Next year's event will encourage engineers to describe their work on nanotechnology in new commercial applications.

#### Attracting attention

The IEEE is also publishing a nanotechnology journal. *IEEE Transactions on Nanotechnology*, first published less than two years ago, is interdisciplinary and reaches out to communities such as chemistry or physics that ordinarily would not be attracted to the IEEE, explains editor-in-chief Sandip Tiwari.

The publication is attracting attention from such media as the British Broadcasting Corp. and *Scientific American*, all of

which reported on research published in the journal. Authors are taking note too. Article submissions are growing by nearly 20 percent a year, according to Tiwari.

"What is unique about this journal is the fact that nanotechnology as a discipline has a lot of very interesting scientific ideas that are now searching for applications. Some have already been perfected, and all are part of the IEEE's domain," Tiwari says. ●

#### For More Information

- Go to the home page of the IEEE Nanotechnology Council, where there is also a link to the 2003 IEEE Conference on Nanotechnology, at <http://ewh.ieee.org/tc/nanotech>.
- For what's going on in nanotechnology standards, check the IEEE Standards Association's P1650 Nanotechnology Standard Working Group at <http://grouper.ieee.org/groups/1650>.
- The legislative outlook for nanotechnology can be found at IEEE-USA Web site at <http://www.ieeeusa.org/forum/issues/nanotechnology/index.html>.
- The IEEE Transactions on Nanotechnology can be found at <http://www.ieee.org/organizations/pubs/transactions/tnano.htm>.



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PHILADELPHIA — **W. CLEON ANDERSON** [left] and **MICHAEL R. LIGHTNER**, [right] both running for 2004 IEEE President-Elect, squared off to present their views at the 15th Annual Candidates Night, hosted by the IEEE Philadelphia Section at the Faculty Club of Drexel University in Philadelphia, USA, on 24 June.

Instead of using a debate format, the two candidates answered questions from the audience. Topics ranged from the IEEE-USA's position on H-1B visas to the value of membership in the IEEE and the organization's financial condition. Section chair Janet Rochester moderated the event.

Specifically, the candidates were asked whether they agreed with IEEE-USA's position to roll back the number of H-1B visas issued to 65 000 from the current 195 000. This and other visa programs allow U.S. companies and universities to employ scientists, engineers, and programmers from outside the United States. Another concern was raised about the non-immigrant visa program called L-1, which allows companies operating both in the United States and elsewhere to transfer employees from its operations abroad to U.S. locations.

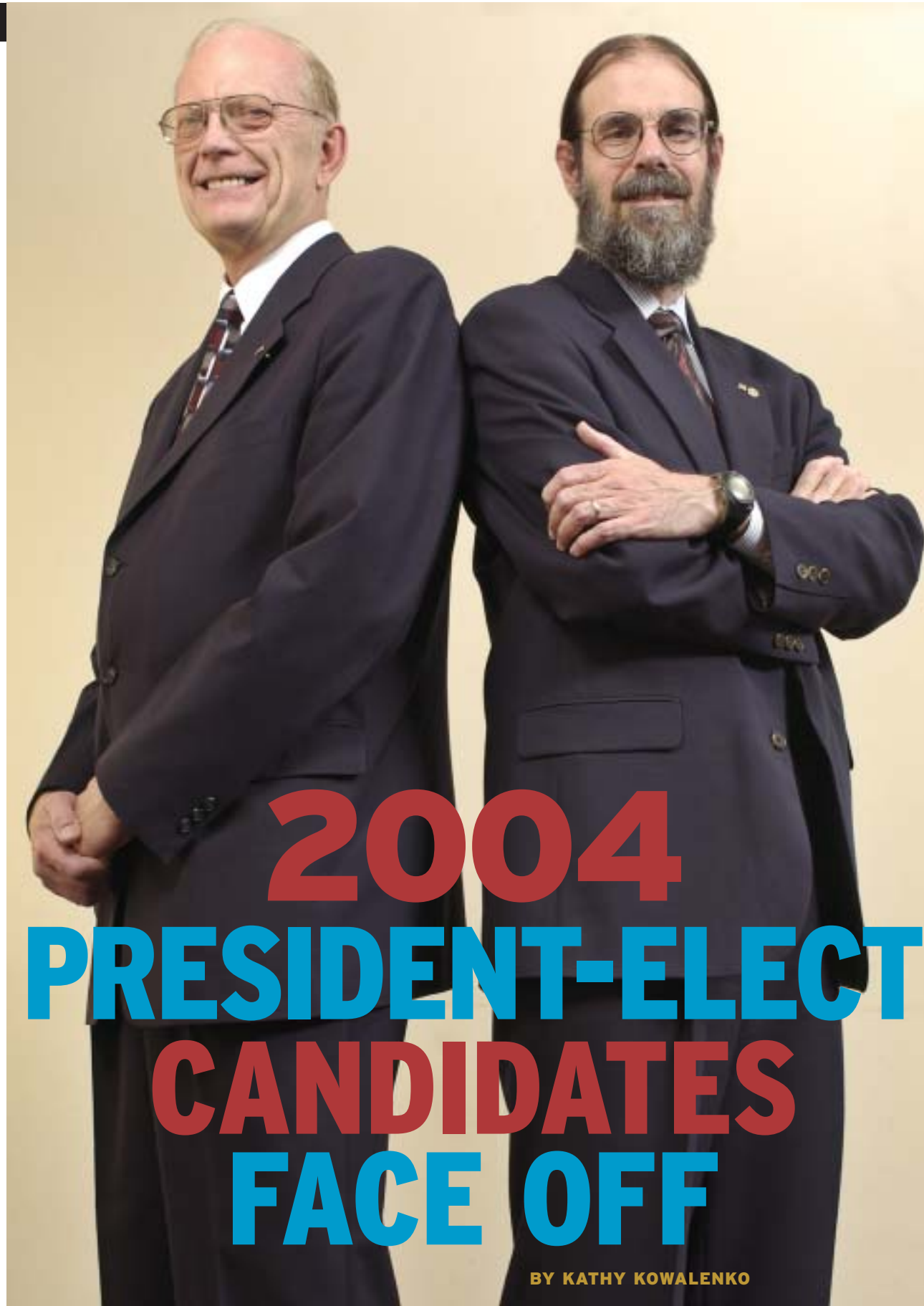
The candidates were also asked if, given the differences between IEEE-USA and the rest of the IEEE on visa issues and other matters, it was time for IEEE-USA to change its relationship with IEEE.

