Should I Worry About Digger???

by Jim Woodyard, IEEE/SEM Secretary

Sitting on the IEEE/SEM EXCOM, as well as both national and international IEEE bodies, for almost a decade has given me ample opportunity to view IEEE programs, think about the future of the engineering profession AND worry. I must admit that my personality type lends to worrying and that I really need things to worry about. The question is what should I worry about? People who know me well can tell you that it is not in their best interest to have me worry about something that falls under their purview because things are likely to start happening when I worry.

The way I prioritize matters for the worry list is, if possible, to "look at the numbers." I have no interest in worrying about professional matters that are not well founded in numbers because I have many personal matters to worry about. A long standing item on my worry list that does not lend itself to quantifying is Digger. Digger is the feline resident in my home, and I find it comforting to worry about the amount of quality time I spend with him. Admittedly, he is far down the worry list, but he is on the worry list should professional matters not meet the numbers test.

The item that is a candidate for my worry list, and on which I want to seek your advice, is the **viability of IEEE student branches**. Here in the Southeastern Michigan Section of IEEE there are nine student branches with levels of activity ranging from award winning to inactive. There are 642 student members in the section. The numbers are impressive. If one is looking for a local IEEE matter to worry about, this item certainly warrants some attention. So, what could I find to worry about in this regard? Using a trite, but popular slogan, are they "all that they can be?" If they are, then Digger is always there for me to worry about. The question that I asked myself is: What kind of numbers are around that can be used to determine if the student branches are all that they can be?

Before telling you about the numbers, I guess that I had better "fess up." Honesty is something that my mother felt strongly about, and it lurks in my subconscious. I know that I bring biases to looking at numbers, and my biases may influence considering the viability of IEEE student branches. So here goes ... I am on the faculty at Wayne State University, and last year, upon returning from a sabbatical, I noticed that student enrollment in the College of Engineering was down, I mean really down. Also, the IEEE student branch was inactive in our department. It occurred to me that a viable student branch could play a role in student retention. After all, a student branch fosters leadership, design competitions, projects, general body meetings, contact with faculty and student camaraderie. Students have told me that these things are important to them. In a moment of self righteousness, I volunteered to serve as student branch advisor and initiated the arduous task of activating the student branch both within the university and IEEE. This is a topic for another article, assuming the editors invite me to write another one after reading this one.

Well, there is something else that my conscience forces me to tell you. In as much as I am weighing worrying about student branches against Digger, Digger bites when I play with him, and I have mixed feelings about his priority on my worry list. These two biases could make it easier for the issue of viability of IEEE student branches, and other matters related to it, to get on my worry list. That might not be fair to people who would be put in a position of dealing with me. Let me tell you the current status of affairs in this regard. I request your help in deciding if this matter should be placed on my worry list or if I should just worry a lot more about Digger. I really need you to scrutinize my processes and numbers in looking at this matter.

I called IEEE Headquarters and asked Rose Nelidin in the student services office if she had data on student membership for the 1990-96 period. She was in a most cooperative spirit and agreed to fax membership tables from IEEE annual reports. Within a couple hours, they arrived, and I anxiously key stroked the numbers into a spreadsheet while I puzzled over the best way to display membership trends. Figure 1 shows the results of my thought processes; it displays the ratio of student members to total membership for three IEEE groups, namely, the entire IEEE organization denoted by the legends marked IEEE, Region 4 and our section.

The data for 1994 are suspect and perhaps should be used to argue that the numbers are just not good enough for use in the considerations at hand. However, if you have worked with the IEEE database over the years, you know it has suffered from system change-overs and management problems. Mark Hunter of our section has been maintaining the IEEE/SEM membership database; the way he rants and raves when he finds IEEE members with Australian addresses in the IEEE/SEM database has become a source of entertainment at our monthly EXCOM meetings. In fact, all of us now look forward to his reports.

