Memories of the NATO Software Engineering Conferences

By Brian Randell

At Dagstuhl, Germany, in August 1996 (see Happenings, vol. 19, no. 3, pp. 74-76), I gave the following rendition of the preparation of the proceedings from the 1968 conference and its follow-on in Rome in 1969. The stories of the two proceedings mirror my memories of the conferences and serve as a reminder of how labor-intensive doing proceedings always is – and will be, despite advances in word processing.

The idea for the first NATO Software Engineering Conference – and, in particular, the idea of adopting the then practically unknown term *software engineering* as its deliberately provocative title – I believe came originally from Fritz Bauer. Similarly, if my memory serves me correctly, it was he who stressed the importance of providing a report on the conference, and it was also he who persuaded Peter Naur and me to be the editors. (At the time, I was working at the IBM T.J. Watson Research Center in the United States, but had gotten to know "Onkel Fritz" through having been a member of the IFIP Algol Committee for several years.) As a result, it was agreed that Naur and I would stay on for an extra week after the conference in order to edit the draft report, though we arranged to move from Garmisch-Partenkirchen in Bavaria to nearby Munich for this second week.

Quoting from our report of the 1968 conference:

> The actual work on the report was a joint undertaking by several people. The large amounts of typing and other office chores, both during the conference and for a period thereafter, were done by Miss Doris Angemeyer, Miss Enid Austin, Miss Petra DandIer, Mrs. Dagmar Hanisch and Miss Erika Stief. During the conference, notes were taken by Larry Flanigan, Ian Hugo and Manfred Paul. Ian Hugo also operated the tape recorder. The reviewing and sorting of the passages from written contributions and the discussions was [sic] done by Larry Flanigan, Bernard Galler, David Gries, Ian Hugo, Peter Naur, Brian Randell and Gerd Sapper. The final write-up was done by Peter Naur and Brian Randell. The preparation of the final typed copy of the report was done by Miss Kirsten Anderson at Regnecentralen, Copenhagen, under the direction of Peter Naur.

As I and other participants have since testified, a tremendously excited and enthusiastic atmosphere developed at the conference, This atmosphere developed as participants came to realize the degree of common concern about what some were even willing to term the "software crisis," and general agreement arose about the importance of trying to convince not just other colleagues but also policy makers at all levels of the seriousness of the problems that were being discussed. Thus, throughout the conference, there was a continued emphasis on how the conference could best be reported. Indeed, by the end of the conference, Naur and I had been provided with a detailed proposed structure for the main part of the report. This was based on a logical structuring of the topics covered, rather than closely patterned on the order in which the conference's various parallel and plenary sessions had happened to be scheduled.

Naur and I were very pleased to have such guidance on the structuring and general contents of the report, since we both wished to create something that was truly a conference report, rather than a mere personal report on a conference that we happened to have attended. Indeed, Naur argued that we should not provide any additional text at all ourselves, but rather produce the main part of the report merely by populating the agreed structure with suitable direct quotations from spoken and written conference contributions. However, I persuaded him that brief editorial introductions and linking passages would improve the continuity and overall readability of the report. So (together with the decision that a small selection of the written texts would also be incorporated in full as appendices), we arrived at the final form of the report.

In Munich, we worked from the notes the rapporteurs had taken, which we had arranged would be keyed, as they were made, to footage numbers on the recorded tapes. The tapes were not systematically transcribed, since this process typically takes five to six times real time. Rather, we used the rapporteurs' notes and our memories to locate particularly interesting and apposite sections of the tapes, and just these parts were transcribed. Thus, we built up a large set of transcribed quotations, which we supplemented with suitable quotations from the written contributions. Then, for each section of the report, one or the other of us attempted to turn the relevant set of quotations into a coherent and pseudo-verbatim account of the discussion on that topic, bringing together material

from separate sessions, when appropriate, since many topics had been revisited in various parallel and plenary sections.

The work in Munich was as enjoyable as it was intense and afforded plenty of opportunity for rehearing some of the more memorable discussions, so that many of these became etched much more deeply into my memory and had a stronger effect on my subsequent research than would have been the case had I merely taken part in the conference. The report was virtually complete by the end of the week in Munich, and then Naur took everything back with him to Copenhagen, where a complete first draft was produced using a paper tape-controlled typewriter (I assume a Flexowriter) – a technique that seemed novel at the time but one that he correctly advised us would greatly aid the preparation of an accurate final text. (My memory tells me that this was then circulated to participants for comments and corrections before being printed, but no mention is made of this in the report, so I may be wrong.)

