Bridging the Gap between Research and Business in Software Maintenance

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Abstract: This welcoming address to the 21st ICSM describes the widening gap between the research world on the one side and the business world on the other. This gap is reflected by the attendance and the publications of the ICSM. The author, who has been involved in both worlds over the past 25 years, offers some suggestions as to how this gap might be bridged, but comes to the conclusion that the gap will always exist due the different goals on both sides.

Despite all of the efforts to bring business and research to work together, the gap between them is actually growing wider. This gap is reflected by the development of the software maintenance field and in particular by the international maintenance conference. This fact is underlined by the attendance and by the contributions to this conference. To understand this phenomenon, we must go back to the beginning.

In the United States by 1981 both business and government were becoming increasingly concerned over the high costs of maintaining their software systems. No one had foreseen how much it would cost to keep these systems in operation. It had become obvious to all involved in data processing that once a system went into operation the real problems began. The research community was oblivious to that situation. At that time, researchers were more concerned with new development methodologies, CASE tools and 4th generation languages, which they hoped would solve the maintenance problem. This only shows how little they understood the nature of that problem.

It is, therefore, not surprising that the early publications on software maintenance came almost solely from practitioners and their managers with only a few contributions from the academic world. The year 1983 could be looked upon as the birth date of software maintenance because in that year two significant events took place. One was the publication of the first IEEE tutorial on Software Maintenance, edited by Girish Parikh and Nicholas Zvegintzov. The other was the first IEEE Workshop on Software Maintenance sponsored by the Naval Postgraduate School and chaired by Prof. Norman Schneidewind.

The first tutorial on software maintenance contained 32 contributions of which 4 came from government agencies, 16 from persons involved in business projects, 4 from the editors themselves and 8 from academics. Those 8 included Victor Basili, Laszlo Belady, and Manni Lehman, all of whom have since become deans of software maintenance. The most significant research contribution was the paper by Lientz and
Swanson on their survey of the problems in application software maintenance in 487 user companies.

The first workshop on software maintenance in Monterey attracted 57 contributions of which 36 came from industry, 7 from governmental agencies and the rest from universities and research institutes. Many of the leading American industrial companies including TRW, Bachman Information Systems, Raytheon, Peat/Marwick, Texaco, GTE, Hughes Aircraft, AT&T and Boeing sent speakers to that first ICSM. Foreign industry was also represented with Sweden’s FFV Electronic, Japan’s Fujitsu and Joint System Corporation and Germany’s Siemens which this author represented. The papers were far from the current academic standards. Today they would hardly quality for an industrial session, but they contained invaluable information on the state of maintenance in business and how business was struggling to cope with it.

In 1987 the Workshop on Software Maintenance evolved into a full scale conference, the ICSM, but it retained its industrial character. The proceedings from that conference contain 21 papers of which 10 came from business and 2 from governmental agencies. Despite the fact that the general chair and the program chair came from a government agency – the National Bureau of Standards – and the other program chair came from a software house, the academics were starting to move in. the papers were evenly divided between industry and academia. Still business issues dominated the conference. The leading reverse- and reengineering tool vendors were there to demonstrate their commercial products and to establish contacts with business and government representatives which made up for over two thirds of the conference participants.

A key person in these early years of the conference was Bob Arnold, who edited the first workshop proceedings in Monterey, chaired the second workshop, 1985 in Washington and co-chaired the 1987 Austin conference. Dr. Arnold represented in his person the join between academia, where he wrote his dissertation on reengineering, and business, where he earned his livelihood as a consultant for software maintenance.

After 1987 the conference began to drift away from business issues. In San Diego, in 1990, the general chair – Tom Pigoski – came from a government software house but both program chairs came from universities – one from the U.S. and one from Great Britain. The program committee accepted 50 contributions. Of those 19 came from either an industrial company or a governmental agency, the rest came from either universities or research centers. As such, the practitioner representation had dropped from 75% in the first workshop to 38% in the sixth conference.

Since then 15 years have passed and the nature of the conference has changed radically. What started as a business forum has evolved into a mailly research forum. At the 20th ICSM in Chicago, 2004 there were 48 regular papers, 4 dissertation papers, 5 industrial case studies and 8 tool presentations. Of the 48 regular papers only 3 came from persons working in industry. Even considering the 5 industrial papers, the proportion of business participation had dropped to 16%. Furthermore, of the 144 participants, less than 30 came from the business sector. In the proceeding conference in Amsterdam only 9 participants were there from business companies.
The conclusion to be drawn from these figures is that industry and government, i.e., the users of the maintenance technology, have turned their backs on this conference. They have turned to other sources of information to help them in solving their problems. One could also conclude that the formal requirements for the contributions have risen to a level where persons applying the technology can no longer meet them. This may be good for the academics striving for publication points, but it is definitely not good for the conference. Conferences of this type should act as a bridge between those with the problems and those with the solutions. As it stands now, the conference is dominated by those creating solutions to problems they have defined for themselves.

There are a number of alternatives to alleviate this situation, some of which deal only with the ICSM conference and others, which deal with the software maintenance community as a whole. There could be a quota for industry papers. At the moment there is an industrial session with another standard to allow persons from industry to present their practical experience. This session could be expanded with the hope of attracting more papers, but this is not sure. For this years ICSM we received 185 standard submissions of which almost all came from universities or research institutes, whereas there were only 10 industrial submissions of which 7 were selected.

Another alternative could be to advertise the conference more through business channels such as the Computer Weekly. In the beginning this conference was cosponsored by the American Maintenance Association chaired by Nicholas Zvegintzov. This helped to draw in participants from industry and to encourage them to contribute. Now that the conference has become international, it is no longer so simple. The business media channels are published in the local language. So it would mean translating the calls for participation into the local languages, which would increase the costs.

Even then, it is doubtful if business would be interested. The 1999 ICSM in England drew no more participants from industry than those in countries where English is not the mother language.

Thus, one is lead to believe, that the problem has a deeper cause. The academic and the business world seem to be speaking different languages and pursuing different goals.

Business is looking more often for the simplest and cheapest solution to a problem. They prefer to have a conventional solution which works rather than an innovative one which doesn’t. Academics, on the other hand, strive to develop new solutions even if they don’t work in detail. Knowing this, business will continue to give the academics only toy projects to play with in order to test the feasibility of some new concepts. This may work in some fields, but not in software maintenance since it is much too context dependent.

So where does that leave us? Unfortunately, there is no easy remedy to bridging the gap between business and research on software maintenance. Business will continue to be absent from such conferences as long as they see no business value in attending, and academicians will continue to encapsulate themselves in their own
world because it is much more interesting and comfortable to define their own problems than to solve the real problems of business. It will take a conscious effort on both sides to find a common ground on which they can work together. Then the ICSM could once again become a conference for both industry and academia.