

A Decade of Applied Computing

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ABSTRACT

As we close out the first full decade of the ACM Special Interest Group on Applied Computing, the ACM Symposium on Applied Computing, and the ACM SIGAPP newsletter, *Applied Computing Review*, it may be useful to review some of the events that have taken place since their inception from the perspective of one of the founders. This paper will attempt to place the past decade of applied computing in a meaningful perspective.

Keywords

Applied Computing, experimental computing, computing applications, ACM SIGS.

1. INTRODUCTION

As the founding conference chair of the ACM Symposium of Applied Computing, I had ample opportunity to wax eloquent on the importance of applied computing to the global community, and the need for global forums for those interested in the area to exchange ideas. As I will explain below, many of us envisioned SIGAPP as a partnership between academia, industry and government, and took every opportunity to try to facilitate communication between computer and IT professionals in all three groups.

I recall that at the first "official" ACM SAC conference in March, 1992 I challenged the audience to come up with examples where academe and industry were "disconnected" and then to attempt to figure out new and innovative ways to establish the reconnection during the following year. In that vein, the theme I gave to that first conference was "Technological Challenges of the 1990's."

In order to liven up things a bit, I began my welcoming remarks with the proclamation that the CD was dead. While it would be an exaggeration to claim that one could hear a pin drop after my remark, the room got right quiet as the audience tried to convince themselves that they must have misunderstood what I said. Quite to the contrary, at the moment when the compact disk was revolutionizing the recording industry, the home entertainment industry, and, at the same time, the tertiary storage technologies within the computing industry, I proclaimed the demise of the very technology that was just beginning to dominate several disparate electronic markets.

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I later explained that I was trying to make the point that the fields of computer science and information technology had much more to offer industry than industry realized, and that a very natural symbiosis between the two environments was not manifesting itself because of some very fundamental cultural clashes. I elaborated on my original remark that in the case of the CD, the technology was on a collision course with the logic behind transporting digital information: it makes no sense to distribute digital data on physical media. Carrying bits around on vinyl makes no more logical sense in the digital information age than carrying the hardcopy in saddlebags. The future of digital information interchange is through cyberspace (a point not overlooked by Napster, incidentally) and, I argued, industry-academic research partnerships could advance the technological horizons of both for the common good. The challenge, as I saw it was to break down the cultural barriers and that, I further proclaimed, was what SIGAPP, SAC and ACR was all about. We still haven't risen to that challenge.

2. GENESIS

SAC and SIGAPP history buffs may be interested to know that SAC and SIGAPP were actually an outgrowth of a innovative initiative that came from the high-tech Mecca of Oklahoma. In 1987, Don Fisher and some of his computer science colleagues at Oklahoma State University started the Oklahoma Workshop on Applied Computing (OWAC) that brought computer science faculty and IT professionals together to exchange ideas on the future of computing. By the third WAC, in March, 1989, the meeting had begun to take on truly regional character, drawing participants from Arkansas, Kansas, Missouri, Oklahoma and Texas. In addition, for the first time the 1989 WAC was held in cooperation with both the ACM and IEEE Computer Society, and was also supported in part by a grant from the NSF. In 1990 and 1991, the proceedings were published by the IEEE Computer Society Press. These relationships with ACM, IEEE-CS and the NSF would continue until the conference actually became part of SIGAPP in 1992 and the proceedings thereafter were published by ACM Press.

It's worth noting that in his General Chair's Message in the Proceedings of WAC '89 [1], Don Fisher stated the objectives of WAC

- 1) to provide a forum for interchange of ideas among computing specialists from a broad range of disciplines in academia and industry,
- 2) to provide a quality meeting at a location with reasonable cost; and

- 3) to provide an opportunity for graduate students to present papers in interact with scientists in the region.

In fact, the spirit of these objectives was carried over to SAC, but I'm getting ahead of myself.

