

THE NOTION OF LICENSING SOFTWARE ENGINEERS HAS BEEN WEIGHED AND ARGUED ON GLOBAL, NATIONAL, AND STATEWIDE PLATFORMS FOR MANY YEARS. HERE, WE GO TO THE FRONTLINES – TEXAS AND CANADA – WHERE THE PRACTICE OF LICENSING IS IN FACT WELL UNDER WAY. SENTIMENTS MAY NOT HAVE MELLOWED REGARDING THIS SUBJECT, BUT THE PERSPECTIVES WE PRESENT HERE ARE BASED ON REAL EXPERIENCES.

TEXAS LICENSING OF SOFTWARE ENGINEERS: ALL'S QUIET, FOR NOW

~BY DONALD J. BAGERT

SINCE 1937, anyone wanting to use term “engineer” as a professional designation in the state of Texas had to be licensed as a Professional Engineer (PE). In June 1998, after several months of study, the Texas Board of Professional Engineers voted to add software engineering as one of the areas of engineering specialization for those seeking licensure.

Most of the opposition to the licensing of software engineers by Texans was voiced within the first year of licensing in the state. For instance, a bill was proposed for the 1999 session of the Texas legislature that would have (at least temporarily) halted the licensing of software engineers, and would have also legalized the use of company-based certifications that used the term “engineer” (for example, Microsoft Certified System Engineer). That bill died in committee in the state House of Representatives, and no bill of this type was offered in the 2001 session (the legislature meets once every two years in Texas). One of the concerns voiced by those in opposition to licensing was that it



would hurt the state economically (for example, companies would leave and/or not consider a move to the state); however, I am not aware of any evidence that this has actually occurred.

More recently, it appears the events of Sept. 11, 2001 have not yet affected attitudes in Texas concerning the licensing of software engineers. It is true that Texas, like the rest of the country, has become much more security-conscious (including the security of software systems) in the months after 9/11; but unless a major software-related terrorist attack occurs, I do not believe it is likely to affect the licensing issue.

On May 14, a search at the Texas Board Web site (www.tbpe.state.tx.us) revealed there were 44 PEs with current licenses whose professional specialty is software engineering. Affiliations for these PEs were from a wide variety of companies such as Compaq, EDS, Exxon, Mobil, IBM, Lockheed Martin, Motorola, Nokia, Raytheon, and Texas Instruments. There were also software engineers with academic (Texas A&M, Texas Tech, and the University of Texas Medical School in Galveston) and government (Texas Department of Transportation and

U.S. Air Force) affiliations. I have had a chance to meet about three-quarters of the software PEs, and have found them to be people with the background, experience, and professionalism the computing community would expect of a software engineer.

I believe there are two major reasons why licensing in Texas has gone smoothly to date: the waiver rule and the involvement of members of the Texas software engineering community.

The waiver rule (which is available to all PE applicants, not just those specializing in software engineering) allows people with a minimum 12 or 16 years of experience (depending on the type of bachelor's degree obtained) to obtain a PE license without taking either the Fundamentals of Engineering (FE) or Principles and Practices of Engineering (P&P) exams. In lieu of the latter, the waiver process is considerably more demanding than the normal process. For example, it requires endorsements by more practicing PEs and closer scrutiny of the applicant. The FE exam is targeted to recent graduates of engineering or engineering-related degree programs. The morning section of the FE exam is the same for all participants, and mostly consists of questions in engineering sciences, lab sciences, and continuous mathematics. In the afternoon either a discipline-specific exam or a general exam (somewhat an extension of the morning component) is taken. After passing the FE exam and working for four or more years in the field as an "engineer-in-training," a person can take one of several discipline-specific P&P exams.)

This waiver rule was enacted in response to the North American Free Trade Agreement (NAFTA) in order to make it easier for Canadian and Mexican professional engineers to be licensed in Texas. However, it is my understanding that no other state has enacted such guidelines. The waiver rule has facilitated the licensing of qualified individuals as software engineers in a way that perhaps no other state can currently match.

However, the recent establishment of undergraduate software engineering degree programs at both UT-Arlington and the UT-Dallas, combined with the fact that the Accreditation Board for Engineering and Technology (ABET) adopted criteria for the accreditation of software engineering programs, makes it imperative that viable alternatives to the waiver rule be established for potential software engineers in Texas. A P&P exam specifically for software engineering applicants can be developed, as well as a software engineering option for the afternoon portion of the FE exam. However, NCEES (the organization that offers the FE and P&P exams) is traditionally cau-

tious to move on developing such tests, so it may be 10 years or more until such software engineering-specific exams are available.

