Chapter 5: Version 1.0, the Miracle of '96

> "No system is so perfect that it cannot be made to work."
> —Anonymous Engineer

5.1 Mechler Who?

Edmund Mechler had worked for several years in the engineering department of a Pittsburgh natural gas utility before he became a SEEPP volunteer. He managed projects concerned with developing special computer systems, geographical information systems, and special document handling systems. He saw SEEPP's work as an extension of what he was trying to do in his department:

> I basically thought…the software industry [keeps] going around in circles. And at that time they were really going around in circles. The material that they handled is really not that complex. In fact, the computer is really a simple-minded thing. But there's so many pieces of the simple mind. And we kept going around in circles, almost like reinventing the wheel. And I figured, well,…if they put an engineer behind it and they get the people to start doing that and take it out of the realm [of do it your own way], maybe we can really concentrate on making it an engineering thing that really builds on itself and starts moving ahead instead of just keep going around in circles. I mean, even now [2002] you can pick up a book and it's a matter of terms. And soon as you figure out what the terms are, you're right back 10 to 20 years ago. It really doesn't change. [1]

Mechler seems to have been an ordinary software engineer. While working as an electrical technician at MIT's Instrumentation Lab (helping to develop hardware and software for research applications), he decided to become an electrical engineer and started taking classes at Northeastern University in 1970. After four years at the Instrumentation Lab, he returned to Pittsburgh, planning to pursue his engineering degree full-time at to the University of Pittsburgh. But, faced with "a lab *four* hours a night [once a week] for *one* credit", he switched from engineering to mathematics (which, in those days, did not require labs even though it housed computer science). Mechler graduated *cum laude* with a BS in Mathematics in 1976 and, having avoided that four-hour lab, returned to engineering, receiving a master's degree in industrial engineering from Pittsburgh in 1979. He then worked for industry, primarily in engineering (electrical, computer, or industrial)—at first in hardware and then software. Eventually, Mechler moved into project management, "the communications part of" software engineering and was certified as both a CCP (Certified Computer Professional) and a PMP (Project Management Professional). Though he lived and worked in Pittsburgh during the early years of the Software Engineering Institute, Mechler had had no contact with it when, early in 1995, he first learned of the joint IEEE-CS/ACM project from a trade publication, *IEEE Institute*.[2] He immediately contacted Melford. Melford had IEEE-CS fax him a complete Call (February 6). The final two pages of the Call contained a blank application form. Mechler filled it in and faxed it to Melford. Melford emailed Mechler on March 2, acknowledging receipt of the application and assuring him that "of course you are a member of the working Group(s) you checked off." He also warned

Mechler, "As this is a volunteer effort, our turn-around times tend to lag. You should receive some confirming e-mail in a week or so. If you don't, please let us know!"[3]

Mechler chose SEEPP over the other two task forces because it was, as far he knew, the only one at that time asking for volunteers.[4] A middle-level technical manager in a utility, he was concerned with getting those he worked with to follow standard procedures.[5] "Professional Competence" (Gotterbarn's working group) seemed the category closest to that concern. But, like Gotterbarn, Mechler saw participation in that working group as a step toward certification. As he wrote a friend (March 13, 1995):

> Did you know that the IEEE Computer Society and the Association for Computing Machinery have formed a Joint Steering Committee for the establishment of Software Engineering as a Profession[?] Part of which is certification. I have joined a working group on professional competence and hope to join one on certification. But…the education issues must be solved before certification[,] according to Dr. Mario Barbachi [sic] of the Software Engineering Institute, the head of the Joint Steering Committee [whom Mechler had talked to by phone earlier that day].[6]

Mechler had called Barbacci because he had heard nothing from Gotterbarn's working group and was anxious to do something. He told Barbacci he was willing to "assist in any capacity you may need". He specifically expressed an interest in the following subjects within the Body of Knowledge: Communication; Real Time Systems: Client/Server; Project Management; and Parallel Computers.[7]

On April 21, Mechler wrote Melford again: "I haven't heard from you for a while. When will the committee be in action?"[8] Melford responded four days later: "Apologies for the delay, Ed. You should receive e-mail this week or next."[9] While we do not know whether Mechler got the email (presumably from Gotterbarn) within the next two weeks (as promised), we do know that Melford had informed Gotterbarn of the new volunteer by June—because Mechler received two emails from Gotterbarn on June 10.[10] Gotterbarn had not yet added Mechler to the basic profcomp list; so, what Melford received was what looks like a forward of the profcomp message. The first email laid out a general plan; the second listed some codes of ethics to "look at" and asked volunteers both to choose some to report on and to let Gotterbarn know which they chose.[11] This was just what Mechler had been waiting for. "We started out very easy…let's look at some other codes and see what we can get out of [them]. That's not a bad idea."[12] On June 29, he sent in two summaries: one of the IEEE code; the other for the National Society of Professional Engineers.[13] On July 1, Gotterbarn sent these to profcomp list with encouraging news about what other volunteers were doing:

> We have some volunteers for the second item in the task list [of June 10]. Ed Mechler has jumped in with some engineering codes. I have appended his contribution. Since we are interested primarily in competence, it might be useful to write a little bit about what each code says or fails to say about competence. This will help us get a discussion started. Ed…would you be willing to carry your work this one further step.[14] Joel Fineman is looking at BAR association codes, and Amr El-Kadi has offered to work on some of the other codes I listed, e.g., the business communications and the conservation codes. He will also look at the Microsoft Certification Success Guide by

John Mueller…I will look at the ACM and British Computer Society Codes. Thanks for being willing to help.

We still need volunteers for the first and third tasks on my initial memo. I am working on setting up a listserv for us. I will let you know. If any of you can do this easily (I have to convince another university [University of Tennessee] to loan us their facilities) it would be great if you could set this up. Let me know.[15]

Some of the other volunteers also did summaries, though the only one to go out through Gotterbarn's list came from El-Kadi (August 31).

Sometime late in the fall (as he recalls), Mechler began to worry—and to act.

In the beginning, when we were asked to review the models [other codes of ethics] in SEEPP, we were given a deadline for the first copy [of the code]. To a project manager this is very important. When I couldn't get any answer from the emails [to Gotterbarn] I just took over to meet the deadline.[16]

Mechler was not in a good position to "take over". "I knew there was a joint task force [steering committee]. I knew there were three committees [task forces]. How SEEPP was structured, I had no idea."[17] He had no idea how large Gotterbarn's working group was—or, at least, was supposed to be (even though he had the email addresses on Gotterbarn's header). He thought of the working group as consisting of a "half a dozen" people.[18]

5.2 Starting from Zero

On December 4, 1995, Mechler emailed that "half a dozen" (with a "cc" to "Barbachi, Ph.D."—because Jayaram had suggested keeping him informed).[19] The half dozen (beside Jayaram) were: (Manny) Norman, El-Kadi, Sullivan, Burnstein, and Weil. (For some reason, my name was not among the half dozen.) That email began much like one of Gotterbarn's. Mechler was writing only to those who had responded to his November email; he had communicated with Gotterbarn separately ("I finally got in touch with Don G. and he reported there were problems with the group: no reply to what yet."); he (Mechler) had a plan for how to proceed. But, having started as Gotterbarn might have, Mechler did something that Gotterbarn had not done. He "note[d] some of the work I have been doing, some additional resources, and a preliminary outline." The "preliminary outline", a page and a half long single-spaced, was something new—in effect, a rough draft of a code of ethics (though also very like the code summaries Mechler had done). It began:

INTRODUCTION
SYSTEM DEVELOPMENT
　　　Evaluate business affects [sic] and culture changes
　　　Implement Ethical evaluation.
　　　Assure proper Goals and Objectives
　　　Assure proper Development Methodology
　　　Assure proper Project Management
　　　Assure proper testing, debugging, Case Tools, GUI, etc

> Only approve safe and accurate documents
> Assure proper privacy, accuracy, property, access and people

There followed similar lists of rules for "PROFESSIONAL PRACTICES (Himself/Herself)" AND "PROFESSIONAL OBLIGATIONS (Others)". Mechler offered this list as a "starting point":

> I agree with Manny [Norman] that we should have reviewed more examples but I did not see any from the membership; if you have an outline please pass it on. I did two and have asked for ACM version plus reviewed some articles so I have developed this prototype. I have tried to organize the subcategories but not all that good, feel free to change. Also, [feel] free to change anything else. Please return comments by the end of the year…. I plan to mix in all your comments and get your approval of the outline by Feb, 1996. Then we can decide what the final version for submission should be like.