If you will permit me, I will continue this process and suggest that we look at the numbers over six-years. It appears, if we neglect the 1994 data, that Figure 1 shows a trend, and perhaps something real is happening. The data suggest that, since 1990, the fraction of IEEE membership made up of students has decreased. Interestingly enough, our section has a significantly larger fraction of students than both Region 4 and the entire IEEE organization. Maybe there isn't a
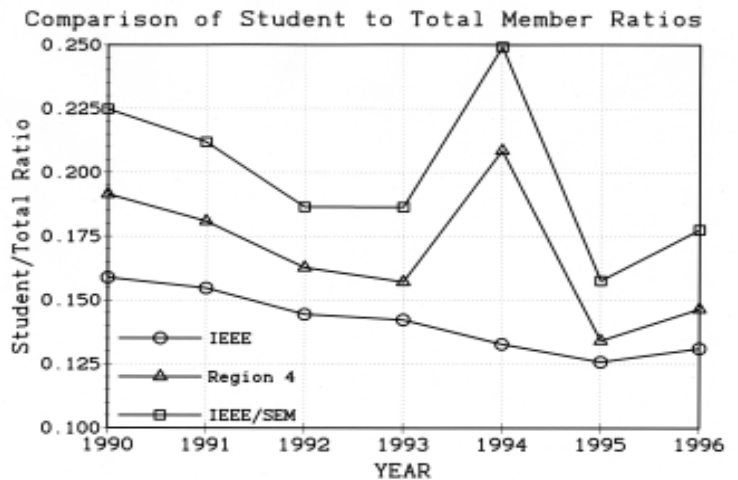
Figure 1: Comparison of the ratio of student to total membership for IEEE as a whole, Region 4 and IEEE/SEM.

problem in our section. Perhaps IEEE Headquarters isn't being all that it can be, and we are just doing fine. Maybe we would be doing even better if it wasn't for them. Hey! Maybe if they got it right, it would turn out that the 1994 numbers are correct and all the other numbers are wrong because several of our members have been listed in an Australian section database.

Next, I mused on a way to present membership trends. I wanted to be able to present you with the absolute membership numbers and the trends at the same time. Figure 2 is an attempt to display the memberships and trends for various IEEE groups. The curves are normalized to 1990 data and displayed with a legend that includes 1990 membership. The graph is rather "busy" but shows the relative membership of groups, and can be used to determine the annual membership for any one of the six groups. The figure shows that total IEEE membership has decreased only 2% percent over the 1990-96 period; Region 4 and IEEE/SEM memberships have decreased by about 11 and 14%, respectively. Student membership data show a more alarming

Or ... Darn Those Numbers!!!

trend; *Region 4 and IEEE/SEM student memberships have decreased by about 32% percent over the six-year period!* Should I worry about this? Is Digger's priority on my worry list in jeopardy? Figure 2 raises two questions: What are the enrollment trends in engineering, and what fraction of engineering students is student members of IEEE?
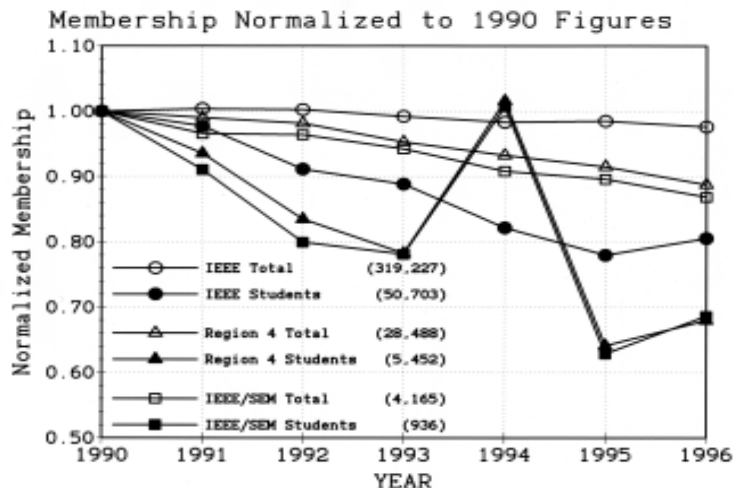

Figure 2: Memberships normalized to 1990 for various IEEE groups. The 1990 membership for each group is shown in parentheses.

Again, I got lucky! I found two people who went beyond the call of duty and helped me find the needed numbers. With the assistance of Carol Heckman at Wayne State University and Paulette Lashley at the American Association of Engineering Societies (AAES), I was able to gain access to an annual publication entitled "Engineering and Technology Enrollments." The publication contains fall semester enrollment data for U.S. institutions. The publications are produced by the Engineering Workforce Commission of the American Association of Engineering Societies, Inc. Between Carol and Paulette, I was able to obtain numbers for the 1990 through 1996 period.