**LIGHTNER** began by explaining what changes IEEE-USA could make. He noted that by operating now as part of the IEEE and thus as an [Internal Revenue Service] IRS 501 (c)(3) organization, IEEE-USA faces many restrictions, including a prohibition from making political donations and organizing political action committees. [The number refers to a paragraph in the U.S. tax code.] By contrast, if it changed to a 501 (c)(6) organization, it could spend more freely on lobbying and promoting the professional interests of its members.

"This 501 (c)(6) code removes many of the restrictions that IEEE-USA currently operates with," **LIGHTNER** said. "It would distinguish it as a separate body, allow it to more effectively do its job in the United States, and allow the rest of the world to understand its specific purpose."

**LIGHTNER** said he didn't know what IEEE-USA's position would be on changing its tax code, but he would support IEEE-USA if it chooses to do so.

On jobs and visas, **LIGHTNER** pointed out that IEEE-USA is an advocate for engineers in the United States, not for engineers in other countries. The IEEE itself, as a global organization, looks after the welfare of engineers no matter where they live and



# 2004 PRESIDENT-ELECT CANDIDATES FACE OFF

BY KATHY KOWALENKO

no matter where they work, and this, he pointed out, is not IEEE-USA's purview. Those two "are on different missions," he said. "They will always have tensions, and we have to learn to live with those tensions."

It is IEEE-USA's duty to examine and respond to the employment environment in the United States, he said, and cited the 7 percent unemployment rate, which he noted was the highest for electrical and computer engineers in ages.

Regarding H-1B visas, **LIGHTNER**

favored a more focused and dynamic response instead of a blanket way of approaching workforce issues. He suggested looking at the engineering workforce globally from the U.S. perspective "and simply saying to U.S. government representatives that we've got too much of this or too much of that with respect to visa activities."

IEEE-USA must work with the range of industries that we have in this country, he continued, and not allow a small segment to

drive policy statements. "What we do has to reflect the broad scope of U.S. industries."

**ANDERSON** agrees with the IEEE-USA's position on the H-1B visa program, which seeks to roll back the number of H-1B visas.

"My company had a contract with Canada, and an opportunity came up for several of our engineers to work in Canada," he recalled. The job openings were very tightly regulated by the Canadian government. "It is appropriate for the United States to do the same and regulate where engi-



neers come from and who is going to be employed in this country," he said. "We have a green card program [for permanent residents from abroad] to do that."

To **ANDERSON**, the H-1B visa program now resembles an indentured servant situation. People entering the United States under the program are under contract to remain with the company that sponsored their entry. There are reports that an "outrageous fee" is being charged if a person doesn't fulfill the contract, according to **ANDERSON**. He said that the program has been seen by some "as an opportunity to push down the salaries of [U.S.] engineers and exercise a brain drain on other countries around the world, which has us being called 'ugly Americans.'"

"It was never explained in the press that way," he pointed out. He supports the IEEE-USA policy of using green cards instead of the work visas. He feels the IT [information technology] profession "could fulfill its staffing needs through the green card program."

The H-1B program appears to **ANDERSON** to be a cheap way to get engineering from engineers outside the United States who will not be paid the going salary of U.S. engineers. "If that's what it is, then it is wrong," he stated. "And I have told that to my colleagues from other countries who have had the wrong idea about H-1B."

He added that H-1B is a U.S. issue, not an international issue, so it should not be handled by the IEEE. However, it is appropriate for IEEE-USA to make statements about H-1B and to explain the situation to members of the U.S. Congress.

**ANDERSON** agreed that the H-1B visa level should revert back to the original cap of 65 000 and not continue to be expanded, particularly with the high engineering unemployment in the United States.

**LIGHTNER** pointed out that H-1B visas became an issue in the United States not because of what IEEE members in other countries did, but because of the situation in the United States. Several years ago, he pointed out, the computer and IT industries said that they did not have the workforce they needed. This led segments within the IEEE in the United States to fight over H-1B; IEEE members elsewhere in the world were not involved.

"We have to put forward a policy reflective of broad segments of our industry members within the United States, and we may not be doing so," **LIGHTNER** said.

Additional questions and answers from the candidates' forum follow.

**Q. Members are concerned whether their dues reflect the value of their membership. If you were riding with members in an elevator and had only one minute to explain what they are getting for their money, what would you say?**

In his elevator speech, **ANDERSON** said he would emphasize his concept of "membership advantage." This not only includes attending Section meetings and networking, but making use of the IEEE E-Mail Alias Service that members receive.