The actual printing and distribution were done by NATO, and report became available in January 1969, just three months after the conference. Copies were distributed freely on request, and it rapidly achieved wide distribution and attention. One of the more delightful reactions to it from among the participants was of Doug McIlroy, who described it as "a triumph of misapplied quotation." (It was only many years later that I learned from short article by Mary Shaw that Al Perlis gave out copies of the report to the computer science graduate students at Carnegie Mellon University with the words, "Here, read this. It will change your life. [4])

The first conference was such a success that the organizers sought and obtained NATO sponsorship for a second conference, to be held one year later in Italy. Naur, wisely, was not prepared to repeat his editorial labors, but I – rather rashly, after initial hesitation – agreed to do so, this time in cooperation with John Buxton. As I recall, the plans for the second conference were discussed at a meeting held in an office at NATO Headquarters. My main memory is that the office was dominated by a very large and impressive safe, which to my amusement was revealed to be completely empty when our host, at the end of the meeting, opened it so as to put away the bottles from which drinks had earlier been served to us. During these preparatory discussions, I provided, based on my hard-won experience at Munich, what I proudly considered to be a very well thought-out list of requirements regarding the facilities that we need to have in Rome. (The most important of these was that the editorial team should have full-time access to an Italian speaker, who would help sort out any difficulties that might arise – of this, more later.)

My initial (over)confidence was also in part due to the fact that second time around, Buxton and I had been offered the fulltime services of two experienced technical writers from International Computer Limited, namely, Ian Hugo (who had been involved in the preparation of the first report) and Rod Ellis, and we had each arranged to be accompanied to Rome by an expert secretary, Margaret Chamberlain and Ann Laybourn, respectively. Hugo, incidentally, went on to help found Infotech, a company that subsequently over a period of years organized a large number of technical conferences, each of which led to the publication of a state-of-the-art report, whose format closely matched that of the NATO reports.

In any event, the second conference was far less harmonious and successful than the first, and our editorial task turned out to be very different. Quoting from our introduction to the report of the 1969 conference:

> The Rome conference took on a form rather different from that of the conference in Garmisch, and hence the resemblance between this report and its predecessor is somewhat superficial. The role played by the editors has changed and this change deserves explanation. . . . The intent of the organizers of the Rome conference was that it should be devoted to a more detailed study of the technical problems, rather than including also the managerial problems which figured so largely at Garmisch. . , , The resulting conference bore little resemblence [sic] to its predecessor. The sense of urgency in the face of common problems was not so apparent as at Garmisch. Instead, a lack of communication between different sections of the participants became, in the editors' opinions at least, a dominant feature. Eventually the seriousness of this communications gap, and the realization that it was but a reflection of the situation in the real world, caused the gap itself to become a major topic of discussion. . . . In view of these happenings, it is hardly surprising that the editors received no clear brief from the conference as to the structure and content of the report.

Thus, the task of producing a report that was both respectable and reasonably accurate was much more difficult than I could have imagined – and was not aided by all sorts of difficulties that we suffered, almost all of which would have been much more easily dealt with if a local organizer had been provided as agreed. Nevertheless, a number of the participants expressed pleased surprise at our report when they received a draft for checking and evidently thought more highly of it than of the conference that it purported to document.

The conference had been held outside Rome in a rather charmless American-style hotel whose facilities and cuisine I am sure did little to engender a harmonious atmosphere. It had been agreed beforehand that we would move to a (particular) hotel in central Rome for the report writing, but during the conference, we discovered that no attempt had yet been made to reserve accommodations at that hotel. Needless to say, the hotel turned out to be full, last-minute arrangements had to be made, and our offices and families needed to be alerted to the change of plans.

On the Saturday morning following the conference, the six of us – plus all our luggage and a very impressive set of typewriters, tape recorders, boxes of paper, and other office supplies – were transported by minibus to central Rome to the very pleasant substitute hotel, which was situated just across from the main entrance to the Roman Forum. In fact, we arrived rather too early for the hotel, since only the small suite we were to use as an editorial office was available, our bedrooms not yet having been vacated and cleaned, Thus, we had to accept the hotel receptionist's suggestion that we all be initially installed in this one suite until our own rooms were ready.