The relevant numbers from the publications are presented in Figure 3. The figure shows the total fall semester undergraduate engineering enrollments in U.S. institutions for the 1990-96 period. It includes both full and part-time students. Enrollments in all engineering programs decreased from 380,287 in 1990 to 356,177 in 1996, a reduction of abut 6%. Electrical engineering programs in the same period decreased from 97,128 to 69,604, about 28%. An optimist will point to the slope of the electrical engineering data and suggest that enrollments have almost "bottomed out." A pessimist will ignore the deviation from linearity in 1995 and 1996, and project the straight line to zero enrollment. The pessimist will find that the enrollment in electrical engineering programs will be zero at 9:18 a.m. on August 12, 2005. *At that time, there won't be any electrical engineering students in our classrooms to encourage to join IEEE.* Gee whiz! I didn't expect to find out this when I started on this number thing. Poor Digger! Will he even want to live in my home if I start worrying about this problem? There must be something wrong with the numbers! Anyway, this doesn't seem to have anything to do with IEEE. Whose problem is this? I'm really confused and need your help at this point. Won't early registration via the Internet solve the problem? Will professors turn around from the chalk board to see if there are any students in their classrooms as 2005 approaches?

Since I am not sure that I will retire before 2005, and Digger bit me last night, I decided to look at the enrollments in computer engineering programs.

After all, a significant number of IEEE members are either working in computer-related fields or studying computer engineering, and many of our students are also working in the computer area. Figure 3 shows that enrollments in computer engineering have increased from 24,683 in 1990
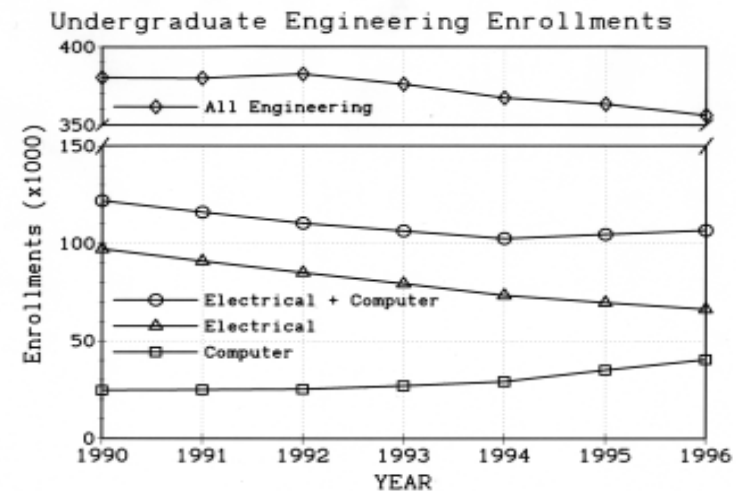

Figure 3: Undergraduate enrollments for all areas of engineering, and electrical and computer engineering for the 1990 through 1996 period.

to 34,991 in 1996, by about 42%; the positive slope suggests the growth will continue. Including computer engineering students with electrical engineering enrollments results in an enrollment decrease of is *only 14%*, and I should retire before the curve passes through zero enrollment. This is great news! Also, electrical engineers really like working with computers; they can teach courses on computers. *Retirement is guaranteed!* What about IEEE's problem? Again simple! Just assume that computer engineers are as likely to join IEEE as electrical engineers, clearly an optimistic point of view, but hey, why not? It looks like I should invest in a pair of leather gloves because it appears that I am now free to worry about Digger.
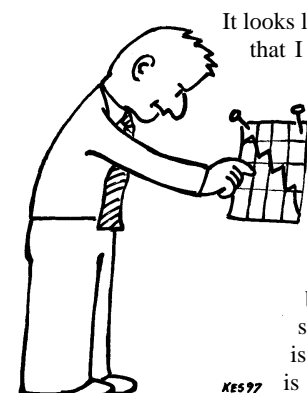
It looks like this number thing has raised some issues that I wasn't really prepared for, like maybe my job is more important to me than the viability of IEEE student branches. Now I am really in trouble, and that honesty thing really makes it hard for me to deal with all these complex issues. On second thought, that's not the case with me. I am an altruist, and students are more important than my job, so lets get back to the viability of student branches. Realistically, the decline in the student enrollment pool for IEEE membership is somewhere between 28 and 14%. Maybe it is 28%. This is close to the 32% decrease in student membership in our section. Well ... it looks like IEEE/SEM is doing just fine! The reduction in student membership is *clearly* due to declines in engineering programs. Hey! Don't expect IEEE to worry about engineering enrollments. We all know they need to worry more about the United States Activities Board (USAB).