The opportunity to stay connected with other members is paramount for **ANDERSON**. "No matter what company I went to or how many times my company changed its Internet service provider, I never lost my friends and I never lost my business contacts because I used my IEEE alias and had it printed on my business cards," he said. "It provided me a comfort zone because I knew that if I ever left the company, I would take all my contacts with me with a simple e-mail change notice to IEEE Member Services."

Along with the e-mail alias, **ANDERSON** also appreciates the virus scanning service provided by the IEEE. "That's a pretty cheap way to avoid getting a virus in your computer," he said.

In his elevator ride, **LIGHTNER** would focus on the community aspect of membership that occurs through participation at Chapter and Section meetings, as did **ANDERSON**.

"You come in contact with people you would probably not meet and interact with if you were not a member," **LIGHTNER** said. Some benefits from those relationships are intangible, but networking and the chance to work with people across company boundaries, and across the world, is of value to every professional, he said. "From an engineering point of view, it's the integral part of such things that really defines member value."

He would also inform his elevator companions that more tangible member benefits include the reduced conference registration fees they pay, and the free continuing and professional educational programs they get from various Societies.

He declared that he was up to the challenge of changing the opinion of many members who believe that the only benefit they get for their dues is a subscription to *IEEE Spectrum*.

**Q. What other kinds of products besides its traditional magazines, journals, and conference proceedings, should the IEEE develop to capture the fast-growing non-traditional technical areas of engineering?**

**LIGHTNER** noted that the IEEE is working on this and has some very exciting products on the horizon. Many companies now offer their employees electronic access to IEEE intellectual property products, not just for the current year, but often back to 1950, he noted. "You can access everything that the IEEE produces, including our standards. This is an amazing amount of material," he said.

He noted that some current features

are not widely known. For example, many members are probably unaware that the IEEE can produce and deliver multimedia transaction papers. In fact, many authors are not yet taking advantage of this feature for their papers.

"We should be capturing the tutorials at conferences and making them available in multimedia. We've looked at search and notification services, and we're rolling those out in new products," he said.

Notification services would involve members establishing a profile about technology they are interested in—say, microwave oscillators—using key words, and whenever a paper is published with those key words, they would be notified. He also explained that the IEEE needs to annotate its products so that, for example, those looking at a particular paper would know that 2500 or 25 000 other people also thought that paper important. Another service could suggest related papers.

Finally, looking into the future, **LIGHTNER** said the IEEE should be able to take its papers apart and present them in a database as separate documents to be searched. "Normal dynamic Web pages take reports and break them into units. It can be the introduction, it can be figures; they're all separate units that are pulled together to create that online report," he said. "We can consider

taking our papers apart in the same way—introduction, conclusion, figures, etc.

"So if you are preparing a survey, you might want to search for and review all 250 introductions of related papers," he continued. "Or you might want to get all schematics for DRAM [dynamic random-access memory, a type of memory used in most personal computers] cells published over the last eight years with links to the full pages if you need them."

**ANDERSON** pointed out how well-known the IEEE is for its intellectual property and its publications, particularly because these papers and articles have been vetted and edited by knowledgeable people. He sees this as one of the big advantages of IEEE publications.

He had several areas of concern, though. One was that the IEEE should not get into non-traditional areas such as "Internet for Dummies" or similar training materials for beginners because that field is already very competitive. Another concern was that some people don't understand the concept of fixed costs and variable costs for products.

"The problem is, everybody looks at what's out there now, and they say 'Let's have that for free,' or 'We ought to be able to donate that for free because it doesn't cost anything to distribute it,'" **ANDERSON**

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SON pointed out. "In reality, we've paid the fixed cost up front, with all the editing and vetting and effort to put this thing together." And those costs must be recovered, he said.

Lastly, he worried about the IEEE's being able to maintain its competitive edge in publishing. "What if other entities like universities decide they can do this job better than the IEEE, that they can have their own files and papers, and that they would also be searchable," he said. "To maintain a competitive edge, the IEEE needs to position itself as the premiere publishing organization of these types of papers."

That's the challenge, rather than putting popular non-traditional products on the Internet, he said. But as for emerging technologies, "we need to watch those very carefully for product opportunities."

**Q. Many volunteers are concerned that the IEEE is having difficulty attracting new volunteers to lead the organization. How would you attract the next generation of volunteers?**

ANDERSON noted that fostering volunteerism, along with improving industry relations and products and services, were identified by the IEEE Strategic Planning Committee last year as the major areas that needed strengthening.

But, he says, all efforts here really feed into another issue—retaining university graduates of the last decade, better known as GOLD, for short. "If we don't retain these recent graduates, we never can tap them as volunteers. Otherwise, we have a graying volunteer force, which I call our 'platinum members.'"

He called for building a bridge between the platinum members and the GOLD members. "We can't just discard the platinum members, or the Institute dies altogether. We can't get younger volunteers unless we retain our GOLD members. We've got to tie together the network of our platinum members with our GOLD members."

He suggested that the GOLD Committee and each Section identify their GOLD members, sponsor them, and provide them with mentors and advocates as a way of developing a network between the two groups. "If you can make those networks work, you may have the beginnings of many beautiful relationships," ANDERSON said.

He noted that teaming up GOLD members and industry engineers was another example of his membership advantage theme.

Reflecting on his own career, he said, "I would have never gotten to the point that I am without a good advocate, a good mentor, a good sponsor, and a good counselor. The IEEE can get more volunteerism, I'm

confident, out of our younger members, if we start to welcome and integrate them into the organization."

LIGHTNER sees attracting volunteers as a key issue.

"If we had to pay for the services of our volunteers, simply on the intellectual property side, we would pay somewhere between US\$500 million and \$1 billion a year," he said. "We cannot exist as an organization without active volunteers. It's absolutely essential and critical that we attract volunteers. This means attracting and retaining members."

