

New SE programs plan to avoid Wang Institute's mistakes

Galen Gruman, Assistant Editor

Beset by huge financial shortfalls, the Wang Institute of Graduate Studies in Tynngsboro, Mass., closed Aug. 17 after founder and primary benefactor An Wang discontinued funding.

Wang's closing prompted the Computer Society's Technical Committee on Software Engineering to express concern about the potential effects on software engineering as an academic discipline, fearing the closure of the highly praised institute could make the start-up of similar programs elsewhere more difficult. "The Wang program was being used as a model. It's really the momentum that was being established [that concerns us]. And they had a lot of weight," explained committee chair Lorraine Duvall, a consultant in Rome, N.Y.

But Wang's closure has not prevented several other software-engineering programs that have geared up in the past year. These programs may benefit from the lessons learned from Wang's failure, lessons that may prevent similar shutdowns in the future, according to those involved in the new efforts at the Rochester Institute of Technology and George Mason University.

High costs blamed. Wang's biggest problem was its costs, according to several people interviewed. "It was too expensive to run. It was nowhere near break-even," said J. Joseph Meng, Boston University's vice president for external programs. Boston University bought Wang Institute's physical plant and will use it as an extension campus.

Wang had asked several universities to continue the software-engineering program, but none would because of its high cost, Meng said. "They were hurting for an academic institution to take on the [software-engineering] degree," he explained, but "we've all concluded that the way it's set up, it couldn't have been run on a financially sound basis."

The institute spent more than \$100,000 per student but only received a \$10,000 return, largely because of its five-to-one faculty-student ratio and small number of students, said James Palmer, director of the new Center for

Software Systems Engineering at George Mason University. Wang's losses are estimated in the tens of millions of dollars. Wang Institute would not confirm the amounts, but the estimates were made by Meng, Palmer, and others.

Despite its costs, the software-engineering program did not cause Wang Institute's closure, said Susan Gerhart, a researcher at the MCC Software Technology Program in Austin, Texas, and a former Wang Institute professor. The program "was not set up to be an autonomous entity. If you separate it [from the rest of the institute], it's no more expensive than any other academic program," she said.

Once An Wang decided to stop funding the institute, it had no way to make up the lost income, Meng said. "They lost their sugar daddy," said Wiley McKinzie, chairman of the Rochester Institute of Technology's Computer Science and Technology School.

Before it closed, Wang Institute had 11 professors, 34 staff members, 28 full-time students, and 27 part-time students, a press release announcing the closure said. About 170 students have attended the institute since it was founded in 1981, the release said.

(Wang Institute officials did not return several phone calls to discuss the closure and spokesmen for Wang Corp., a separate firm headed by An Wang, said they could not speak for the institute.)

To avoid similar dependencies on one major source of income, the new programs have broadened their support, integrating them into existing schools rather than making them independent entities.

New programs. In the past year, three new programs have begun or started planning. George Mason University began a software-engineering program in December 1986. The Rochester Institute of Technology received approval in July from the New York state education board for its own program, which begins this month. And Wichita State University in Kansas is planning to start a software-engineering program in 1988

or 1989.

Seattle University's Software Engineering Dept. is the lone survivor from three programs set up in the late 1970s and early 1980s (Wang Institute and Texas Christian University had the other two). It has survived because it was part of a larger computing program and because there are many large software firms in the Seattle area, said Ev Mills, the department's chairman.

Software engineering also exists as tracks and concentrations at several universities.

George Mason University has hired four former Wang Institute professors — Hassan Gomaa, Sridhar Ragavan, Bo Sanden, and Dick Fairley (Wang's software-engineering group chairman) — for its Center for Software Systems Engineering.

The university is making the most of its location in the "Ada belt" around Washington, DC, an area with perhaps the largest concentration of software development in the US, said George Mason's Palmer. The center, begun with a \$2.4 million grant from the state of Virginia, will offer six or seven courses on software engineering (four of which were offered this past year). It is also working with the Software Productivity Consortium in Reston, Va., a group of aerospace firms seeking to improve software development methods.

