



Engineers and the Three Bears

Often, I feel like the high-tech equivalent of Goldilocks in the well-known children's tale—repeatedly hearing that we have too many engineers or too few engineers and occasionally hearing that we have just the right number. What I hear depends, of course, on

the source of this information. According to the American Society for Engineering Education (www.asee.org), the number of bachelor's degrees awarded in 2002 to 2003 increased 5.4% over the previous year; within this growth, the increase in computer science was even greater, at 8.2%. Master's degrees had a 12.1% increase, even more impressive.

At the same time, the National Science Board (www.nsf.gov/nsb) says that our "emerging and critical problem" is the looming shortfall in science and engineering labor, due to increased demand and the decrease in foreign-born students studying and then staying in the United States. The board notes that the United States now ranks 17th among nations in the number of 18- to 24-year-olds studying science and engineering, down from ranking third in 1974.

But wait. The Bureau of Labor Statistics (www.bls.gov) states that unemployment for engineers was in the 6.5 to 7% range during 2003, a sharp increase from previous years. And there is considerable anecdotal yet convincing evidence that the job situation is, as the euphemisms say, challenging.

My problem with all this "the-sky-is-falling" shouting is that, as an engineer, I like to investigate what the data represents, the ambiguities in it, and the techniques used to gather it. And this road has led me to more questions than answers. Just as with probing a noisy circuit

using poorly grounded and compensated probes, connected to a precise instrument with unknown calibration, you can get lots of data but only roughly valid numbers. The quality of our ability to measure this thing called the "number of engineers," our definition of "engineer," and the accuracy of the segmentation among the various engineering disciplines are just a few of my concerns.

TOO MANY ENGINEERS, TOO FEW, OR JUST RIGHT?

Further, those are just my retrospective concerns. When I see future-indicating numbers on students and degrees, my questions change. I wonder to what extent college degrees indicate graduate career paths. Perhaps, those institutions that see the need for more scientists and engineers are really looking to fill their classrooms with

tuition-paying students, and to get cheap assistants for their faculty's projects. I also wonder whether we know what types of engineers and how many we will need absolutely, or as percentage of the population. Productivity per designer has increased tremendously since the 1950s. No longer do we need an army of engineers to manage the paperwork, databases, and design; we have EDA, CAD, PLM, MRP, and other acronym-labeled tools to get us through almost every aspect of the design process.

When I step back and distill the data and my questions, my conclusion is clear: No one knows with any real accuracy how many engineers we'll need, however you define that need. So many uncertainties exist in the way the data is taken, the way

roles are defined, the paths that technologies will take, and all aspects of the data-definition, -collection, and -analysis chain, that any conclusion could be way off. It would better to focus on enhancing engineering's attractiveness, so the people with the natural inclinations, talent, and necessary training, will follow. □



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