Mechler had, in other words, bypassed the various IEEE stages Gotterbarn had regularly set out (before Mechler began receiving SEEPP mailings). Mechler had also ignored the role of the other working groups (from which he had heard nothing). He even ignored the distinction between "code of ethics" and "professional practices" (something else lost in documents "before his time"). He had simply jumped into drafting a document that was to look something like the documents he had been examining. This may seem like the wrong way to write a code of ethics, to work on the upper stories before a proper foundation has been laid, definitely not the way to write a complex software program. But this "starting point" grew into "Version 0" of the Software Engineering Code of Ethics (see 5. Appendix). It was in fact the beginning of what Gotterbarn had called a "straw man".

The effect was immediate. Though I had intended to remain a quiet observer, I responded on December 5 with an email entitled "Additions to your e-mail list of December 4, 1995": [20]

> "Accept responsibility...." How about something about environment? Software, in many uses, may have substantial impact on the environment not clearly covered under "public health, safety, and welfare." I believe civil engineering now has such a provision.

> "Assure employees know..." Good. Now, what about employers and supervisors? If a software professional doesn't pro-actively assure that they know the constraints he operates under, they may react with anger rather than understanding to a mid-crisis announcement that "I can't do that because it is against my profession's ethics." For example, certified financial analysts are supposed to give their employers a copy of the CFA code of ethics each year (and must certify to their association that they have done so).

> Otherwise, a thorough list. Very good job.

When I wrote these comments, I imagined they would be one set among half a dozen. In fact, they seem to have been the *only* comments. So, on December 14, Mechler wrote his handful of

volunteers again (now seven with my name added)—with the uninformative subject heading "Copy of: Continuation – More":

> Volunteers
>
> Here is some additional info from
>> The Unwritten Laws of Engineering - W. J. King
>> Pa State Registration Board of Professional Engineers,
>>> Land Surveyors, and Geologists Newsletter
>>> concerning registration law.
>> Michael Davis-Works at the IIT Center for the Study of
>>> Ethics-Response to Continuations12/4/95
>
> INTRODUCTION
> SYSTEM DEVELOPMENT
>> Assure proper estimates
>> Assure specifications are fully understood
> PROFESSIONAL PRACTICES (Himself/Herself)
>> Add environment issues to "Accept Responsibility .."
>> Faithful Agent
>> Put forth best effort
>> Show initiative on projects
>> See through to successful finish
>> Don't try to do it all yourself
>> Don't ignore signs of trouble
>> Don't dodge the issues
>> View matters from others points of view
>> Accept full responsibility
> PROFESSIONAL OBLIGATIONS (Others)
>> Assure employers and supervisors know of code of ethics
>> Voice concerns
>> Don't supplant another engr after steps have been taken
>>> for employment
>> Fair and just compensation
>> Never invade another division's domain without knowledge
>> Give fair hearings
>> Don't prevent better opportunity elsewhere
>
> I hope to hear from all of you soon.

These new items would be added to the first "straw man". Norman responded the same day with an apology: "I hope to get my stuff about the accounting profession out over the Christmas break. Life is just so busy during work times!" He was as good as his word. On December 28, he sent out his extracts, using Gotterbarn's "list" (rather than Mechler's visible list of addresses). On March 18 (almost three months later), Mechler emailed the "final outline" to his seven (with

a cc to "M. Barbachi, Ph.D" even though Barbacci had become IEEE-CS President in January and Felipe Cabrera had replaced him as chair of the Joint Committee):[21]

> Volunteers,
>
> I have not heard from Don Gotterbarn since his e-mail dated 12/15/95; if any of you have heard please let me know. I do not know the conditions of Task Force or Steering Committee; this is why Mario is cc. Well, on with our task.
>
> Below is the final outline; examples are getting too repetitive. It has been updated from Manny's e-mail dated 12/28/95 (please Manny change anything you want) and Project Management Institutes Code of Ethics. I would suggest the next step be: each of us pick a section and add words to make it more readable i.e. Article I: Software Engineering Professionals in System Development
> >   must assure the following factors: (did mine!!!)
> Please pick a section or propose another approach and let me know by 3/25/96.
> We will try to complete the task by 4/15/96.

Mechler sounds optimistic in this memo. But a comparison of what he said with what he did *not* say suggests that he had not yet solved Gotterbarn's problem (getting the working group to work). First, he explicitly mentions only Norman's ("Manny's") contribution. We have no evidence of any other (except mine). So, even among Mechler's small group, only three had contributed anything to the code—and, of these, Mechler alone had contributed almost everything.[22]

Second, two days later, Mechler e-mailed "the remainder of our new sub-task force" to announce that he was "assuming a facilitator position, if there are no objections, to bring this task to some degree of completion." He was in effect taking over Gotterbarn's position as head of the Professional Competence working group—except, apparently, he had not yet realized that there was such a working group and thought his sub-group the remnant ("remainder") of the task force (rather than of the working group) . Hence, from then on, he would occasionally use the acronym "SEEPP/E" for his "sub-group".[23]

Having in effect replaced Gotterbarn, Mechler seems to have begun to think in the same orderly way Gotterbarn had. Mechler did not stick to the plan he had announced two days before but returned to (something closer to) Gotterbarn's:

> First we should agree on [what] the final product should look like. I like an intro sentence with bullets. Most of the ones [codes] I review[ed] were like this. Please agree or suggest options by 4/8/96. Then we will divide the sections between the members.

Third, Mechler does not seem to have expected much to come of his suggestion that the format be chosen first—or that "each of us pick a section and add words to make it more readable" (Gotterbarn's "divide and conquer" again). On the same day that he sent off this general email, he emailed me:

I will be in CHI from 4/1 to 4/3 at the AIIM Conference at McCormick Place. Is it near you? How about lunch?

I accepted the offer two days later, curious to know how much Mechler in person would resemble the Mechler of so many emails. We met on April 2 at my CSEP office and walked the mile to Chinatown for lunch. (Mechler looked like a college professor or senior engineer, average height and build, silvery hair, only a warm smile to distinguish him from a great many other people.) After much sociable back and forth over dim sum, Mechler announced that no one had come forward to "provide the words" for his outline and that he now worried that no one would. The work would come to nothing unless a "Thomas Jefferson" appeared to do for the code what Jefferson had done for the Declaration of Independence. No such person had yet appeared. Mechler was not himself the person; his skills lay elsewhere. The tone of Mechler's voice, the pleading look in his eye, the unfolding of his hands, convinced me that he was asking me to be the code's Jefferson.

I had only one good reason to refuse. I thought of myself as a mere observer (*participant-observer* only in the sense that I was not to stand out as an observer but blend into the crowd of participants). My two small suggestions of December 5 had made me a marginal participant. To do more, to do for the software engineers' code of ethics what Jefferson had done for the Declaration of Independence, was to move from the margins of the process to the center, potentially changing the dynamics in ways hard to predict but certain to invite questions about whether the process was typical. The process (and the code) might have too much of me in it, too little software engineer. Volunteering to draft the code might hopelessly contaminate the process CSEP was supposed to study.

On the other hand, the process seemed about to come to a halt—again. And, given the few volunteers who still were active, this halt might not be so much another halt as the last, final, and disastrous end of the project. To fail to help draft the code might well mean there would be no drafting to study. An unusual opportunity would be lost. In this moment of crisis, the risk of contamination seemed worth taking.

I did not know why Mechler had picked me (except that I had showed interest and apparently could write), but I did think I could do a good job.[24] Though a philosopher (Ph.D., University of Michigan, 1972), I had had a year of law school (1976-77, also at the UM, when I could not find a job in philosophy). Among the usual (required) first-year courses, there had been one elective. I had chosen comparative law and learned much about French and German legal codes, including the experimentation and theorizing that preceded them. I had been especially impressed by the way the major nineteenth century legal codes combined "general clauses" (such as "An immoral transaction is void") with more specific rules ("Where the subject of a shareholders' resolution is the appointment of auditors for the examination of certain events connected with the organization or management of the corporation, those shareholders who are directors or officers of the corporation may not vote"). The summer after my first year of law school, I clerked for the Secretary of the Michigan Law Revision Commission (a UM faculty member). The subject of the laws he helped to revise that summer was special assessments, a subject only a real estate lawyer could get passionate about. But the problem of putting more than a dozen independent statutes into a single, sensibly organized, easy to use, and politically acceptable form was not so different from the problem Mechler's list now posed.