Like Seattle University, George Mason University serves mainly professionals from local industry: 85 percent of its masters students work for local software developers, Palmer said. Catering to these professionals, the program (part of its Information Technology and Engineering School) will have "some theory, some application," Palmer said. "It's not just applications, it's not just theory," he said. The program will be split between the Computer Science and the Information Systems and Systems Engineering departments, with the first concentrating on theory and the second on software-systems engineering.

George Mason has 750 masters students and 200 doctoral students, about

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a quarter of whom are enrolled in software-engineering courses, Palmer said. In fact, the program "has increased our total enrollment by a significant amount," he said. Enrollment has tripled since September 1985.

The Rochester Institute of Technology is also following the industry-oriented model. "We are forming a local software-engineering consortium. We intend to become a major academic player on the software-engineering field," said computer science chair McKinzie.

The software-engineering program (formally called Software Development and Management because using the name "software engineering" would require that students get an engineering license from New York state), will be housed in the Applied Computer Studies Dept., a division of the Computer Science and Technology School. It will blend courses from the software-engineering program, Computer Science and Technology School, and Business School, said Guy Johnson, chairman of the Applied Computer Studies Dept.

"We're concentrating on the actual problems of software development," Johnson said. But the program intends to avoid being dependent on a main benefactor as the Wang Institute was, he said. "We hope for cooperation from local industries to put together projects," Johnson said. The university's long-standing relationship with local industry should help this effort, he said, pointing out that "we've always had [industry] advisory boards in our departments."

But the program was set up to work without industry money, McKinzie said. Funds from the consortium will expand the program, not underwrite the basics, he said.

Software engineering's role. The rise of software engineering in academia has raised questions about the discipline's role in education. While a degree called "software engineering" is not necessary, the types of courses that were taught at Wang Institute are needed, said the Computer Society technical committee's Duvall.

"I think the need is very great," she said. When she was hiring programmers for a large company several years ago, "I didn't think that traditional computer-science graduates had the engineering background. I wanted problem-solving abilities and methods of approaching solutions," Duvall said.

"Software engineering has not prospered in academia" despite the field's growth, said Seattle University's Mills. This may be partly caused by a rivalry between computer scientists and software engineers, he said, a rivalry much like that between computer scientists and electrical engineers. "Computer-science programs are still trying to establish as a standard what kind of person ought to come out of them," Mills said.

"There is a substantial management component [in software engineering] since a large part of the problem is project management," MCC's Gerhart said. "That upsets [some] computer-science departments."

The problem with software engineering is the question "Where does it fit in?" Gerhart said. It is a conflict between fundamental knowledge (computer science) and applying that knowledge (software engineering), she said. But, she added, the two can coexist: "England has been very successful in taking some of the pure, theoretical approaches and making them work in applications. They [the two disciplines]

are much more integrated in the universities there."

Palmer acknowledged potential rivalry between computer scientists and software engineers — "that's a normal concern," he said — but said the programs at the university are "complementary by design" and should minimize such rivalry.

Johnson also said he is not concerned about a rivalry between computer science and software engineering: "People in computer science recognize that this is a reasonable academic field." However, McKinzie said that some of the acceptance may be because software engineering is an area that government and industry will spend money on, not because it is accepted as part of computer science.

"Industry and government will probably have to set up separate research and educational plants from computer-science academia," McKinzie said. Several such programs do exist: the Software Productivity Consortium, MCC, the Software Engineering Institute, and the Defense Dept.'s STARS program. And the new software-engineering programs are oriented more toward industry's needs to retrain professionals than to teaching undergraduates.

At Seattle University, the rivalry is muted because computer science is an undergraduate degree and software engineering a masters degree, Mills said. Plus, he said, most of the software-engineering students are professionals from area firms like Boeing who are going back to school to sharpen their skills. They are not competing for the same students that the computer-science program is.

Reversing enrollment declines. When set up as a program for professionals, software engineering can reverse declining computer-science enrollments, Palmer and McKinzie said.

In fact, one reason that the Rochester Institute of Technology started its software-engineering program was to recruit students for the Computer Science and Technology School, which has seen steadily declining enrollment for several years, McKinzie said, largely because traditional computer science is not sufficiently oriented to applications. Johnson agreed.

The solution to declining enrollments is to form joint programs with other disciplines, McKinzie said. "Right now, I think that's a good thing to do. But eventually it [computer science] will integrate itself into all other disciplines," he said, so these joint programs will no longer be needed.