I still treasure the memory of our arrival, which was watched openmouthed by the various hotel staff and guests in the lobby. This was not just because of our number, our mountain of luggage, and the small army of porters (just one of whom had a door key) that was being employed to move our luggage. It was undoubtedly also due to the interesting appearance the six of us must have made; in particular, the fact that Margaret Chamberlain was wearing an extremely short miniskirt. This fashion apparently had yet to spread from London to Rome, where it was still regarded, at least by all the Italian men, as quite sensational. And Ellis was wearing a splendid long black leather jacket and the sort of thick-soled suede shoes that at that time were known, in Britain at least, as "brothel creepers." But most memorable of all was Buxton's remark when the last of the porters had bowed himself out of our suite, and the six of us were standing around our luggage mountain wondering what to do first. He suddenly said, "I've had a great idea. Let's phone down to the front desk and ask for 2,000 feet of color film and a stronger bed, please."

This provided a wonderful start to a week in which we managed to find continual solace in humor despite the pressure of work and the many adversities we had to face. For example, by midweek, almost all of the original typewriters and tape recorders were no longer operational, and we were threatening to abandon Rome and move to Brussels in order to complete the work at NATO Headquarters. Even the stapler had broken. As Hugo has reminded me, "The suite had a bathroom that was surplus to requirements, and the bath became the final resting ground for dead typewriters, tape recorders, etc; by the end of the week, it was full to overflowing." However, we soldiered on, though in the end, Laybourn had bravely typed half of the report on a totally unfamiliar German-keyboard typewriter that we had managed to borrow from the hotel.

All these adversities – whose impact would have been much less had we had the promised local assistant – in fact helped to bind us together as a team. Ellis's brilliant gift for mimicry also helped, by providing many welcome moments of general hilarity as, suiting his choice to the topic at hand, he switched effortlessly in conversations with us using the voices of Edsger Dijkstra, Fritz Bauer, and many of the other participants, whose conference comments had been captured for posterity by our tape recorders.

We did, in fact, finish the report by early Friday evening, in good time for a final celebration dinner, once Ellis and Hugo had returned from the University of Rome, where they had made copies of the draft report (and, rather fittingly, broken the photocopier). It was in keeping with the rest of the week, though, that nearly all the restaurant waiters in Rome chose that moment to go on strike – indeed, we saw a large procession of them march right past our windows, shouting and waving banners – so that we had to content ourselves with an excellent dinner in the hotel.

Something I had completely forgotten, until I reread the introduction to the 1969 report while preparing this brief account, was that this second report was typeset at the University of Newcastle upon Tyne, where I had moved from IBM in the interim. In fact, some of the world's earliest work on computerized typesetting had been done at Newcastle. Quoting from the report:

> The final version of the report was prepared by the Kynock Press, using their computer type-setting system. . . the preliminary text processing being done using the Newcastle File Handling system.

(However, I perhaps should also mention that this second report took three months longer to produce than its predecessor report.)

Unlike the first conference, at which it was fully accepted that the term *software engineering* expressed a need rather than a reality, in Rome there was already a slight tendency to talk as if the subject already existed. And it became clear during the conference that the organizers had a hidden agenda, namely, that of persuading NATO to fund the setting up of an International Software Engineering Institute. However, things did not go according to plan. The discussion sessions that were meant to provide evidence of strong and extensive support for this proposal were instead

marked by considerable skepticism and led one of the participants, Tom Simpson of IBM, to write a splendid short satire on "Masterpiece Engineering" (see the attached Appendix).

Buxton and I later decided that Simpson's text would provide an appropriate, albeit somewhat irreverent, set of concluding remarks to the main part of the report. However, we were, in any event, "persuaded" by the conference organizers to excise this text from the report. This was, I am sure, solely because of its sarcastic references to a "Masterpiece Engineering Institute." I have always regretted that we gave in to the pressure and allowed our report to be censored in such a fashion. So, by way of atonement, I attach a copy of the text as an Appendix to this short set of reminiscences.

It was little surprise to any of the participants in the Rome conference that no attempt was made to continue the NATO conference series, but the software engineering bandwagon began to roll as many people started to use the term to describe their work, to my mind often with very little justification. Reacting to this situation, I made a particular point for many years of refusing to use the term or to be associated with any event that used it. Indeed, it was not until some 10 years later that I relented, by accepting an invitation to be one of the invited speakers at the International Software Engineering Conference in Munich in 1979. The other invited speakers were Barry Boehm, Wlad Turski, and Dijkstra. I was asked to talk about software engineering as it was in 1968, Boehm about the present state, Turski about the future of software engineering, and Dijkstra about how it *should* develop. I had great fun in preparing my paper since I included numerous implied challenges to Boehm, whose talk was scheduled immediately after mine, to justify claims about progress since 1968. He studiously ignored all these challenges, or perhaps failed to recognize them, I am sorry to say.