One solution, he said, is to increase the organization's visibility by labeling everything reasonable with the IEEE brand. For example, every electrical and computer engineering department around the world, bar none, should have the IEEE logo on its Web site, with hotlinks to a site suitable for the students and faculty from that organization.

Companies that buy IEEE products also could co-brand with the IEEE, LIGHTNER said. For example, if they put the IEEE logo on their Web sites in an appropriate place, "the IEEE will set up a Web site that's customized to the company and supports its engineers. As an engineer, then, you would be seeing IEEE everywhere," he said.

If the IEEE disappears from the view of the working professional, "we're not going

to solve the volunteer and member challenge, no matter what we do," he said.

LIGHTNER also called for a better understanding of why students drop out of the IEEE after they graduate and then rejoin later in their careers. "We have to understand what the trigger points are to bring people back in," he explained.

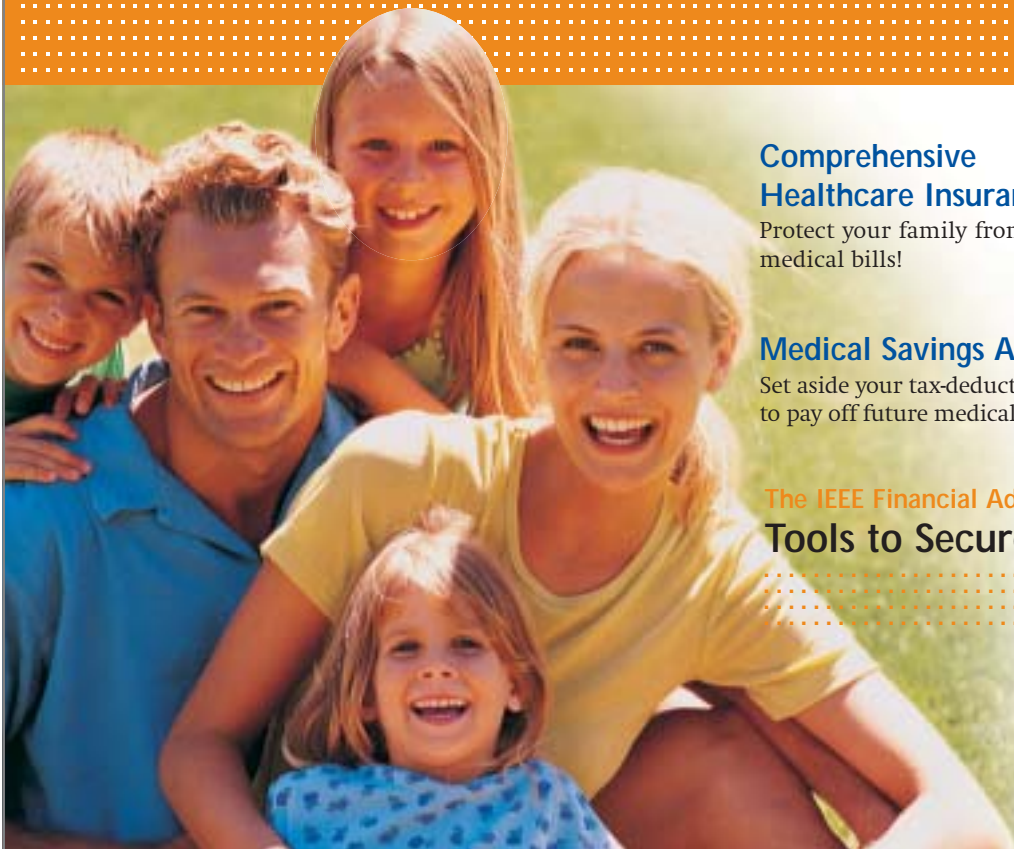
Through branding and a different way of positioning the IEEE, "people would never think of not being members," he said. "We may also need different kinds of membership, different levels of membership, different ways of participating, so we would be broader in what we offer. I think that will allow people to stay on board in a more flexible way and to change their level of participation as their time and resources allow." ●

**ON THE WEB.** More questions and answers from the candidates' forum can be found on *The Institute* Online at [www.ieee.org/theinstitute](http://www.ieee.org/theinstitute).

To learn more about this year's candidates, visit the IEEE election site at [www.ieee.org/organizations/corporate/candidates.htm](http://www.ieee.org/organizations/corporate/candidates.htm). Also, each President-Elect candidate has his own Web site. See W. Cleon Anderson: <http://www.cleonanderson.com> and Michael Lightner: <http://ece.colorado.edu/~lightner/IEEE>.

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# Investment in Computer Security Pays Off, Expert Says

BY HELEN HORWITZ

“COMPUTER SECURITY is much more than a research interest for me,” says Eugene Spafford. “It’s something where I can make a difference in the world, and I believe I can play a unique role there.”

Spafford may soon play that role on a larger stage, thanks to his having been selected for appointment, along with seven other IEEE members, to the U.S. President’s Information Technology Advisory Committee (PITAC) [see sidebar, right]. An IEEE Fellow, Spafford has devoted more than 20 years to developing reliable computing and network security systems, and he has worked on improving information security, computer crime investigation, and information ethics. The proposed members of PITAC—the total of 25 are leading IT authorities—are to provide President Bush with expert, independent advice on advanced information technologies.