While WAC was in its infancy, I co-founded and chaired the Board of Directors of the Arkansas Society for Computer and Information Technology which also had it's own Arkansas Computing Conference each spring. In the first few years, both WAC and ACC had about 150 attendees each. In 1988, the research center I formed at Arkansas participated in both WAC and ACC. It occurred to me at that time that it made more sense to have one large meeting than two small ones and so I proposed to the WAC organizers that we consider cooperating. We agreed to make this a truly regional event in 1988, dropped the "Oklahoma" from the Workshop on Applied Computing title in 1989, and held the first conference outside of Oklahoma in 1990 in Fayetteville, Arkansas where I served as conference chair. Since WAC's attendance was in excess of 150 (the magical number that the professional societies used to distinguish between "workshops" and "symposia," we had by that time changed the name of the conference to the Symposium on Applied Computing (SAC) – the name that persists today. In 1990 we had in excess of 400 attendees and presenters, from California to Florida, and even a few from Australia and Europe. Don Fisher, the founder of OWAC, provided an appropriate inaugural keynote address for the new SAC entitled "Information Technology, Information Resources: The Haves and Have Nots."

Meanwhile, I had proposed to the WAC steering committee the previous year at the '89 WAC in Tulsa, that we consider forming an ACM Special Interest Group and operating SAC (ne' WAC) under the rubric of the SIG. The concept appealed to the steering committee, which authorized me to approach the ACM SIG Board with the proposal. After several iterations of the proposal over the next year and a half, the ACM chartered SIGAPP in the fall of 1990. We began 1991 with 11 voting members, and finished the year with 299. While SIGAPP was forming, the 1991 SAC operated under the previous "in cooperation" agreement with ACM and IEEE-CS and was chaired by Dick Hetherington in Kansas City. The 1991 SAC was the last one held outside of the penumbra of SIGAPP.

As founding chair of SIGAPP and the new incarnation of SAC, I served as conference chair from 1992-1994 under what were somewhat trying circumstances. By some twist of fate, just as SIGAPP was getting off the ground, the ACM SIG Board changed the SIG "allocation formula" (the overhead charged all SIGs as the cost of doing business under the ACM rubric) so that it was no longer primarily dependent upon membership dues, but rather gross revenue. This couldn't have come at a more inopportune time, for SIGAPP had only 411 members by the end of 1992, but derived a considerable revenue from SAC (around \$50,000 at the time). As a result, in 1992 the SIGAPP allocation increased by an order of magnitude to \$14,372 against a total membership revenue stream of under \$5,000. This threw the SIGAPP fund balance way in the red, and thoroughly demoralized the SIGAPP and SAC volunteer leadership. I felt that I couldn't in good conscience ask anyone to take the reigns of SIGAPP or SAC until they became financially stable, and

hence stayed on as both SIGAPP and SAC chair through the 1994 conference. By that time, and this is another area where SIGAPP really lead the way, SAC became co-sponsored by a number of SIGS, including over SIGADA, AIGCUE, SIGFORTH, SIGBIO, and SIGICE. In another of life's little ironies, SAC remained quite profitable long after it became a part of SIGAPP, although SIGAPP actually never received much of the profits. The absurdity was that the considerable revenue of SAC actually worked against the financial viability of SIGAPP. Under the SIGBoard rules at the time a SIG could only participate in the profits to the same extent that it could cover the losses. Since the revised allocation formula threw SIGAPP in the red, it could not cover future losses, so SIGAPP received little revenue from the very conference it created.

The end of the story was that within the year, it was obvious to everyone concerned that the revised allocation formula was an exceedingly bad idea, the ACM came upon a more enlightened approach, Dave Oppenheim came on board as Treasurer of SIGAPP and SAC and put both on a sound financial footing, and I stepped down as chair of both in favor of then vice chair, Woody Hedrick.

3. APPLIED COMPUTING

3.1 What's in a Name

As I mentioned, we actually inherited the term "applied computing" from Don Fisher's OWAC. I always had a problem with that term, because in a sense everything in computer science, and computing in general, is applied. However, by the time I galvanized everyone behind the idea of bringing SAC under the ACM/SIGAPP umbrella, SAC already had name established name recognition. In addition, by 1990, SAC had about 400 attendees and was financially sound, so I took the "if it ain't broke..." position and did nothing to change the name of the conference. In retrospect, this was probably my first big mistake.

The problem wasn't just with the term, but with the fact that it clashed with the evolutionary trend of the ACM SIGs to "tunnel down" into fairly narrow areas. The original SIGs were primarily broad-based – SIGPLAN which covered all of programming languages, SIGARCH which covered all of computer architecture, SIGGRAPH, and so forth. The trend over the past twenty years, however, has been quite the opposite. SIGFORTH and SIGAPL illustrate the narrowing of special interests from within the original SIGPLAN community; SIGMULTIMEDIA did the same with respect to SIGGRAPH.