Even after such tests are offered, those wishing to avoid the longer wait required by the waiver option in Texas still must take the FE exam. This means that undergraduate software engineering curriculum must include engineering sciences (which are domain-specific topics) and other topics that might not otherwise be included, or students must learn such information on their own if they wish to pass the FE exam. (Learning some of the necessary information outside of the standard curriculum to prepare for the FE exam is not uncommon among electrical engineering students at a number of universities.) So, even after software engineering-specific tests are developed by NCEES, the exam option will not be optimal, but it will be possible and require a minimum of only four years of experience to be licensed instead of 12 years.

The licensing of software engineers is an extremely emotional issue with some people in the computing community. There are those who believe that aiding organizations such as the Texas Board of Professional Engineers in their licensing efforts is wrong, and that licensing efforts should be resisted at all costs. My personal belief is that—at least in Texas—working within the system has reaped benefits for the software engineering community. When the Texas Board began consideration of the licensing of software engineers in 1997, it was my impression they saw software engineering as a subdiscipline of electrical engineering (much as they consider computer engineering as one). However, the Texas Board appointed a Software Engineering Advisory Committee (of which I was a member), that was able to help the board better understand the field of software engineering, which in turn led to the guidelines for approval of the applications in place today.

For instance, the Texas Board passed a working definition of "the practice of software engineering" before considering and approving a motion to amend the Board Rules to allow software engineers to be licensed. This definition (which itself is not part of the Rules) was written (with significant input from the Advisory Committee) to be independent of application domain, and specifically listed "information or financial systems" as example domains. (However, the valid issue of whether a licensed software engineer should also be certified in a particular application domain is one that has not been addressed, although in my opinion it eventually should be.)

So I personally feel the active involvement of people such as myself has been to the benefit of the soft-

ware engineering community in Texas. That does not mean that I do not have concerns about licensing, especially with regard to the specific examination process required in most other states. However, I believe that positive aspects of working with the licensing entities have outweighed the negative ones.

As far as others in the software engineering community (residing in Texas or not) are concerned, everyone should follow their own conscience. For instance, there are those who disagree with licensing in any profession, those who disagree with licensing of software engineers under any circumstances, those who feel that software engineering is not yet mature enough for licensing, and those who disagree with a licensing process for software engineers that involves the FE exam (and does not consider different application domains). Also, it is my impression that only about half of the U.S. states are as restrictive about the use of the term "engineer" as Texas is; this affects how licensing should be addressed. Yet another issue is how a state addresses the "welfare" aspect of the "health, safety and welfare of public" phrase that most engineering licensing laws use: certainly severe financial losses due to software can have an effect on the public.

However, I believe that at some point NCEES will offer licensing examinations for software engineers, and having all stakeholders in the software engineering community involved in the development and maintenance of these exams will be to the benefit of everyone concerned. It is for that reason I hope that professional computing associations like the ACM will someday find a way to be involved with the development of such examinations and of other software engineering licensing criteria. As an ACM member for over 20 years, I plan to do my part by keeping the discussion going in forums such as this. **■**

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A RICE UNIVERSITY PERSPECTIVE ON SOFTWARE ENGINEERING LICENSING

BY KEN KENNEDY AND MOSHE Y. VARDI

IN June 1998, the Texas Board of Professional Engineers adopted software engineering as a distinct discipline under which engineering licenses can be issued. The motivation for this decision was the expectation that licensing and the associated regulation of the software engineering profession would lead to substantive improvements in the education of computer software professionals and in the practice of software development in the state of Texas. Four years later, it seems appropriate to reflect on the impact of software engineering licensing in Texas.

In the spirit of full disclosure, we admit we have been skeptical of software engineering licensing from the outset. We are both professors at Rice University with substantial experience teaching courses in soft-

ware development and reliability. From that perspective, the goal of improving education and practice in software development is a laudable one. However, we were worried that licensing might have exactly the opposite of the desired effect. There are several reasons for our concern.

First, it is unclear that licensing software engineers will have any positive impact on the quality of software because most software will continue to be developed by companies. This is particularly true of software that can directly affect public health and safety. In other disciplines, such as civil engineering, individual engineers or small firms provide services directly to government and the public. Thus, licensing serves as a mechanism for certifying that practitioners adhere to the standards of the profession. Most independent software developers, on the other hand, contract directly with corporations, which have the resources to know the difference between profes-