Fashioning a Foundation for the Computing Profession

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T o paraphrase the opening sentence of Jane Austen's *Pride and Prejudice*, it is a truth universally acknowledged that a new column must be the better for a solid foundation. If that column is called "The Profession," the foundation must provide a clear appreciation of what a profession is and is not. A profession must in turn be distinguished from a craft and from a trade. All three of these collective nouns—profession, craft, and trade—denote a college of practitioners who share a body of skills and knowledge. But each differs in the responsibilities it places on its members.

CRAFTS AND TRADES

A craft's members are primarily responsible to their fellow practitioners. A craft will survive only if its products attract continued custom, and those who are not sufficiently skilled in a particular craft will not be acknowledged as members of it by those who are.

Members of a trade, on the other hand, are as responsible to their clients as to each other. Further, a lack of skill or knowledge in trade workers, such as electricians or auto mechanics, can endanger their—or their employers'—clients. Thus, government regulations typically control a trade's conduct, while official certification controls its membership.

A trade's members have traditionally supported each other by joining together in guilds or unions. These organizations can negotiate with employers and governments to ensure that their members are well paid and well provided for in the workplace.

A craft's members are not usually regulated in what they can charge for their work, nor do they have any power to prevent outsiders from practicing their craft. Members of a trade are regulated, and outsiders usually cannot practice the trade in public.

Because it is unregulated, a craft—such as acting or athletics—will have a few successful members who are extremely well rewarded. Most of its members, however, receive no compensation beyond their own satisfaction. On the other hand, even modestly successful tradespeople can expect a remuneration generous by ordinary standards, and assured for them by regulation. Unless they establish a large business of their own, however, tradespeople cannot expect to be paid even a small fraction of what the entertainment and sports industries pay their star performers.
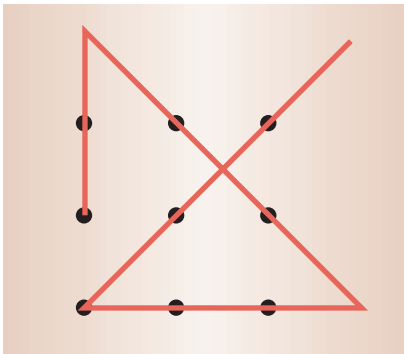
PROFESSIONS

Like trades and crafts, professions are distinguished by a shared body of knowledge and skill. Professions typically publish magazines, journals, and books that confirm and promote their particular body of knowledge.

In a craft, such as woodcarving or ice hockey, knowledge is focused on the materials or performances being crafted, while skill is focused on applying techniques—and possibly tools—to the work at hand. In a trade, such as plumbing or auto mechanics, knowledge is focused on the trade's tools, while skill is focused on the procedures in which the tools are exploited to achieve a standard result using standard materials. In a profession, such as doctoring or engineering, knowledge is focused on improving the material health or welfare of the community, while skill is typically focused on the process of guiding others in their trades, businesses, or private lives.

> **Members of a true computing profession must look beyond the problems they are paid to solve, paying heed to how their profession and the world at large affect each other.**

It follows that a profession, in contrast to a craft or trade, has a direct effect on the community and its members. Thus a profession has a primary responsibility to the community that the profession's effect
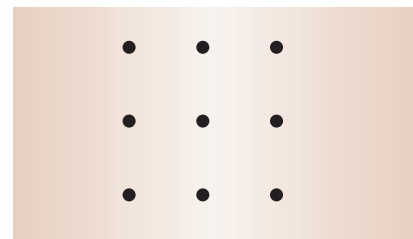
Figure 1. The nine dots puzzle. In the early days of computing, many thought that a competent system analyst must be able to "see outside the nine dots." This expression sprang from the puzzle in which you are required to draw four end-connected straight lines through the nine dots.

Figure 2. The solution. To solve the puzzle with only four lines, you must extend the lines beyond the square defined by the nine dots.

upon it be a benevolent one. A profession that seeks to have digital equipment—computers, or machinery driven by them—used beneficially within the community, and which seeks to guide others in the use of such equipment, is therefore truly a profession, providing it is based on a distinctive body of knowledge and skill.

THE COMPUTING PROFESSION

The body of knowledge and skill that defines the profession to which the IEEE Computer Society's members belong is suggested by the technical articles that appear in the Society's publications. The computing profession is relatively new, still forming, and as yet uncertain of its identity. It is in danger of losing the respect of its wider community, which associates the profession with apparent fiascoes like the Y2K affair, or feared fiascoes like the Internet stock bubble.

The future health of the computing profession depends on its members taking an interest in issues outside its body of knowledge and skills. These issues fall into three classes, those that relate to

- the profession itself: its identity, territories, the trades it should encompass (if any), how it distinguishes itself from other professions and chooses to cooperate with them, how it seeks to influence those who educate its would-be members, what that influence should be, and so on;
- the constraints that might or should be imposed on the profession by the external community: constraints of law and professional conduct, the effect of national and international government policies, how business practices relate to the profession's management and careers, and so on; and
- the profession's effect on the external community: its effect on education, personal behavior and health, business behavior and ethics, community welfare and equity, and so on.

In this column, we will emphasize the professional importance of issues such as these, provide a basis and stimulus for members to consider them, and offer an outlet for members' opinions. Some issues overlap the classes, and all involve problems more appropriately resolved through discussions than computations. Nevertheless, the social status of the computing profession and its members doesn't ultimately depend on resolving these issues. Rather, our status depends on our members' being aware of, well informed about, and able to express reasonable opinions on these issues when challenged by people outside our profession.

THE NINE DOTS

Back in the early days of computing, when it was more a trade than a profession, those who belonged to it consisted largely of programmers and systems analysts. To be considered competent, common wisdom decreed, a system analyst must be able to "see outside the nine dots." This expression sprang from the popular puzzle, shown in Figure 1, that required the victim to draw four end-connected straight lines through nine dots arranged in a three-by-three dot grid.

Figure 2 shows that the nine dots puzzle can only be solved by realizing that its rules allow a corner—where one line starts and the next begins—to lie outside the square that the dots define. The puzzle challenges the analyst to consider the entire circumstances of a problem when designing its solution.

Now, when the computing profession encompasses so much more than systems analysis and coding, when the affluent throughout the world use personal computers, and when the digital network connecting the world's computers has be- come at least as significant as the computers themselves, it has become essential for those who would be members of a true computing profession to look beyond the problems they are paid to solve, taking note of how their profession and the world at large affect each other.

Oddly, few "nine dots" solvers ever look outside the sheet of paper on which the nine dots are drawn. Thus they fail to realize that all nine dots can be lined up on a single straight line. The procedure is best done in three steps:

1. Draw a straight line through each row of three dots so that you have three parallel lines.
2. Make a simple cylinder out of the sheet of paper so that the three original lines make three circles.
3. Move the two adjacent edges along each other—angling one upward and the other downward—until the ends of two of the lines on one edge line up with two of the lines on the other edge, leaving one line end free both above and below the two joined lines.

It will be easiest if you draw the three original lines along the *length* of the paper because, when curved, the sheet makes a broad cylinder that adjusts more easily to movement of its edges. The resulting spiral connects all nine dots with an unbroken line.

G ranted, this second solution to the nine dots puzzle is far from obvious. Custom has it that you need four lines to solve the puzzle, just as custom imposes on us certain attitudes toward our trade or profession. In this column, we shall strive to provide content that helps us remove those blinders so that we might better see beyond the bounds of our daily professional lives. ✷

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