In any event, SIGAPP was intentionally set up as a broad-based SIG that would appeal to the practitioners and experimentalists involved in the entire spectrum of computing. I have always felt that this was the true beauty in Don Fisher's vision. However, the fact was that SIGAPP and SAC were gearing up to appeal to the broad base of the ACM membership at just the same time that the majority of the SIG community was becoming more myopic. This clash caused a cultural rift of sorts, because SIGAPP and SAC were trying to appeal to the very narrow applications areas that wanted their own SIGs and other specialized communication venues. As a result, neither SIGAPP nor SAC achieved their deserved identity as a primary forum for

practitioners and academics to come together to discuss problems of common interest.

Perhaps it is interesting to review the original SIGAPP Mission Statement: "The mission of this organization is to further the interests of the computing professional engaged in the development of new computing applications and applications areas and the transfer of computing technology to new problem domains." Although this was a part of the formal charter of SIGAPP, it didn't appear in print until Volume 2, Number 2 (Fall, 1994) of Applied Computing Review. When I wrote this mission statement in 1991, it caught the essence of what I felt SIGAPP and SAC should be about. Note that the term "applied computing" never appears. Therein lies the rub.

Hindsight is always 20-20, but had I to do this all over again, I would have avoided all use of the term "applied computing" in the SIG and the conference, and instead used some variation of "experimental computing," "computer applications," or even "technology transfer" (though I loath this phrase for the confusing and misleading way that it has been used by academic administrators as a surrogate for "revenue stream"). My point is that the use of the term "applied computing" hurt both the SIG and the conference, because many perceived it as too vague and without focus. In fact, as the mission statement makes clear SIGAPP and SAC always had a sense of purpose – to foster the collaboration between those in industry and academe who were pushing forward the frontiers of computing technology in use. But that message seems to have been lost, and to some degree that is a result of a poor choice of words. It is somewhat ironic that OWAC, WAC, SAC and later SIGAPP and ACR all anticipated by several years the observations made by the Computer Science and Telecommunications Board of the National Research Council in their 1994 publication Academic Careers for Experimental Computer Scientists and Engineers [2].

3.2 What's in a Number

As an experimental computer scientist, I've always been interested in predicting the future. Over the years, by my account at least, I've become quite facile at distinguishing between enduring technology paradigm shifts, and ephemeral trends.

I won't belabor the point here, but as any good experimental computer scientist will confirm, there's a considerable amount of "technology bounty hunting" going on in our profession, as managers and executives leap from craze to fad, in the quest of market share and technology leadership (in this regard, see [3]). Part of my "sermon on the servers" to clients and associates over the past few decades has been my advice on **mission-critical enabling factors for successful applications development** which I shall without fear of immodesty offer here:

- Locate appropriate technology horizons
- Maintain technology compass heading
- Innovate quickly and without restraint
- Avoid technology surprises
- Focus on technology paradigms, not trends

My focus here is on the last item of the list. Perhaps the greatest mistake made in IT business and industry is to fail to maintain the focus on paradigms. To illustrate, the user-friendly desktop metaphor will endure where object-oriented GUI displays may not. Non-linear document traversal will always be with us, while author-centric, prescriptive hyperlinking is just a special case. Being untethered is an essential part of future computing and IT, whether current wireless protocols endure or not. Visual programming environments, where all of a program is created in a visual paradigm, represents the future, whereas visual programming utilities such as Visual Basic, Visual C++, etc. that involve visual programming only at the level of interface will soon die of old age. You get the idea: some computing innovations are here to stay, where others are "of the moment." Of course, the way one discovers the difference is by venues such as SIGAPP and SAC!