I also had an interest in professional codes going back to the 1974-75 academic year, when I had taught legal ethics at the law school of Case-Western Reserve University. Lawyers were just learning to use the new *Code of Professional Responsibility* (1970) after abandoning the old *Canons of Ethics* (originally adopted in 1908 but much amended since). The Canons were a simple list of *do*'s and *don't*'s, not so different from Mechler's Version 0. The new Code was divided into seven Canons (general provisions). Under each Canon were several specific Disciplinary Rules (enforceable) and Ethical Considerations (the exact force of which was a subject of controversy even though the Code's "Preamble and Preliminary Statement" described them as "aspirational"). Because this three-level structure did not correspond to any other document with which lawyers generally worked, there had been much discussion among them about what codes should do and how they should do it, a discussion that led to the abandonment of the 1970 Code in 1984. The code that replaced it (*The Model Rules of Professional Conduct*) had the standard format of a model statute, that is, mandatory rules with commentary to explain how to interpret the rules. Any "aspirations" went into the commentary as guides to interpretation.

I had begun writing about professional codes in the mid-1980s.[25] I had begun studying engineering codes about the same time.[26] I had even written a theoretical piece with part of a model code in it (though one concerned with governmental ethics).[27] I felt that I had been preparing to be some professional code's Jefferson for a long time. While I knew that I knew too little about software engineering to write its code alone, I thought I could count on Mechler, my colleagues at IIT (especially Burnstein), and perhaps some other volunteers to compensate for my ignorance.

I should, however, not then have made the decision to draft the code. Even though the NSF grant that had brought me to lunch that day had explicitly treated providing technical assistance as one of the purposes of the grant, the decision to provide that assistance belonged to the research group, not to me alone. I should have told Mechler that I was inclined to volunteer, if Mechler would have me, but that I could not volunteer unless the research group agreed. Mechler would no doubt have understood—and waited. Instead, I immediately said I would try to do a draft, perhaps hinting that I would have to consult Weil to be sure I could do it. Mechler's response was enthusiastic. He left no doubt that he had hoped I would volunteer.[28]

We should not conclude from these events that Mechler scheduled the lunch in order to recruit me as "wordsmith" (or, at least, not with that purpose alone). Mechler had just had a lesson in the importance of visiting with members of the working group when passing through town. On March 18, he had received an email from Jayaram—which read in part:

> Regarding the elusive Don Gotterbarn, you are singularly lucky having got his email [of December 15, 1995]. He was in LONDON during Feb 2nd of this year presenting his paper—you guessed it—on ethical issues in SE! This Conf titled "Professional Issues in SE" was organized by my colleague (who shares the office space with me!). All that was required of Don—if he was remotely interested— was to give me a call spending as little as a quarter or ask my colleague who was a co-chair or take a brisk walk worth 15 minutes from the venue or use his subway ticket purchased for the day for a 5 minute ride TO GET ME AT MY UNIVERSITY (I had to take my graduate-level classes that day)!

While this e-mail also complains of Gotterbarn's failure to respond to e-mail (a subject to which we will return in Chapter 6), its heat suggests that no amount of email could substitute for the courtesy of a personal visit. Gotterbarn did not visit Jayaram because, though attending the "Westminster PASE'96 Conference London", he did not realize that the "@Westminster" in Jayaram's email address meant that, like the conference, Jayaram was located in that part of London (once an independent city) in which Westminster Abbey is located.[29] Gotterbarn must by then also have forgotten the list of working group members he had last updated nine months before; Jayaram's address there is "London".[30]

Jayaram knew that Gotterbarn was at the conference because Gotterbarn gave a paper (actually, two) and so had his name listed in the conference program. But Melford's name also appeared in the program; he too gave a paper. Melford also did not look Jayaram up.[31] Why did Jayaram not also complain about Melford's failure to pay a courtesy call? There are two possible explanations. One is that Jayaram was thinking of Gotterbarn as leader of Jayaram's working group—and was complaining about his conduct in that capacity (rather than in his capacity as SEEPP co-chair). That Melford was the other SEEPP co-chair would then be irrelevant. The other possible explanation is that Melford's name no longer meant anything to Jayaram. Melford was by then invisible to most members of SEEPP's working groups (or, at least, of Gotterbarn's working group). For a long time now, the only messages from SEEPP (or any of its working groups) had come from Gotterbarn. Of these two (compatible) explanations, the second seems the more likely. Like many other members of Gotterbarn's working group, Jayaram may have lost track of the distinction between SEEPP and the Professional Competence Working Group. For him, the working group was SEEPP and SEEPP was Gotterbarn.

Mechler naturally assumed that Gotterbarn meant no discourtesy and decided to prevent such an oversight from weakening his "sub-group". So, on March 19, he told Jayaram that he had taken "the liberty to send [your reply] to the other team members working on the ethics outline". Then, on April 5 (after his meeting with me) he emailed the sub-group: "Just in case any of us travel I would like to list what city each of you lives in. If one of us travels to a member's city we could meet." He then listed the eight members of the group (including himself and me), asking each to email his or her location. On April 10, he emailed to all a list with location for each. (Plainly, the five who had had nothing to say about Mechler's "straw man" were still reading their email and anxious to stay involved: they had all sent in a home town.)[32]

5.3 "Mr. Jefferson" at Work

A few days after my meeting with Mechler, I informed Weil that I had agreed to do a first draft of the code.[33] She approved. She had missed the meeting only because she was out of town. She had already tried to help Mechler get on with the writing—without herself consulting the research group. On March 25, she had written: "I am glad to see the work going forward. Your list of March 18 is quite comprehensive. Do you plan to put the imperatives in categories with rationale or preamble to each category?"[34] Mechler responded the next day that he was "open to discussion. Maybe give an example of one of the categories. I wasn't myself but each member can take a part or suggest a form." Weil had concluded from this exchange (especially, from the request that she give examples) that Mechler had done all he could and that the group as a whole would not do more. She had herself begun to think of who might be brought in to do the writing. She had come to the same conclusion as Mechler.

During our April meeting in Chinatown, Mechler and I had discussed schedule. I had pointed out that I was in the last weeks of the semester. I could not do much before May. On May 2, Mechler emailed a reminder: "During our meet in Chi. you said that you would add the 'good words' to the ethics outline. Was the text copy I sent cc good enough for this task? Let me know if you want a paper/WORD/WordPerfect/etc. copy." I responded (May 8): "WordPerfect copy would help. Probably cannot finish job before June 15. O.K."[35] On May 15, Mechler emailed "With regard to adding words to the outline, I am sending you a disc with three versions [of WordPerfect]. Let me know if one is ok. Also have dos and secondary file if you want. June 15 ok for finish date." The diskette arrived about the same time as the email. I set to work immediately.[36]

By May 24, I had a rough draft—and several problems on which I wanted Mechler's advice before I went further. I wanted Mechler's advice for three reasons:

> First, it turns out that there are some clauses which, when I started trying to put into prose, I realized I didn't understand. (See ?'s.) Second, there are some clauses I didn't know what to do with, either because they didn't seem to belong in an ethics code (too specific), because they seemed to repeat what I already had, or because I couldn't figure out where to put them. (Hence, the unnumbered clusters at the end of some sections.) Third, I have found myself rearranging your list. Have I missed something I should have seen; or have I really made an improvement?

Because I had also changed Mechler's (computer) formatting, I "didn't dare to send" the draft email. I therefore asked for Mechler's fax number.

Mechler took four days to respond. His four paragraphs suggest that he had a lot to think through before responding. He declined to let me pass the buck: "mainly you must decide how far you want to go adding words." He then acknowledged an issue that I had not raised in my May 24 email: "From our conversation in Chi., I believe that you did not want to go too far due to your two roles. In fact, while reading your e-mail a question occurred; when I pass this around to the other members of the group do you want credit or should I say an anonymous member added words?" He then returned to my questions, offering a few options but, essentially, giving permission to do whatever I thought best:

> In regard to your specific questions, they all seem reasonable but should I or the group answer? There is no doubt in my mind that you had to rearrange clauses, found duplicate clauses and ones that are hard to place, if they can be placed. Also, how far should you go? Maybe the effort you have already completed is enough and I [should] pass around the results plus questions? Let the group finish the effort. I must leave these questions up to you because of our conversation in Chi.

Recalling that what Mechler had said "in Chi" was that he had gone as far as he could, that there was no one else to do it, and that unless I did it, it would probably not be done, I replied on May 30: "Your email of May 28 gave me courage to do one more draft (if you find the document I sent you to be basically what you had in mind)."

Most of my email is, however, about how to present the draft, once finished, to SEEPP/E. I thought that Mechler, not I, should send it out in part "for practical reasons". In the past, CSEP

had had trouble emailing large documents. CSEP's librarian, "the email expert", had just resigned, moved to Denver, and not yet been replaced. But, in part, I thought that Mechler should send out the draft because it was "important that at least one software engineer is happy enough with the document to put it out." That Mechler had to "put it out" did not mean the draft need be anonymous, only that Mechler "should make it clear that I am trying to work within the list of do's and don't's the group developed, providing a framework rather than new substance." I concluded by promising one more draft if Mechler's comments "are mostly favorable."