If this is an enrollment issue, then I can take a laissez-faire attitude, blame the shrinking pool of students on the K-12 system and worry more about Digger. I certainly would never, ever, ever suggest that the decrease in engineering enrollment at the universities is due to some flaw in the professoriat. We do our job very, very well, thank you! If there is a problem, it rests somewhere else. Just ask our students. They will tell you how we, the

professors, not the staff, spend a great deal of time providing them with useful career advice; we have developed a superior "seamless just-in-time" curriculum for them that involves freshmen and transfer engineering students with engineering curriculum during their first semester at our universities; we have developed outstanding teaching laboratories and we, the professors, teach the laboratories; we work shoulder to shoulder with them on national design competitions; and we use a lottery system to select the IEEE student branch counselor in order to preserve collegiality because so many faculty want the position. Wait a minute! Maybe you had better not ask the students. After all, what do they know about this? Yea, ask me, I'll tell you where the problem rests. Let see ... what about that honesty thing? What does mother know about this? I fibbed to her once when my brother and I broke Mr. Smith's basement window while hitting golf balls with a baseball bat, after she had repeatedly asked us to stop. She never found out that we did it. That's funny, why did she volunteer me to cut Mr. Smith's grass all summer and give me instructions not to accept payment? Could she have ... ?

Anyway, that takes care of questions about the professoriat. Lets get back to the numbers. Figures 2 and 3 can be used to determine the percentage of electrical and computer engineering students that are members in IEEE. In 1990 about 42% of the electrical and computer engineering students were student members of IEEE; in 1996, 39% were student members. Darn those K-12 teachers!

It seems to me that, while I have just begun the process of getting the numbers to determine if I should worry about the viability of IEEE student branches, I must have looked in the wrong places because the numbers don't look very good, and some other issues have surfaced that really complicate things. This isn't what I had in mind when I started this process. This is very ... very ... troubling. Gee, I just got an idea. I think I know how to handle this! Those IEEE numbers really aren't any good. Just ask Mark Hunter. Things are just fine with our student branches. What about those enrollment trends? Easy! The U.S. Post Office provides lousy service. They simply lose responses from a lot of the universities, and those bureaucrats at AAES are too lazy to follow up on things. That's why the AAES's numbers are down. Enrollments in electrical engineering are fine, thank you! What about the decrease in Wayne State University's enrollment in engineering? Again ... easy. We have a parking problem. Commuter students go to schools that have easy parking. Will the administration ever learn? Hey, I don't know about you, but I'm back to worrying about Digger, and leather gloves are on sale!

What about that honesty thing and mother? Boy, that's a hard one! Now I am confused again. Well ... I just don't understand the implications of all the numbers. I really need your help. Please send me an e-mail message at woodyard@eng.wayne.edu, and tell me if you think I should worry about Digger.

Section and Chapter Officer Responsibilities

This article outlines officer duties. The descriptions are intended to give a general idea of officer roles. The section encourages officers to find additional ways to serve local IEEE members.

Executive Committee: The Section Chair, Vice Chair, Secretary, Treasurer, Directors, and Chapter Chairs are members of the section's Executive Committee, known as EXCOM. This body directs and coordinates the section's activities. EXCOM meetings are typically held once a month, with no meeting in July. EXCOM members should attend the EXCOM meetings and are responsible for providing a status report to the Section Secretary when they can not attend a meeting. EXCOM members are also responsible for writing an article for *Wavelengths* during the program year.

Section Officers

Chair: Leads the IEEE/SEM section. Chairs EXCOM meetings.

Vice Chair: Organizes the spring and fall section meetings. Chairs EXCOM meetings in the absence of the Section Chair.

Secretary: Handles section's communications with other entities. Compiles annual section report for IEEE headquarters. Prepares EXCOM meeting agendas, takes minutes at EXCOM meetings, and disseminates meeting minutes.

Treasurer: Handles section's finances. Reports monthly on spending and income. Provides information to auditor for annual audit.

Directors

Technical Activities: Coordinates with chapter officers and the Section Vice Chair regarding technical sessions for the section meetings. Plans and arranges other activities of a technical nature.

Professional Activities: Coordinates job fairs, acts as an interface for vendor and university displays at the section meetings, and encourages members' professional growth.

Membership & Public Relations: Encourages and fosters IEEE membership through activities such as GOLD and mentoring. Maintains the section's membership lists, which IEEE headquarters provides, and disseminates membership statistics to section officers.

Chapter Officers

Chair: Ensures that at least two chapter meetings are held during the program year. (These meetings can be held jointly with other chapters.) Coordinates the chapter's activities.

Vice Chair: Typically responsible for organizing at least one meeting and coordinating chapter volunteer efforts.

Secretary-Treasurer: Submits meeting report forms to the Section Secretary for all chapter meetings in order to remain in good standing with IEEE as a viable chapter. Coordinates with Section Treasurer regarding chapter funding needs.