The reason for bringing this up, is that for many years I tried to track technology innovations and extract from their trends the meaningful and enduring from the inconsequential and ephemeral [4]. I did that for SAC in the years I was involved with it as well. I kept a running tally of articles submitted and published by keyword and theme. You may be wondering where the idea of the pie chart representing the distribution of accepted papers on the proceedings cover came from. Well, it came from my tracking activity. When it came time to design the cover art for the first ACM SIGAPP SAC conference in 1992, I was challenged in two respects. First, I lacked the budget to hire someone to do the cover art. Second, being artistically challenged I couldn't do this myself, so I decided to reproduce a pie chart from my tally of accepted articles (see below). This practice continued for many years after my involvement in SIGAPP and

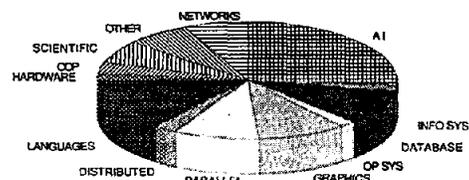
APPLIED COMPUTING: TECHNOLOGICAL CHALLENGES OF THE 1990'S

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George Hedrick
David Roush
Roger Wainwright*



SAC, and perhaps continues to this day. As another piece of trivia, this first proceedings also used the "burgundy bleed" cover. This was also motivated by my considerable lack of artistic ability. At the time, inexpensive color printers weren't available so I had no way to colorize the text and pie chart. In order to make the cover acceptably colorful, I told the printer to print all of the cover text and art in reverse, using the background for the color. This poor man's excuse for art was also carried over to the first issue of Applied Computing Review when it went to press in late 1992, and remains to this day.

4. ITS ALL ABOUT STANDARDS

Once SIGAPP was formed, SAC was merged into it, and the SAC volunteers set out to spread the gospel, it became immediately obvious that we were getting disconnected from our membership. The problem was that the thousands of participants in SAC over the years had no formal connection with SIGAPP when it was formed. We needed some way to connect the SAC loyalists with the new SIG. That's where Applied Computing Review came in.

My original idea in 1992 was to put ACR on the recently deployed World Wide Web. But when I polled the SIGAPP and SAC volunteer leadership, the received view was that too few of the members/participants used the Web to make it a viable option. So, hardcopy-via-snailmail was the option of choice.

Once again, SIGAPP was well ahead of its time. Once again, I polled the volunteers and determined that it was universally felt that another un-refereed publication was unnecessary. So it was decided that ACR would be the first refereed SIG newsletter. The SIGAPP and SAC community said that they would not support a newsletter that did not pass through some sort of peer-review process. Unbeknownst to me, that decision put me on a collision course with both the ACM SIG and Publications Boards. It may sound like a trivial issue now, but this cause a big ruckus in 1992. What made matters worse was that I was serving on the Pubs Board at the time and should have known better!

In fact, the SIG newsletters were set up to be un-refereed and spontaneous. "A publication can't both be refereed and spontaneous at the same time" I was told. I pointed out that our community didn't want, and wouldn't read, an un-refereed publication, so the newsletter concept wouldn't work for us. As fate would have it, there was some wiggle room in the ACM Publications Guidelines reprinted below (see www.acm.org/pubs/copyright_policy/):

"Reviewed: one or more experts have examined the work and have given assessments to an editor about clarity, soundness, novelty, prior publication, proper citations, and other criteria.

"Formally reviewed: A thorough review with emphasis on clarity, accessibility to the general reader, and timeliness. Persons serving as formal reviewers are independent of the editors who request their advice.

"Refereed: A thorough review with emphasis on novelty and soundness. A journal refereeing process seeks to advise the editor whether to reject or provide specific guidance for

revisions. A conference refereeing process seeks to advise the editor whether to accept or reject; a strict deadline is enforced. Persons serving as referees are independent of the editors who request their advice."

The difference is more than semantic, and so SIGAPP seized the moment and made ACR formally reviewed – a first for the ACM SIG community. In the inside cover of the first issue of ACR we reported that "All ACR articles are externally, multiply and blindly reviewed for originality, importance, correctness, coherence, effectiveness and timeliness." A brief review of the ACM Guidelines quoted above will suggest how I came up with the wording. The remaining text of the "information for authors" section remained faithful to the SIGAPP mission statement: "Original articles relating to innovative and novel applications of computing technology are encouraged. This includes general interest articles, surveys, case studies, and research monographs so long as they are oriented toward current or future computing applications."

5. CONCLUSION

As I pointed out in my keynote address that accompanies this article, the past decade of applied computing has seen more change than the 50 years preceding it. During that time we have seen the transition from a world of client-side productivity applications to a world of network-centricity. Today's servers have the capability of 1980's vintage supercomputers. This exponential increase in computing horsepower predicted by Gordon Moore applies through the entire computing food chain, as today's clients exceed the capabilities of 5-7 year-old servers.