Mechler took almost a week to respond (in part because my email arrived late on Thursday, after he had left work, and he did not return to his office until Monday). But his response, when it came (June 6), was certainly favorable: "I just read your draft and have only one word for it EXCELLENT EXCELLENT EXCELLENT EXCELLENT. It is a great step forward." He then suggested that "when you find a statement that is unclear or you do not know if it fits put 2 or ??? to highlight the condition." Just to be sure I would not take this minor criticism too hard, Mechler concluded the email as he had begun, with praise: "Really looking forward to the review draft. Again an excellent job, just what I wanted."

My next communication with Mechler is a "classic mail" letter with the same date as Mechler's email (June 6). The letter seems to begin with an (understated) acknowledgment of Mechler's approval: "I took your comments to mean continue. So, I did." Enclosed with the letter was "your disk with the draft code of ethics". Mechler was to "note that this is (more or less) on time and (certainly) within budget." The letter concludes with me looking forward "to your response, but especially to the responses of all those connected to us only by email."

A closer reading of my letter shows that it is in fact *not* a response to Mechler's email of that day. Mechler's letter was received at "15:50:41", rather late in the afternoon on Thursday. How could I revise the code as instructed, put it on disk, and write my covering letter, in what little remained of the working day? Memory does not answer that question, but there are at least three reasons why it is improbable that I rushed out a response. First, I had no reason to rush. I had originally given myself till June 15—and Mechler gave no indication of holding me even to that date. I had more than a week until that target date and, given SEEPP's history until then, a week or two beyond that date should have bothered no one. Second, I generally worked on the code at home because I considered such writing to require concentration. The office was for work that would not suffer from frequent interruption. Third, there is an *email* that seems more like a response to Mechler's. That email was sent on Monday, June 10. In it, I inform Mechler that a diskette "(with a somewhat revised version of the code you saw) is in mail. Please put in '???' as you see fit (all unnumbered phrases)." Apparently, I did not receive Mechler's Thursday email until Monday. (I generally did not come to the office on Friday during the summer.) I had worked on the code without Mechler's four *EXCELLENT*'s; hence, I could not follow Mechler's suggestion about the use of "???" and had to have Mechler add them himself.[37] That I sent Mechler the revised version on the same day that Mechler's email arrived with its praise, seems to be pure coincidence.

So, what were the comments Mechler had made that encouraged me to do one more draft? They should not, it seems, be those of May 28, since I said I would do one more draft *if* Mechler's comments on the draft on which Mechler had not yet commented were "mostly favorable". Mechler's June 6 comments were the comments I was supposedly waiting for before doing another draft. Did Mechler send any comments between May 28 and June 6? The archives contain none. No one recalls any. And the tone (and substance) of Mechler's June 6 email makes

it doubtful that there was any communication in the intervening week. So, it seems, I had not waited for Mechler to comment. I had taken Mechler's May 28 email as permission to continue with detailed revisions even as Mechler assessed the overall document ("mainly you must decide"). I expected Mechler to approve and acted accordingly. What I did not expect was that Mechler's approval would be so unequivocal.

54 The Architecture of Version 1

Then, for an entire month, nothing happened. But, on July 10, the following email from Mechler arrived at CSEP:

Volunteers,

One of the members of SEEPP/E, Mike Davis, has taken our outline and added the good words. The attached, in text mode, is the result. I think I talk for the entire group that has been working on this when I thank him very very much. Now it is your turn. Please review and send me the changes by the end of July. We should be able to submit the FINAL product by the end of the summer.

As you read each rule or at the end of a rule you will see statements with ??? attached. These were statements that Mike wasn't sure of, thought they were covered, or didn't know where to place. If you think they should be placed tell me where or they will just disappear.

We are finally in site of the end.

Ed

There was no attachment, but the promised document arrived a minute later as a separate email, just over four single-spaced pages long. Version 0 was now very close to what would soon be Version 1 (6. Appendix). There was a preamble (Introduction), seven general clauses (Rules) such as "Software engineers shall, insofar as possible, assure that the software on which they work is useful to public, employer, and user, completed on time and at reasonable cost, and free of significant error" and, under each general clause, between three and eleven more specific clauses preceded by an "In particular, software engineers shall…" Each Rule had both a number (1-7) and a name in capitals (PRODUCT, PUBLIC, JUDGMENT, CLIENT AND EMPLOYER, PROFESSION, COLLEAGUES, AND SELF). Each specific clause had a decimal number indicating its place under the general clause as a sub-rule. For example, the first specific clause under Rule 1 was 1.01 ("Assure that they understand fully the specifications for software on which they work"). The two decimal places allowed for the number of clauses under a Rule to grow beyond 9. At the end of all but section 3, 5 and 7, there were one or more (left-over) rules or phrases followed by "???". The first of these, for example, was "Assure proper privacy, accuracy".

Given Mechler's favorable response, it is worth noting that I had not merely "added words". I had entirely reworked Version 0, keeping only a) the terms "Introduction" for

"preamble" and "Product Development" (shortened to "Product") and b) the wording of provisions I did not understand or thought redundant or inappropriate. Mechler's other categories (and titles) had been abandoned and all the individual rules had been rewritten. Mechler had said he would like a code consisting of an "an intro sentence with bullets. Most of the ones [codes] I review[ed] were like this". The code he got had a more complicated structure. There were no bullets. Instead, I had (it seemed) followed the typical IEEE standard.[38] Each sentence bore a number, making reference easy. The Rules were not simply introductory sentences; they were the general clauses governing interpretation of the more particular rules under the general rule and serving as a backstop when no particular rule applied. My chief innovation, the use of "In particular" before each list of particular rules, was intended to stress that the particular rules were not all that a software engineer need be concerned about. The general rule had to be considered too.

My structure was no closer to that Weil had suggested ("put the imperatives in categories with rationale or preamble to each category"). The general Rules, though serving to categorize the more specific rules, were not mere rationales or preambles. They were (as the code called them) Rules. In this respect, as in some others, my document most resembled codes with which most software engineers would have been familiar. In general structure (and many provisions), it resembled the IEEE's Code of Ethics of 1979, the Code of Ethics of the National Society of Professional Engineers, and ABET's Code of Ethics.

Significantly (as it turned out), my (version of the) code did not much resemble either IEEE's 1990 code of ethics or (except for its decimal numbering) the ACM's 1991 code. The IEEE had drastically shortened its 1979 code to a brief preamble and ten imperatives (such as "1. to accept responsibility in making engineering decisions consistent with the safety, health and welfare of the public, and to disclose promptly factors that might endanger the public or the environment"). The ACM's 1991 Code of Ethics and Professional Conduct, though a long code like mine, was organized in a different way: an unusually long (six-paragraph) preamble, twenty-four "imperatives" (a little over a page long), and "Guidelines" inserted between the imperatives to provide one or more paragraphs of guidance on interpretation of the imperative immediately above. The imperatives are divided into four categories: General Moral Imperatives (such as "1.1 Contribute to society and human well-being"), More Specific Professional Responsibilities ("2.1 Strive to achieve the highest quality, effectiveness, and dignity in both the process and products of professional work"), Organizational Leadership Imperatives ("3.1 Articulate social responsibilities of members of an organizational unit and encourage full acceptance of those responsibilities"), and Compliance with the Code ("4.1 Uphold and promote the principles of this Code"). My code had many more imperatives than the ACM code had; it did not distinguish between (what the ACM's Preamble called) "fundamental ethical considerations" and "more specific considerations of professional conduct" (though it had a similar distinction between general and specific professional rules). My code did not make a point of the professional's "leadership role". In these ways at least, my code could easily seem to anyone familiar with the current codes of the two sponsoring organizations to be a retrograde development, a throwback to a style of code deliberately abandoned for something better.

We might then have expected Mechler's reaction to have been more ambivalent than it was. Certainly, given the diversity of Mechler's little group, we would expect at least one of its members to question the code's structure. None did. SEEPP/E's reaction was as favorable as Mechler's. We can almost hear the sigh of relief. At last, here is a draft code with which they

could work. The structure was familiar enough that it did not get in the way of what seemed important: the particular requirements. One of the four SEEPP/E members who had had nothing to add to Mechler's list now responded in detail. That response (July 14), more than a half page long, came from Egypt (through Gotterbarn's PRFCMP list). Among El-Kadi suggestions were removing "3.06. Decline to contract for a service with self. (?) ???", replacing the word "badly" in 4.06 with "not as excepted" or "inappropriate", and renumbering (and moving) 5.04 to 6.04. Norman's response, sent only to Mechler (July 20), was similar—with one exception—, though more than two pages long: Norman proposed one new rule: 7.04 "Endeavor to keep current with advances and changes in the field."