In my 1979 attempt at describing the 1968/1969 scene, I did not feel it appropriate to dwell on my experiences in helping to edit the two NATO reports, so I am very pleased to have had cause to complete my personal software engineering reminiscences, so to speak. I thank the organizers of this conference for giving me this opportunity and, in particular, a belated means for me to publish the text that was so sadly censored from the report of the 1969 conference.

References

[1] J.N. Buxton and B. Randell, eds., *Software Engineering Techniques: Report on a Conference Sponsored by the NATO Science Committee, Rome. Italy. 27-31 Oct. 1969.* Brussels: Scientific Affairs Division, NATO, Apr. 1970.

[2] P. Naur and B. Randell, eds., *Software Engineering: Report on a Conference Sponsored by the NATO Science Committee, Garmisch, Germany. 7-11 Oct. 1968*. Brussels: Scientific Affairs Division, NATO, Jan. 1969.

[3] B. Randell, "Software Engineering in 1968," *Proc. Fourth Int'l Conf Software Eng*., pp. 1-10, Munich, 1979.

[4] M. Shaw, "Remembrances of a Graduate Student (for panel, 'A Twenty Year Retrospective of the NATO Software Engineering Conferences')," *Proc. 11th lnt'l Conf Software Eng.*, vol. 11, pp. 99-100, 1989. (Reprinted in *Annals of the History of Computing*, vol. 11, no. 2, pp. 141-143, 1989.)

Brian Randell can be contacted at
Department of Computer Science
University of Newcastle upon Tyne
Newcastle upon Tyne, Northumberland, NEI 7RU, England
e-mail: b.randell@computer.org

Appendix: Masterpiece Engineering by T.H. Simpson

[Editor's Note: We have attempted to find Tom Simpson in an effort to let him know that this report is being published, but have been completely unable to locate him. Even contacts in IBM have been unable to trace his current location.]

You may be interested in an experience I had last night while I was trying to prepare some remarks for this address. I was walking outside in the garden attempting to organize my thoughts, when I stumbled over a stone in the ground. To my surprise as I picked myself up, I saw that it had an inscription chiseled into it. With some difficulty, I deciphered it; it began:

> Here on this spot in the year 1500, an international conference was held.

It seems that a group of people had gotten together to discuss the problems posed by the numbers of art masterpieces being fabricated throughout the world; at that time, it was a very flourishing industry. They thought it would be appropriate to find out if this process could be "scientificized," so they held the "International Working Conference on Masterpiece Engineering" to discuss the problem.

As I continued walking round the garden, now looking a little closer at the ground, I came across the bones of a group, still in session, attempting to write down the criteria for the design of the Mona Lisa. The sight reminded me strangely of our group working on the criteria for the design of an operating system.

Apparently, the conference decided that it should establish an institute to work in more detail on production problems in the masterpiece field. So

they went out into the streets of Rome and solicited a few chariot drivers, gladiators, and others and put them through a five-week (half-day) masterpiece-creation course; then, they were all put into a large room and asked to begin creating.

They soon realized that they were not getting much efficiency out of the institute, so they set about equipping the masterpiece workers with some more-efficient tools to help them create masterpieces. They invented power-driven chisels, automatic paint tube squeezers, and so on, but all this effort merely produced a loud outcry from the educators: "All these techniques will give the painters sloppy characteristics," they said.

Production was still not reaching satisfactory levels, so they extended the range of masterpiece support techniques with some further steps. One idea was to take a single canvas and pass it rapidly from painter to painter. While one was applying the brush, the others had time to think.

The next natural step to take, of course, was to double the number of painters, but before taking it, they adopted a most interesting device. They decided to carry out some proper measurement of productivity. Two weeks at the institute were spent in counting the number of brush strokes per day produced by one group of painters, and this criterion was then promptly applied in assessing the value on the enterprise of the rest. If a painter failed to turn in his 20 brush strokes per day, he was clearly underproductive.

Regrettably, none of these advances in knowledge seemed to have any real impact on masterpiece production, and so, at length, the group decided that the basic difficulty was clearly a management problem. One of the brighter students (by the name of L. da Vinci) was instantly promoted to manager of the project, putting him in charge of procuring paints, canvases, and brushes for the rest of the organization.

Well, for all I know, the institute may still be in existence. I leave you with one thought: In a few hundred years, somebody may unearth our tape recordings on this spot and find us equally ridiculous.

T.H. Simpson
IBM Corporation
Wheaton, Md., US.A.