Spafford, a professor of computer sciences at Purdue University, Lafayette, Ind., USA, is founder of Purdue’s Center of Education and Research in Information Assurance and Security (CERIAS), an interdisciplinary organization with faculty and students representing six schools. As director of CERIAS, he oversees one of the world’s leading centers for exploring the technologies and methods for ensuring information security and reliable software. With support from industry sponsors, CERIAS operates a range of programs—from the purely technical, such as intrusion detection and network security, to those dealing with ethical, legal, educational, and economic issues. The center also offers instruction for preparing K–12 education curricula in computers.

## A bountiful source

Through its faculty and students, the center is also a source of expert speakers, acts as a resource for journalists and other researchers, and develops special outreach projects. For example, for this year’s Indiana State Fair, CERIAS created a display on how to prevent identity theft.

“Our multidisciplinary approach sets us apart and gives us an important breadth of vision,” explains Spafford. “Early in my research of computer security issues, it became obvious that many of the concerns are not in computer science disciplines but in management, psychology, sociology, education, communication, linguistics, and philosophy.”

Spafford, who also is a professor of philosophy at Purdue, points to hefty ethical challenges that arise. “Some ethical problems are



*Eugene Spafford [second from left], along with other security experts, appeared before the U.S. House Committee on Science at a hearing held in October 2001 to discuss how to protect the United States from cyber attacks.*

## Eight IEEE Members To Advise On U.S. Information Technology

In addition to Eugene Spafford, seven other IEEE members in the United States were among the individuals selected for President George W. Bush’s Information Technology Advisory Committee (PITAC).

Member Bernard Daines is chairman and CEO of Linux Networkx, in Bluffdale, Utah. His company has built some of the world’s largest cluster computer systems and has developed hardware and software for overall system management.

Affiliate Member Judith L. Klavans is the deputy vice president of university libraries at Columbia University in New York City.

Fellow Edward D. Lazowska of the University of Washington, Seattle, will co-chair PITAC with Spafford. He holds the Bill and Melinda Gates Chair in the university’s department of computer science and engineering.

Fellow David A. Patterson is a professor of computer sciences at the University of California, Berkeley.

Senior Member Daniel A. Reed is director of the National Computational Science Alliance and also of the National Center for Supercomputing Applications, both at the University of Illinois, Urbana-Champaign.

Fellow David H. Staelin, a professor of electrical engineering at the Massachusetts Institute of Technology, Cambridge, works in the areas of remote sensing, estimation, and telecommunications.

More information about the committee is at <http://www.itrd.gov/pitac/index.html>.

handled by individuals who lack the right framework to consider them properly,” he says. “For example, if someone discovers a security flaw, what is the best way to handle it?” Should the person keep quiet, hand over the problem to a vendor, or discuss the flaw in a mailing list?” he asks.

These and other approaches are used, he notes. But they should also, Spafford says, “use tools like models and cost-benefit calculations to deal with the ethical, legal, and economic aspects of information security.”

He says both better education and better tools are needed for those handling these issues. “This way,” Spafford affirms, “we’ll empower them to make better decisions.”

The computer security expert says many information technology (IT) breaches over the last decade happened because the compromised system was a few dollars cheaper to buy than another. “But the individuals

responsible for the buying decisions had no purchasing guidelines to help them quantify risk, maintenance, reliability, or other crucial downstream consequences,” he notes.

“The consequences of mishandling a security flaw,” Spafford cautions, “can result in an increased number of system break-ins, additional strain on law enforcement, and damage to corporate reputations. These are not technology issues, but [they are] ethics issues. What is the right thing to do?”

In 1991, Spafford, who is also a fellow of the Association for Computing Machinery (ACM), participated in a joint ACM–IEEE undergraduate curriculum committee to recommend standards. One of his key contributions was suggesting that security coverage, along with social and ethical issues, be required subjects in computer science programs.

## Hooked early on computer security

Gene Spafford became interested in computers as an undergraduate at the State University of New York–Brockport, USA. Then, while working toward his master’s and doctoral degrees at Georgia Institute of Technology, Atlanta, USA, he got hooked on microcoding and operating systems development, and also fell in love with teaching. He also was intrigued by computer reliability and security issues.

“In 1983 I was warned that computer security was not a suitable career path unless I wanted to pursue theory,” he muses. “I continued to work on security almost as a hobby. I noted in my doctoral work how difficult debugging is, and I did extra, post-doctoral work on code verification and testing technologies.”

A defining career moment came for him in 1988, when Robert Morris unleashed his infamous “worm” program on the Internet, causing computer systems to crash at many universities and military and medical research facilities, among others. Spafford analyzed the program, which had hit his systems, too. And because of his activities in Usenet, a global online discussion system, and as a well-known member of several online security discussion groups, others turned to him for advice. “My analysis, done at first for my own edification and for my students, turned out to be very widely sought by others,” he says.

Subsequent activities, including collaborating with colleagues on new, secure systems, helped to cement his reputation and validated the new field of computer and network security. These experiences eventually prompted Spafford to form Computer Operations, Audit and Security Technologies (COAST), a shared-resources lab at Purdue that is now part of CERIAS.

He is especially proud of CERIAS’ community involvement. “This past summer, we operated a boot camp for smaller four-year schools, especially those serving students like women and older students who are underrepresented in computer science,” he says. “Faculty members received certification allowing them to create new courses on information security. Also, CERIAS is teaching Indiana public school administrators the importance of protecting student records, as well as instructing K–12 teachers on how to protect this information.” ●

## MEMBER RECOGNITIONS

### Communications CEO Leads Canadian Academy

BY THERESA POULSON

IEEE FELLOW MORREL P. BACHYNSKI LEFT farm life in Saskatchewan, Alta., Canada, behind to make his mark on the communications industry as CEO of his own technology firm. He'll use the leadership skills he learned along the way in his new role as president of the Canadian Academy of Engineering in Ottawa, a volunteer position that he took on in June.