We now live in a computing milieu in which product life cycles are measured in months. Never before in the history of technology has it been as critical for researcher and practitioner, for industry and academe to work together. That presents the future leaders of such groups as SIGAPP and SAC with their greatest challenge – to break down the barriers between groups from different workplaces and to foster a spirit of cooperation. Every SAC should be equally important to both academia and industry. Without such partnerships, we will never be prepared to address the demands of the rapid-changes in computing.

I illustrate the point from some well-worn anecdotes taken from a recent installment of my Digital Village column referenced above [3]. Ponder the following quotes for a moment:

- "Computers in the future may weigh no more than 1.5 tons." – Popular Mechanics, 1949
- "I think there is a world market for maybe five computers." – Thomas Watson, Chairman of IBM, 1943
- "There is no reason anyone would want a computer in their home." – Ken Olson, president, chairman and founder of Digital Equipment Corp., 1977
- "640K ought to be enough for anybody." – Bill Gates, 1981
- "Heavier-than-air flying machines are impossible." – Lord Kelvin, president, Royal Society, 1895.
- "The wireless music box has no imaginable commercial value. Who would pay for a message sent to nobody in particular?"
- David Sarnoff's associates in response to his urgings for investment in the radio in the 1920s.

•"Airplanes are interesting toys but of no military value."—Marechal Ferdinand Foch, Professor of Strategy, Ecole Superieure de Guerre.

•"Louis Pasteur's theory of germs is ridiculous fiction." —Pierre Pachet, Professor of Physiology at Toulouse, 1872

I'm sure that all of you could easily add to this list. These positions, though silly in retrospect, were all taken seriously in their day. What is more important, there were researchers and practitioners of that day that understood the folly of the position. If only they had been communicating with each other.

The world of technology is rife with irony. Isn't it ironic that Xerox Parc led the way in user-interface design, yet never capitalized upon it? Isn't it ironic that IBM developed RISC architecture 10 years before Sun capitalized upon it? How ironic that DEC got blindsided by the advantage of a smaller-scale computing platform only 10 years after they blindsided IBM with the same phenomenon.

If we are to avoid the mistakes of the past, we have got to become more aware of the risk factors in our industry. We have to *avoid the "groupthink" or herd mentality* that drives us to our most egregious of technological blunders. We have to *avoid the natural cloistering of people and ideas* that is inherent in developing computational artifacts. We have to be willing to *abandon any technological commitment that just doesn't make sense* any longer, no matter how strongly we have supported it in the past. We need to *avoid the stifling effect of technological inversion*, where we create top-heavy management environments and semi-literate IT infrastructures where success is as much a product of serendipity as sagacity. And finally, we need to *avoid the technological imperative* where we do things not for the sake of solving problems for people in specific places at certain times, but just because we know how. Note that SIGAPP and SAC are strategically placed to address these risk factors — if only the dialog between researcher and practitioner, between academic and industry technologist, between developer and designer can be permanently established. This is where the real payoff is in SIGAPP and SAC. I welcome you to this challenge.

I hope that in some small way these words and my talk will have provided you some insights into the importance of your professional activities, and will have animated you to continue your work with even greater enthusiasm.

6. ACKNOWLEDGMENTS

My greatest thanks to all of the great SIGAPP, SAC and ACR volunteers with whom I have had the great fortune to collaborate during my tenure as founding chair and editor. I am much the wiser for the experience.

I am reluctant to thank individuals, for I can not identify all of the key volunteers here. But I will overcome my fear of leaving out a key person and recognize some of the individuals who made my experience with SIGAPP and SAC most enjoyable. A special thanks to Don Fisher for pointing us all in the right direction. To Dave Oppenheim for keeping our projects financially viable. To Woody Hedrick for always being there to help surmount the insurmountable. To Pat McCarren at ACM HQ for helping us work through some rather dicey financial problems. To Jim Hightower for coming up with the concept of a conference co-op that not only expanded the scope of SAC. And to Ed Deaton, the magician-conference director who kept the devil from the organizational details.

To all of the present volunteers, I dedicate this bit of history and prophesy with the hope you will realize the original vision of SIGAPP and SAC and bring industry and academe together in the support of global, innovative computing applications.

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