5.5 Drafts, Drafters, and Draftees

Early in August, Mechler concluded that he had received all the comments he would receive (just two). He therefore emailed his "Volunteers" (August 8, 1996) the following (with a cc to Cabrera):

> Attached, in text form, is the final product of the SEEPP/E subgroup after adding your comments and eliminating ??? that were not necessary. If you have any outstanding additions etc., please let me know by the end of August because at that time I will submit it as our final product.

This email brought a surprising response, a long fax (eight pages, single spaced). On August 17, I wrote:

> I guess I misunderstood your memo of July 20. I didn't realize you intended to do the final draft. I thought I would get the suggestions and incorporate them. I think this would be better for two reasons: 1) to keep the single style (a minor matter); and 2) to take into account suggestions Bernstein [sic] and Weil have made—and with which I agree (a more significant matter). I also had left some loose ends I wanted to clean up. I guess I should have put all this on email—like everyone else—but I didn't. So, I'm now doing this fax to give you some idea of thinking here.

Following this introductory paragraph, there was a second explaining the two-and-half pages of annotations on the document that formed the second half of the fax. That document was *not* Mechler's "final code" but the one I had prepared largely independently, scavenging Mechler's "final code" when it arrived. I downplayed the differences. Except for "the change of an 'its' to a 'the' in the last line of the introduction" and the addition of "endeavor" at the end of Rule 7, all changes were (I noted) in the subsidiary clauses and "even these changes leave more than 90% of the text unchanged." Yet, whatever the similarities, the two codes did differ significantly—as the two pages of annotations comparing the "M" code (Mechler's) with the "D" code (Davis') made clear. What had happened?

As so often during SEEPP's early years, there had been a failure of communication. I had just assumed that I would remain in control of the drafting. Though I had *suggested* that I would do *only* "one more draft", I had not actually said that I would do only one more—and I had not meant that I would do only one more. What I had meant was that I was ready to withdraw if

Mechler thought I was getting in the way of software engineers doing what they wanted. But so far, the software engineers involved seemed to be happy with what I was doing. And I was enjoying myself immensely. I therefore had no reason to withdraw and so had not. I had, however, said nothing about this to Mechler. From what I had said, Mechler drew the obvious inference that he was lucky to get as much out of me as he had. Since he had a document with which he could work, he had worked with it, accepting Norman's and El-Kadi' suggestions whenever he could.

Mechler also had not guessed that I was using IIT's research group to provide the sort of communal deliberation on the code that email had not provided. Since award of the grant in early 1995, the research group—(primarily) Burnstein, Weil, and I—had been meeting almost monthly to go over SEEPP email, trying to understand the process. But, starting in June, once I had sent Mechler the first draft, Weil had begun convening meetings of the research group every week or two to go over the code itself. Each of the three members of the group seemed to come with a different purpose. Weil seemed primarily interested in understanding the code. Her questions were generally of the what-does-this-mean variety. When neither Burnstein nor I could answer the question, there followed a discussion of what the provision *should* mean. Once there was agreement on that, I revised accordingly. Burnstein, the only software engineer present, was concerned *both* to demand enough of software engineers to raise standards to a point she considered decent—*and* to avoid demanding so much that the code could not generally be followed. She could often state a problem with a provision (or the absence of a provision) without being able to offer appropriate language to fix it. She had remained silent online in part because she was participating in the research group's deliberations but in part because she could not on her own have offered "the words" and did not feel comfortable just complaining. Having worked alone on the code for almost two months, I was happy to have a responsive audience. I would take notes at the meeting, revise the code, and circulate a new draft the following week. What satisfied my two colleagues stayed; what did not was revised until it did. I had a resource Mechler lacked.

Most of the IIT changes in the "D draft" simply clarified an existing clause or moved it. But five added new rules. Three of the new rules originated with Burnstein. Two of these were under Rule 1 (with older clauses renumbered accordingly): "1.01. Assure that specifications for software on which they work have been put in writing, satisfy the user's requirements, and have the customer's approval" and "1.02. Assure that they understand fully the specifications for software on which they work." The other clause was 7.05 ("Improve their knowledge of the law governing the software and related documents on which they work"). The other two new rules were an attempt to explicate the injunction against "self-dealing" (rather than, as El-Kadi had suggested, simply dropping it): "3.05. Neither solicit nor accept a contract from a governmental body on which a principal or officer of their employer serves as a member" and "3.06. Participate in no decision of a governmental or professional body, as a member or advisor, concerned with software, or related documents, in which they, their employer, or their client have a financial interest." I had found the inspiration for this explication of "self-dealing" in part in the NSPE's code of ethics (II.4.d.) and in part from studying of *ASME v Hydrolevel* (a case in which a volunteer participant in the standards writing process of the American Society of Mechanical Engineers seemed to have written standards designed to eliminate one of his employer's competitors).[39]

In this way, two more of the "silent four" (Burnstein and Weil) made substantial contributions to the code. Only Jayaram and Sullivan did not. Why? One explanation is that they resembled Burnstein in not being able to work alone. They might have made contributions similar to hers had they been able to participate in the sort of face-to-face meetings IIT's research group had. They both think one or more face-to-face meetings would have helped the process.[40] Another possibility is that they saw others doing the work they would have done. They saw no reason to intervene. Both were evidently reading their email; they had responded, for example, as late as April when Mechler had asked for home town. Each had contributed his share to the early work, Sullivan by attending many of SEEPP's early meetings, and Jayaram by summarizing several British codes of ethics (though that contribution seems to have been lost in the ether). Jayaram certainly had said enough when things seemed to be on the wrong track (or when he thought Mechler needed to know who chaired the Joint Steering Committee). Now that the group seemed to be on the right track, Jayaram could read his email with delight.

5.6 A Big Mistake

On August 20, 1996, I sent Mechler a diskette version of the code. The covering letter indicated that, while the code was identical to the one faxed on August 18, "you should have received a fax with this revision of M [Mechler's] 4.09, which I suggest [as] new 1.11, renumbering accordingly". This new 1.11 ("Assure that raw information used in software is accurate, derives from a legitimate source, and is used only in ways properly authorized") would eventually prove controversial (as would most of the other late additions).[41]

On September 11, Mechler emailed what was now *almost* Version 1, with a covering note two paragraphs long. After the salutation "Volunteers", he reports:

> We had some last minute suggestions; I have added and attached, in text, is a copy for your review. Please do as fast as possible; if I do not hear from you by Sept. 30th, I will submit as our final product. Please remember each style is different.

Though this email is addressed to Mechler's usual seven, the cc includes not only Cabrera (as was now Mechler's custom) but Gotterbarn (which was reasonable, since Mechler was technically working under him, but had not been Mechler's custom) *and* Keith Miller—a novelty requiring explanation.

Mechler's explanation, given in the second paragraph, is: "Keith, Don forwarded a copy of your 'Testing, Reliability, and Trustworthiness' to me. After reading, I thought you may want a copy of our 'Ethics'." Miller's working group (Reliability and Safety) seemed to have been working more or less in parallel with SEEPP/E and had (it seemed) sent out its draft (two and a half pages single-spaced) on July 15 (with a revised version coming a day later)—denying Professional Competence (or SEEPP/E) the honor of reporting first. We will tell the story of Miller's document in Chapter 6.3. For now, what is important is Mechler's response. Miller's document arrived just as Mechler was completing the draft he would send out on August 8 (what I labeled "M"). Mechler had time to read, reflect on, and benefit from Miller's document. Mechler nonetheless acknowledges no debt to Miller. Miller's document suggested no revision in what would soon be Version 1. Mechler's only response to Miller's document seems to have been to send his own as a courtesy (as if he were leading a coordinate working group) or perhaps

as an expression of pride (since he received Miller's document only because Gotterbarn had forwarded it). While Mechler had to receive his copy through Gotterbarn, each member of IIT's research group had received an individual email copy directly from Miller. Miller must have recalled that we were supposed to be observing the process as part of his working group. I used the document as a check against the code I was working on; I was pleased to find no reason to change what I had done. I did not wonder why I had no emails concerning its drafting.[42]

I sent Mechler two more (minor) changes on September 13. On September 30, 1996, Mechler emailed Cabrera and Gotterbarn (with cc to each of SEEPP/E's seven members): "Attached, in text format, for your review, is the final product of the SEEPP Ethics group. If there is additional work on this product, or any other part of the project, please contact us." Cabrera responded the next day with, "Thank you Ed."[43] On October 4, Mechler took Cabrera's courtesy response as an excuse to underscore SEEPP/E's willingness to remain involved in work on the code (and to make sure a change of email address did not exclude him):