Established in 1987, this nonprofit organization is composed of 265 professional engineers from all disciplines who have been nominated to the academy for the significant contributions they have made in their fields or for service to their profession. The group serves Canada on all issues of engineering and technology.

"My personal interest is to see the academy grow in recognition and stature," Bachynski says of his appointment, "by being active in issues concerning the engineering profession."

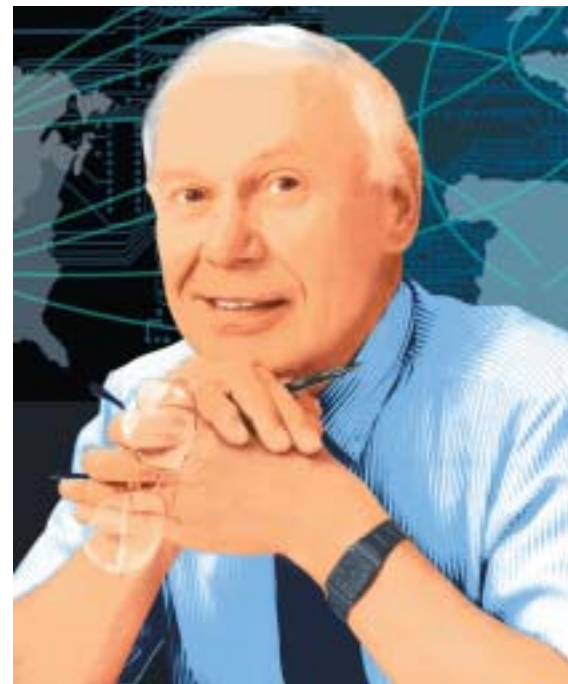
As head of the academy, he plans to raise public awareness of the important role engineering plays in society and to encourage young people to take an interest in the field. He also hopes to help Canadian engineers improve their professional qualifications, which were examined in an academy paper, "Assuring Competence in the Canadian Engineering Profession."

Bachynski also wants the academy to continue to influence Canada's energy conservation efforts as the country strives to meet its commitments to the Kyoto Accord, the 1997 global treaty limiting greenhouse gas emissions. The organization is currently investigating the possibilities of developing several key energy technologies highlighted in a study it sponsored, "Energy and Climate Change."

Bachynski brings to his position the experience he gained as CEO of MPB Technology, in Montreal, a business he helped found in 1976. He earned a Bachelor of Science in engineering physics from the University of Saskatchewan in Saskatoon, and went on to earn a doctorate in physics from McGill University in Montreal. "I was interested in all things practical, excluding farming, so God left me engineering," Bachynski says.

He began his engineering career in 1955 with RCA Canada in Montreal as a research engineer concentrating on nuclear fusion. During a company restructuring, Bachynski had the choice of transferring to an RCA job in the United States or switching fields. He opted to try something different, and in 1976 he and about a dozen people from the research and development team at RCA formed MPB. "The initial idea of the company was to get research contracts and evolve those into commercial products," Bachynski notes.

MPB, which had about CAN\$35 million in sales last



year, took on a more visible role in 1987 when it assisted in the design, development, and manufacture of the routing switches for the undersea cable, the Transatlantic Telecommunications-9 System. Known as TAT-9, the cable connects Canada, France, Great Britain, Spain, and the United States.

Bachynski's engineering experience should come in handy as he tackles the numerous national issues on his agenda for the Canadian Academy of Engineering. ●

## IN MEMORIAM Bruno O. Weinschel, 1986 President

BY RICHARD J. GOWEN

IEEE Life Fellow and 1984 President

MY FIRST IMPRESSION OF BRUNO was of a technical person who well understood engineering and what it took to be innovative. He was detail-oriented and worked closely with his employees at Weinschel Engineering Co., now MCE/Weinschel Corp., the company he established in Frederick, Md., USA, in 1952. It specialized in the study and application of microwaves.

He was a hands-on manager. He knew who was involved in what projects, and knew how they were being done, and he understood the technology that was at the heart of a project. One of his great strengths was his knack for being well organized and well prepared.

It was his technical understanding, along with his work with the U.S. Department of Commerce and the former National Bureau of Standards (now the



National Institute of Standards and Technology), that made him well suited to serve, in 1976, as vice president of IEEE Professional Activities and to chair the United States Activities Board (USAB), which later became IEEE-USA. I had been

involved with USAB and was serving on the IEEE Board of Directors at that time, and Bruno and I became friends and worked together on a number of projects.

Bruno was a very special person, deeply dedicated to science and to making changes in the way industry and government worked together. He reveled in working in Washington, D.C. He felt the IEEE clearly had technical pre-eminence in the world and wanted the organization to develop an effective lobbying arm to assist the U.S. Congress and the U.S. Office of Science and Technology Policy to form policy that would encourage technological innovation and research. Ultimately, he hoped this would lead to the development of new industries. He helped develop technology policy that fostered competitive growth, which became the hallmark of the USAB.

As President of the IEEE in 1986, Bruno provided the impetus behind a new plan to make IEEE publications available

in electronic format. He prepared the organization to take the next step beyond print by laying a foundation for electronically storing large amounts of technical information and transmitting it to members. He also saw clearly that the traditional modes of sharing information about new technologies through publications and conferences could also be converted into electronic courses, enabling people to get the just-in-time information they needed for their work.