> Felipe
> Thanks for the "Thanks e-mail" and CC to the group. Again if additional work is required we are available. Also, the product is available in other formats if you require a better version; it is held now in "Word".
>
> I have a new e-mail address
>   emechler@eri.eqt.com
> I will keep open the CompuServe one for the project for a while. The new one is under Exchange and as you know this is much better, except I need to get a book for various areas I can not get an answer for: too far ahead of total implementation.
>
> What is the status of the Joint Steering Committee and three task forces? When I read about this endeavor, it became very important to me. We really need to move in the direction proposed. Will the results be published? If you need any help, in any area, please contact.
>
> Ed

The same day this friendly note was sent, Dennis Frailey (the Joint Steering Committee's vice chair) emailed the (non ex-officio) members of the committee his comments on the code (with Gotterbarn alone receiving a cc). Two days later (October 6), Cabrera accepted Mechler's offer of help:

> Ed,
>   Could you address the comments made below [Frailey's email without identification of author]?
>   Some are tough and general, and perhaps they cannot be addressed. Yet the more pointed ones would be nice to clarify and fix.
>   Please let me know.
>
>   —Felipe

Frailey's second paragraph set the tone of his response: "In general, I think this expresses some good ideas, but is entirely impractical in a number of cases. The problem is that many of the things being proposed are vaguely defined, impossible to accomplish, or not under the control of the software engineer. A few others might not be generally accepted as the 'right' thing to do."[44] Frailey had objections to every item under Rule 1. After that, his criticisms were more scattered but still substantial. He seemed to have gone over the code with some care.

The next day (October 7) Mechler received another email from Cabrera. It began by urging Mechler "not to feel overwhelmed or disappointed but pleased that smart people are reading your document in a careful manner." It then asked him "to address" the points made in the email "below". Below was a forward from Mary Shaw, though Mechler could not tell the source from the version Cabrera sent him. Cabrera had cleansed it of (almost) all references to members of the Steering Committee. Shaw too was unhappy: "I share xx's general concern that this is fine in theory but hard to apply. I realize that codes of ethics should be idealistic, but they also must be credible—that is, practitioners should be able to see how the code shapes their work. Another way of saying this is that this draft seems a little naïve."[45]

The attempt to preserve confidentiality failed. Mechler soon learned the identity of both critics. But the knowledge was of little use. The two critics had votes on the Steering Committee. Though only one-sixth of the Committee's voting members, they might well be speaking for a larger number, enough perhaps to defeat the code if it were put to an immediate vote. Mechler had no idea how the others would vote. He had no choice but to respond to their criticism.

5.7   Mechler fights back

Until now, Mechler must have seemed to everyone in SEEPP/E a gentle administrator, one who inevitably worked by consensus, without strong ideas of his own. He had known how to bring a difficult undertaking to completion, but he had shown no deep understanding of what SEEPP/E was doing. He had not objected to anything any SEEPP/E member had proposed. His practice seemed to be to accommodate everyone. Even when I, however unintentionally, proposed to discard a draft code to which Mechler had devoted considerable effort, about which he must have had some authorial pride, and to which he had publicly committed himself, he had simply accepted my version of the code, letting his own die without a word of objection.[46] Mechler seemed ill-fitted for debate with two stars of computing, one a professor and the other a senior researcher (and adjunct professor). What followed shows how hard it is to read character.

Mechler probably should have taken time to allow his first thoughts to mature into a strategy. He should have consulted others, gathered evidence where that seemed appropriate, and organized his response into a systematic analysis of the criticism, something academics could recognize as a decisive refutation. But email invites quick response (especially to critics who themselves seem to have responded quickly). Mechler did as invited. Looking back with the advantage of half a decade, Mechler admits that "[w]hen I saw the comments I saw red. Not because people were commenting on the product, I expected that. It was the comments themselves." They were like the comments he heard when he tried to introduce his company to processes successful outside.[47]

Mechler responded to Frailey's email on October 6 (the same day he received it), going through it item by item, inserting what he had to say to a criticism right after the criticism. He

did the same for Shaw's on October 7. Frailey and Shaw had four distinct kinds of objection in common. Much of the code was either: 1) too idealistic (impractical for anyone), 2) too vague, 3) impossible for a software engineer to accomplish (because not under her control), or 4) not what some would think should be accomplished. To these, Shaw added one criticism of her own (a criticism later revisions of the code would struggle to set to rest): 5) a failure to "discriminate in intensity". She also expressed a general distaste for the code's structure: "On the whole, I think the document would be more likely to be read if it were shorter, crisper, and more realistic. A supplementary document could work through the examples in a little more detail than the 2-liners that constitute most of this document."[48] What she, one of the ACM-appointed members of the Steering Committee, seems to have in mind is, of course, the structure of the ACM's new code of ethics (with its "crisp" two pages of rules and the longer Guidelines with their "examples in a little more detail"). Mechler, an engineer, had not yet seen the ACM code. He therefore did not see what Shaw was getting at. Since his own original conception of the code was closer to Shaw's "crisp" short code, he could only respond with a shrug: "This is a matter of style. We decided on the [NS]PE Code model to list some of the detail in items associated with the rule."[49]

Mechler's response to the other criticisms that Frailey and Shaw made was more pointed. The critics were simply wrong on all five counts. So, for example, in response to the first criticism (good ideals but impractical), Mechler noted that "the SE Code of Ethics was built using other professional codes as models. Ethics doesn't have a practical/impractical side that I have ever experienced." Mechler agreed with Frailey and Shaw that a code of ethics should be practical, not a mere "ideal" (or aspiration). He disagreed only concerning the practicality of Version 1. Mechler's method had (generally) been to go through other codes looking for ideas. Provisions developed in that way could not, Mechler supposed, be impractical insofar as they were (more or less) the same as provisions in other codes that had proved themselves in practice (as evidenced by their long presence in those codes). Of course, in arguing this way, Mechler implicitly undertook to demonstrate that the code as a whole, or at least the particular provisions Frailey or Shaw criticized, were indeed in other codes—or had otherwise proved themselves in practice. This he did not do.[50] Neither Frailey nor Shaw was likely to take a different view of the practicality of those provisions without such an explicit demonstration.

Concerning the vagueness of provisions (the second criticism), Mechler had two responses. One was simply to deny that a provision was vague. So, for example, Frailey complained that "the last sentence of the introduction makes no sense to me: 'Each subsidiary clause is a specific application of its general rule, one experience has shown needs express statement, but no set of subsidiary clauses exhausts the general rule.'"[51] Mechler's response to Frailey's incomprehension is to offer (what he considers) the obvious gloss: "General disclaimer saying we cannot give all instances of a rule in ethics." Mechler's other response is more telling because it is more general: "Usually, ethics are vaguely defined." Every code must leave much room for interpretation. Interpretation is inevitable. Objection to Version 1 on grounds of mere "vagueness" (as opposed to a specific failure to say something more clearly) is in fact an objection to any code of ethics, no matter how long.

Perhaps the heart of the case Frailey and Shaw made against Version 1 was that many of its provisions are impractical for *software engineers* (however practical for other professionals). In some cases, the problem is that the software engineer simply does not have enough control of the process to do what the code asks; in other cases, the problem is that the cost of doing it is too high; and in other cases yet, there is no point to doing it. Frailey and Shaw can be quite specific

about the impracticalities. So, for example, Frailey objects to 1.01 ("Assure that specifications for software on which they work have been put in writing, satisfy the user's requirements, and have the customer's approval") by asking us to suppose "you are brought in to fix something where you have (no) interface with the customer and do not know if the customer has approved." Mechler's specific response is that "[the] example given is one of the problems we are trying to decrease the occurrence of." (This response must be read in the context of his general claim that "I don't think that any of the items are impossible to do as a professional.") His point seems to be that all the rules under Rule 1 are introduced with "In particular, all software engineers shall, *as appropriate*" do as the subsidiary rules require. The code does not actually say that the software engineer in question *must* assure these things even when assuring them is impractical. Frailey's example may well illustrate one of those situations where seeking to do what 1.01 asks *is* inappropriate (because the software engineer is in no position to do it). But even here, it would be good for the software engineer to at least try to do as 1.01 asks (for example, by asking for the specifications or for a way to contact the user or customer). Even when unavoidable, repairing software without knowing what the user needs and the customer wants is never *good* practice. "We" would like to have less of that.

Mechler's response to the fourth criticism is somewhat different. He begins by acknowledging the general point in a way that diffuses it: "I'll give 100 to 1 odds that under any professional code there are items that some will think are not the 'right' thing to do." Codes of ethics generally contain some provisions that "some" think not right. To criticize Version 1 for that is, therefore, no criticism at all, just a fact about writing a code of ethics. The question is not what some might "think" but what *is* "right" or, perhaps, what *all but a few* think right.

That response, though sensible, does not actually dispose of what seems to be bothering the critics, that is, that Version 1 contains provisions *they* think "not right". So, for example, Frailey also objects to 1.01 because "I see no reason the ETHICS would require specifications be put in writing." To this, Mechler responds as he did to the previous objection: "at present[,] writing is the safest way of assuring transfer of data." The code's Introduction explains that the particular rules are ones that "experience has shown need express statement". Rule 1 asks software engineers "insofar as possible, [to] assure that the software on which they work is useful to the public, employer, customer, and user [and so on]." If experience has taught software engineers anything about making software useful, it should have taught them to "document" (put in writing, whether on paper or in electronic form) as much as possible, including the specifications. That (according to Mechler) is why specifications are a matter of ethics.

The disagreement between Frailey-Shaw and Mechler here may only be terminological. For Frailey-Shaw "ethics" seems to be general and uncontroversial (rather like what the ACM identified as the one-page "Code of Ethics"). The requirement to put in writing *is* something that looks too specific (and perhaps too controversial) to be "ethics" in that sense. It is more like an item in a "code of practice" (what the ACM code would put in later sections of its code—or in its Guidelines). For Mechler, however, 1.01 is not too specific or controversial to be in a code of ethics. Mechler, an engineer, had (at this time) not yet seen the ACM code. His paradigms were engineering codes. The NSPE code of ethics includes provisions that are no less specific (and, perhaps, no less controversial); that is also true of ABET's code (or, rather, of the combined Code and Guidelines). Mechler was therefore in a poor position to understand the terminology Frailey and Shaw took for granted. They, in turn, might have responded to Version 1 with more

sympathy had they been familiar with the codes Mechler consulted. We have here a significant difference in "culture" (that is, in the ways of doing things taken for granted).

Mechler's response to the two critics was not totally negative, however. Shaw noted an "omission in the handling of intellectual property." But what she goes on to describe is actually much more than that:

> Piracy appears in 4.04, confidentiality and public domain IP are used inconsistently in 4.05, copyright but not patent appears as a part of a list in 4.07, trade secrets and nondisclosure are mentioned nowhere at all (thought 4.05 was probably intended to address them), there's also nothing about export restrictions, and what there is about privacy is politically loaded.

Mechler agreed to add "patent" to 4.07 (which at that time read, "Inform client or employer promptly if, in their opinion, a project is likely to fail, to prove too expensive, to violate copyright laws, or otherwise to turn out badly"). He also offered to add "export restriction" if Shaw would write the statement and specify its placement. But, "[as] for privacy being politically loaded, maybe, but from an ethical point of view we should be very aware of these conditions". He might have added that 4.07 actually says nothing about "privacy"—except in its catch-all "otherwise to turn out badly". That catch-all could equally well be interpreted to include "patent", "export restriction", and any other consideration that a client or employer should take into account before deciding whether a project should proceed.

This brings us to the last of the five objections, the one only Shaw makes, that Version 1 fails to distinguish between "absolutes" and obligations having less "intensity". Shaw seems to want a code of ethics to consist of "absolutes" (perhaps with another document providing the "aspirations"). So, for example, she says that she would "sign up to expecting an SE to refuse to work on a practice that is blatantly unsafe or fraudulent." What she is not willing to sign to is expecting SE's to satisfy "this committee's view of good process". Mechler has the same problem with this objection that he had with the last. He cannot see what bothers Shaw: "I have never seen intensity associated Ethics: guidelines are statements to help judgment [and, for Mechler, the code is a set of guidelines]."[52] If a project is 'blatantly' something then I don't need a code: the code is for gray areas." For Shaw, it seems, codes of ethics state what everyone knows to be a "bright line". For Mechler, the code should help draw lines in gray areas. The point of a code of ethics is to raise standards, not to leave them as they are. It is (in part) supposed to state a "view of good process".

We could examine the debate between Frailey-Shaw and Mechler in considerably more detail. There is much of interest in the details. But we shall not because this exchange merely begins a debate that will continue until the code (by then, Version 5.2) is adopted three years later. We will have time enough to consider the issues first raised here—in their more mature form. We must, however, draw two (tentative) conclusions now. The first is that the debate reveals a deep division between Mechler (and, presumably, the rest of SEEPP/E) and some members of the Joint Steering Committee concerning what should (and should not) go into a code of ethics. The division does not seem to be between academics and practitioners. While Mechler *is* a practitioner, the rest of SEEPP/E (except Norman) *are* academics (more or less) like Shaw; and Frailey (while a part-time academic) had many years experience at Texas Instruments and still held relatively high rank at Raytheon. The second conclusion is that the division

between Frailey-Shaw and Mechler does not seem to be one between the "low minded" and the "high-minded". The economic welfare or social status of software engineers seems to have played no part in the debate (that is, no one has appealed to such concerns to defend their position). What seems to explain who is on which side of the debate, if any thing does, is a close identification with ACM (rather than IEEE-CS), an identification itself arising from an educational background in mathematics and computer science rather than engineering. The critics (so far) are ACM's representatives on the Steering Committee. They seem to have implicitly accepted the ACM's code as the ideal by which all other codes are to be judged.[53]

5.8   Gotterbarn to the Rescue

On October 8, about 8:40 AM, Mechler sent Cabrera a brief email (with the amusingly errant salutation "Feline"), offering his own guess about the origin of the Frailey-Shaw criticism:

> I tried to answer the concerns as best I could. Hope it is OK. I think the change to a professional status will bring up this type of frustration from many people and maybe this individual is fighting it a little. I did not send my comments to the group; do you want me to? If there are additional comments like these[,] maybe a meeting is in order to discuss the results.

Apparently, Cabrera thought it a good idea to let SEEPP/E see the Frailey-Shaw-Mechler exchange because, at 11:33AM, Mechler emailed Cabrera again (the salutation now "Felipe"):

> I feel in tune with the group after all the reviews and comments building the product. I will send both around asking if there are additional comments or areas requiring change. Will you give me a name for the reviewers to tell the group? Task Force Review Group, etc. Second review to follow tomorrow I hope.[54]

Cabrera replied twenty minutes later:

> I am satisfied with your changes given that you are in tune with the whole group.
> I did send you a second e-mail (I believe yesterday) with more comments.
> I suggest that after you incorporate those comments, if you think it would be good, you should circulate the document by the group. These issues are tough as so many people are affected by them.

Less than two hours later, Cabrera responded again: "Task Force Review Group chaired by me is fine." So, it was Mechler who provided the name by which the critics would be known, giving them a status they would not have had as two individuals on the Joint Steering Committee and adding to the confusion some of the volunteers already had about how the Joint IEEE-CS/ACM project was organized.

The next day (October 9) Mechler sent Cabrera another brief email: "Sorry I spelled your name wrong in the first review ["Feline"]. I think the first commentator got to me a little; heard those responses too many times in my life. It seems the ethics product has developed some heat in the total effort; I got four e-mails from Don Gotterbarn but I will get to them after sending this

reply." One of Gotterbarn's emails (dated October 8) was a page-long announcement (and detailed explanation) of a listserv for the "Professional Competence Standards Task Force" (PRFCMP-L-Request@UTKVM1. UTK.EDU). Everyone else in Gotterbarn's task force received one of these (or, at least, should have). Mechler responded with his new email address and (for good measure) phone number. The next email announced Version 1.0 to the working group, declaring that it was "developed by a sub group lead by Ed Mechler of the professional competence working group." The next paragraph solicited comments on the code [appended several paragraphs below]:

> We are especially interested in distinguishing between those imperatives which are aspirational and those which can be embodied in a code of practice. It would be helpful if your suggestions were accompanied by suggested rewording rather than just sending a general suggestion. Please apply your special expertise to this.

The paragraph immediately below announced there had been a suggestion "by one of their [the Joint Steering Committee's] members that they review [the code] in NOVEMBER!! so your brilliant and rapid responses are encouraged." There was a "ps" announcing Gotterbarn's belief that the "list is back in service" and everyone's name is on it. Between this letter and the code itself (unchanged from the week before) was a temporary address. From July 1996 through January 1997, Gotterbarn would be at the School of Engineering and Applied Sciences, George Washington University. He would be using a GWU email address.

Having read Gotterbarn's emails, Mechler sent off one of his own to his "Volunteers":

> Our product has been review[ed] by the Task Force Review Group chaired by Felipe Cabrera. Attached is the first review comments and my reply, again in text format. If you have any additional comments or disagreements with my comments[,] send them to me as soon as possible and I will pass them on. There appears to be a rush associated with our product so I would like additional comments ASAP. I will send the second review and comments in the next e-mail. Let me know if you get both.