In 1884, Thomas Alva Edison and Alexander Graham Bell were of the opinion that if the American Institute of Electrical Engineers, one of the IEEE's predecessor societies, could foster the application of technology to industry, then technology, in turn, would change how everything functioned. Bruno was a true leader in fostering this same spirit in the IEEE; he epitomized the founding values of the organization. ●

**BRUNO O. WEINSCHEL, 83**

**DIED:** 6 May 2003

**MEMBER GRADE:** Fellow

**EDUCATION:** Technical University, Munich, and Columbia University, New York City

**FIELD OF INTEREST:** Microwave engineering

**CAREER MILESTONES:** Engineer at Bell Laboratories, Industrial Instruments, Jersey City, N.J., USA; section chief of the National Bureau of Standards (now the National Institute of Standards and Technology in Gaithersburg, Md., USA); founder of Weinschel Engineering Co., now MCE/Weinschel Corp., in Frederick, Md., USA.

**IEEE VOLUNTEER ACTIVITIES:** Vice President for Professional Activities; Chair, IEEE-USA; Member of the Standards Committee on Precision Coaxial Connectors 1978-1979; Secretary, IEEE Board of Directors, 1980; IEEE President, 1986.

**AWARDS:** Served with the President's

Committee on the U.S. National Medal of Science; held 20 patents on microwave measurements; William A. Wildhack Award from the National Conference of Standards Laboratories for contributions to metrology; IEEE Richard M. Emberson Award for his leadership in IEEE activities.

# Services At Your Service

BY ERICA VONDERHEID

THE IEEE IS WELL AWARE that often the only contact many members and customers have with the IEEE is through its Member Services or Customer Services associates. With that in mind, increased efforts are being made to answer inquiries as quickly and as completely as possible.

"Everything we're working on is aimed at improving the experience of members and customers," says Marianne Schmidt, director of the IEEE Member Services Contact Center in Piscataway, N.J., USA.

"Our mission is to handle a piece of e-mail or other correspondence or a phone call once, do it right the first time, and make whoever contacts us happy," adds Kathy Burke, manager of Customer Services. "Some Customer Services associates may spend an hour researching something to make sure the customer gets what he or she needs."

Burke reports that most e-mails to Customer Services are answered within 4 hours and a ringing telephone is answered within 12 seconds. Also, only 0.5 percent of callers hang up before the call is answered, well below the 5 percent "abandon rate" standard in the customer services industry.

## Constant improvements

Member and Customer Services representatives are proud of their responsiveness record, but they are not resting on their laurels. Three times a year, Schmidt's team surveys about 1500 members who had recently contacted Member Services to rate their satisfaction with the experience and to discuss how to do better.

"We want to be proactive in making improvements, and the only way to do that is to reach out to members to ask them what they'd like," Schmidt says.

Based on what was learned from such

surveys, Customer Services is working on a procedure for scanning documents, like renewal and subscription forms, an improvement Member Services made last year. Service associates will be able to access these scanned documents in real time from their computers while on the phone with the customer, rather than having to riffle through file cabinets or storage boxes to find information. This initiative is part of the IEEE's electronic communications plan, aimed at eliminating as much paper as possible and providing instant access to information.

## Do-it-yourself IEEE

Service representatives staff the phones and respond to e-mail and postal mail inquiries from 8 a.m. to 5 p.m. Eastern Standard Time, Monday through Friday. But often you can resolve a problem yourself by going online. From the IEEE home page at [www.ieee.org](http://www.ieee.org) and the Member Services Web site at [www.ieee.org/services/index.html](http://www.ieee.org/services/index.html), you can find a host of links to help you update information, change passwords, and add services.

For example, you can update your mailing address, telephone number, and e-mail address through a Web-based form found by selecting "Membership" on the left side of the IEEE home page. And, at this same membership site, you can add services, such as Society memberships or subscriptions, by using your IEEE Web Account. Also through the Web, you can change your IEEE e-mail alias or your IEEE Web account password.

Many forms, such as those needed for membership elevations or renewal, are also found online at "Manage Your Membership," which is on the Membership page. But if you aren't comfortable using these online applications, Member Services associates are available by telephone and e-mail to guide you through the process.

If you need more help or can't find what you are looking for, Schmidt recommends contacting Member Services using a Web form found at [www.ieee.org/memberservices](http://www.ieee.org/memberservices). With this in hand, representatives can resolve your problem quickly, without hav-

ing to contact you again to request items like your member number or address.

If you're in a buying frame of mind, you can purchase books, standards, single issues of IEEE journals, transactions, and magazines, conference proceedings, and IEEE merchandise, including membership pins, through the IEEE Catalog and Store at <http://shop.ieee.org/store>.

## Who you gonna call?

If you are unable to resolve a problem through online tools or an e-mail, it's time to talk to a real person. But if you aren't sure whether your inquiry is member- or customer-related, Schmidt offers a simple way to determine whom to call. If your question is about a tangible product, such as a book or conference proceeding, call Customer Services. If you're calling about a member benefit or subscription, contact Member Services. ●

Contact Member Services online at [www.ieee.org/memberservices](http://www.ieee.org/memberservices)

E-mail: [member-services@ieee.org](mailto:member-services@ieee.org) and [customer-service@ieee.org](mailto:customer-service@ieee.org)

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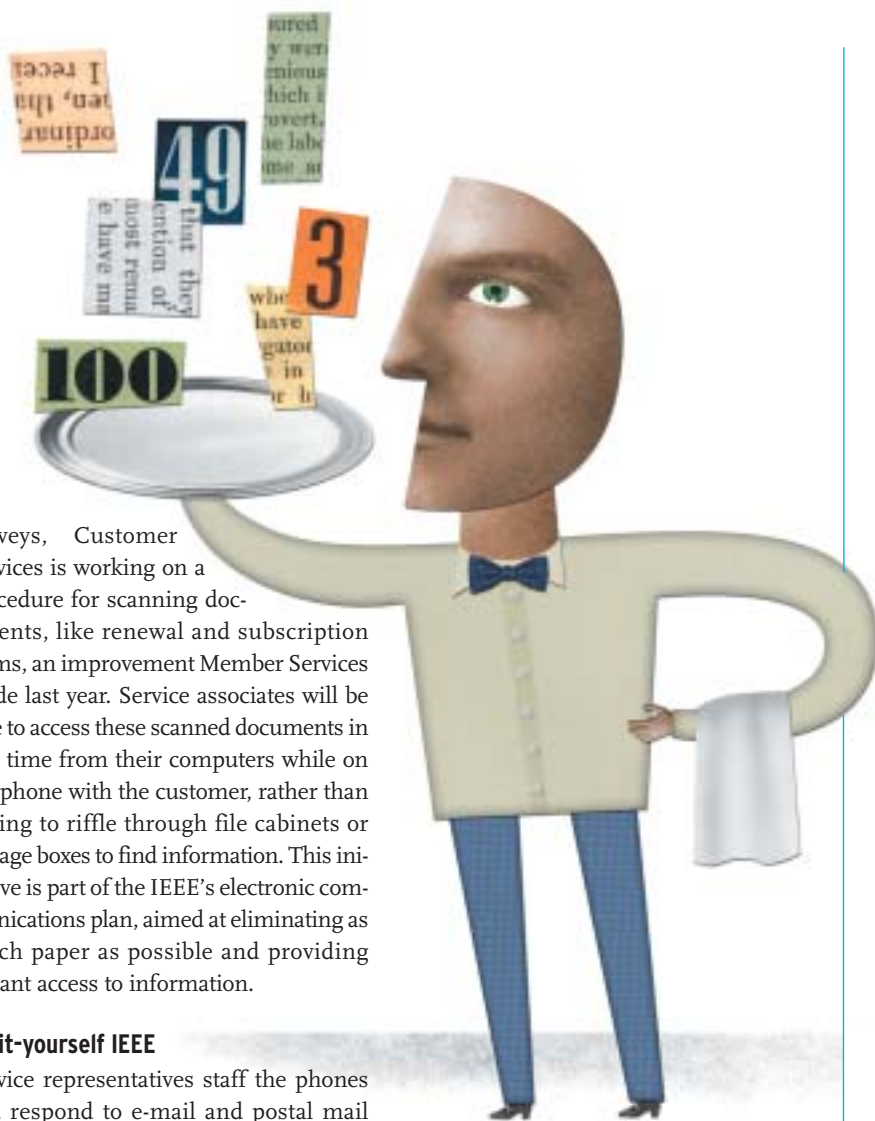
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## Tools to Secure Your Tomorrow



## FINANCIAL ADVANTAGE

# Financial Program Doubles Services in Decade

BY CAROL GOODALE

In addition to marking the IEEE's 40th year, this year is the 10th anniversary of the IEEE's Financial Advantage Program, known as FAP. The program was launched in 1993 to provide members with nontechnical benefits, like life insurance, financial services, and business services. The IEEE was one of the first professional organizations to offer such benefits to its members.

FAP began with 15 benefits packages, and over the past decade, the number of products it offers has doubled to 30. Today, more than 100 000 IEEE members around the world use one or more FAP products, which now run from health, home, and business insurance to purchasing programs for computer equipment and office supplies.

The size of the IEEE's membership helps FAP when it negotiates prices for the products it offers.

"We can leverage the buying power of our membership to offer high-quality providers and competitive pricing," explains IEEE Member Leann Kostek, a past

chair of the Individual Benefits and Services Committee (IB&SC), the volunteer organization that oversees the program.

The IB&SC plays a key role in reviewing potential products and determining which ones to develop. The committee "is like the members' conscience, bringing forward new products and services that are appropriate for consideration," Kostek says. It consists of regional representatives, plus the IEEE treasurer, and other members representing Membership Development and IEEE-USA.

The committee either accepts a program or, when it needs advice, refers it to the Insurance Committee, a consulting group of insurance and financial industry experts. The IEEE's Executive Committee has the final say on which programs will be offered to members.

"One criterion for selecting new programs is that they provide a benefit better than the members can get on their own," says George McClure, a former IB&SC chair. "FAP products address members' different needs

at various stages of their life cycles."

McClure notes that programs added during his tenure included homeowners' and professional liability insurance.

More recent offerings include dental insurance that now covers orthodontics, and a program known as Lifeline Screening that will check on a person's chances of suffering a stroke, abdominal or aortic aneurysms, peripheral artery disease, and osteoporosis.

Over the past 10 years, the IEEE has received nearly US\$20 million that was generated by the various programs. This money helps support other IEEE programs.

The benefits offered by FAP also serve to fulfill what the IEEE's manager of member benefits, Brian Anderson, calls the four "Rs": recruiting new members, retaining their continued participation, recovering members whose dues have lapsed, and lastly, recognition for the IEEE by sponsoring outside activities.

For example, FAP has financially supported several student robotics competitions hosted by IEEE Regions. In this way, FAP provided recognition by promoting an awareness of the organization, an awareness that reaches into the next generation of members.

For more information, visit [www.ieee.org/fap](http://www.ieee.org/fap).

● "One criterion for selecting new programs is that they provide a benefit better than the members can get on their own."

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