He then gave his new email address (as he had with Cabrera). He sent another email to the volunteers a few minutes later, his response to Shaw attached.

Late that day, Mechler emailed Gotterbarn. One of Gotterbarn's four emails of October 9 had offered to help with the response to Frailey and Shaw. Though it was now too late for that help, Mechler thanked Gotterbarn and asked some pointed questions. Mechler wondered why Gotterbarn had asked the working group to divide Version 1.0 into "imperatives" and "aspirational provisions". Was Gotterbarn siding with the critics? Mechler also wondered whether he had missed something. Frailey and Shaw seemed to share a conception of codes of ethics differing from his own. If Gotterbarn shared that conception, it was something about which he (Mechler) should know more. Gotterbarn responded with his interpretation of events and suggested that Mechler have a look at both the ACM and IEEE codes.[55] The next morning (October 10) Mechler emailed the ACM and IEEE for copies of their codes. By 8:36 AM, he had the IEEE code. It took him another hour before he was directed to the website from which he could download the ACM code.[56]

The next day (October 11), Mechler sent Gotterbarn the same documents (his answers to Frailey and Shaw) that he had sent SEEPP/E two days before. By then, Gotterbarn also had—thanks to Frailey—received a copy of Frailey's own comments (October 4) and Shaw's (October 7).[57]

5.9 Farewell Cincinnatus

On October 14, Mechler received his first response from SEEPP/E to his exchange with the Task Force Review Group, a brief fax from me. It began:

> I enjoyed your exchange with Cabrera. Thought you did a good job, too, in dealing with his points. If I have anything worthwhile to add, it is that (in some cases) he didn't pay close attention to the wording, for example, 1.01 does not require more than what is "possible" and its subsidiary clauses that apply only as "appropriate".

My next (and final) paragraph asked a question: "Discussion of 4.01 says 'I agree with Dennis.' Who is Dennis? We don't seem to have his message in our e-mail file!" (Though Cabrera had tried to purge the exchange of all references to members of the Joint Steering Committee before releasing them to Mechler, he had failed. One reference to "Dennis" had survived.)

Mechler emailed me the same day (October 14). He began by sharing a joke:

> I thought you would get a kick out of the two e-mails. I do not think anyone knows that you, etc are helping. It may be unethical, but enjoyable, to answer the comments when I have two or three ethics experts helping.

Of course, neither I nor any of the other experts had helped with Mechler's responses. But some had helped with the code (and all would doubtless have helped if asked). Mechler then gave his assessment of the situation, "I now think that some in fighting occurred but do not know what. Cabrera didn't write the reviews". Mechler now thought he knew what Gotterbarn wanted. Would I have a look at the ACM code of ethics? "I'd like you to read it and comment; I have some problems with the approach." He then went on to ask why "you fax me instead of e-mail" and concluded by describing the state of his SEEPP/E files (which he had promised to the research group): "I have not transferred the e-mails to disc yet. Of course I started a new directory".[58]

On October 18, Mechler received another fax, again from me. Burnstein, Weil, and I had met earlier that day. We had "decided on one editorial suggestion in last line of Introduction" (striking "one" and replacing it with "an application that"). We hoped that would "take care of what one critic thought didn't make sense". We had also discussed "how thin email discussion of our work has been so far." We had expected more "back and forth like that between you and Cabrera". We also asked two questions. One concerned how much discussion Mechler thought had gone on "off our email site (beside my faxes)". The other revealed we had either forgotten all about Miller's email (July 16) or misunderstood what it was: "Is our working group ahead of the others? Or did we just miss their reports?" I concluded with an explanation of my mysterious preference for faxes: "It's easier for me: I know how to use fax-modem; email requires print out for secretary who then types it in again (or carrying in a disk)."

Mechler responded a few days later (October 23). He thought the proposed change in the Introduction was "OK". He would add that to the one change he had said he would make in response to "the reviewer". He was still waiting to see if there would be any other suggestions or comments. So far, there was nothing. He too had expected more debate. One of Gotterbarn's emails had mentioned a Steering Committee meeting in November, but Gotterbarn now said that it had been cancelled. "I will have a meeting with Don next month, he will be in Pittsburgh, and maybe find out what is next." Mechler thought there was a struggle over format. "Were you able to get and read ACMs [code]?.... I think Don likes that one since he worked on it." Mechler did not know how the other SEEPP working groups were doing. But he had passed on to Burnstein a copy of the report (Miller's) that Gotterbarn had sent him. He too would like to know more about the state of "the entire program". He had asked a "number of people…but no answer." Perhaps he would email them now.

I faxed my evaluation of the ACM code on October 26. I had three comments:

First, it is, of course, a new code (1992) in an unusual format. In this respect, it resembles the 1979 IEEE code that, after much boasting and a few years of use, was junked in 1990 for a traditional format. Whether ACM's new format will prove another fad, or instead an enduring contribution to code writing, remains to be seen. On the principle of engineering conservatism alone ("avoid fads"), I think we are justified in staying clear of it for a decade or two.

Second, the ACM's code's format could not easily be imposed on what came out of our e-mail deliberations. What we produced was, in essence, a combination of ACM's "General Moral Imperatives" (some of which, I hasten to add, seem more controversial than "moral imperatives" should be, e.g., "give proper credit for intellectual property") and the more specific imperatives in secs. 2-4. But our system of organization strikes me as more useful than ACM's. The big difference between the two codes is that the ACM's has "Guidelines" and ours does not. I think the idea of Guidelines—or, more exactly, a commentary—for the Imperatives is all right (though nothing yet suggests we need one). But the actual Guidelines do not strike me as very informative, certainly not informative enough to justify the space they take. So, I say that, inch for inch, our code [is] 3 to 5 times more useful (and user friendly) than ACM's.

Third, that's my opinion based simply on looking at the documents. It is, however, not my opinion alone. The two CS faculty at IIT who have used both the old ACM code and the new in teaching both prefer the old for convenience, clarity, and simplicity. So, I think we were wise to go our own way.

This response must have chimed with Mechler's thinking, but we have no record of a response. Indeed, from here on, Mechler's records tell us very little. There is an email on November 8 from Mark Kanko, Major, US Air Force. He had taught a course in the Department of Electrical and Computer Engineering, Graduate School of Engineering, Air Force Institute of Technology, Wright-Paterson Air Force Base (just outside Dayton, Ohio). He had used Version 1.0 in class, asked his students for comments, and thought their comments might help with evaluating the code. Kanko had contacted Gotterbarn the day before and Gotterbarn had

suggested he contact Mechler as well. Gotterbarn and Mechler met for the first time on November 18 at the Software Engineering Institute. They ate lunch between classes Gotterbarn was teaching (and having taped). The next day (after many days of back and forth testing protocols), Mechler seems to have received Kanko's student comments as an attachment ("As I started to read, I wondered whether you would like responses"). (We will consider the student comments in detail in 6.7.)

Mechler also wrote Gotterbarn, Laurie Werth, Kanko, and Norman ("Subject: FW: Ethics Workshop") on that day (November 19): "I had trouble through the Multiple Recipients site; host not found. I decided to form my own list with members I know of. Please one of you send this on to the rest and tell me the correct address of the list." Less than two hours later, Norman responded with some comments about the ethics workshop: "Plan on it for 1998, not 1997."

Mechler's last email from Cabrera arrived on November 25, 1996. The email consisted of the "action items" adopted during the Joint Steering Committee meeting held on Thursday, November 21. (This was the meeting Gotterbarn had thought cancelled. In fact, all that had been cancelled was the participation of ex officio members.) Mechler wrote back thanking Cabrera for the minutes, saying how sorry he was that he had not known of the meeting in advance since he would have liked to have met Cabrera (who lived in Seattle). Mechler also mentioned his meeting with Gotterbarn the previous week. Cabrera wrote back: "I am SORRY, this was supposed to go to Robert Melford. Now you ALSO know all the action items that came out of the meeting." Almost exactly a year after he seemed, like an Old Testament prophet, to come from nowhere to save Gotterbarn's working group (and SEEPP) from failure, Mechler's participation in SEEPP's work had all but ended. We must now consider what else happened in 1996 and how that prepared the way for the very different, but equally important, achievements of 1997.

5. Appendix:

VERSION 0

OUTLINE:

INTRODUCTION
SYSTEM DEVELOPMENT
       Evaluate business affects and culture changes
       Implement Ethical evaluation.
       Assure proper Goals and Objectives
       Assure proper Development Methodology
       Assure proper Project Management
       Assure proper testing, debugging, Case Tools , GUI, etc
       Only approve safe and accurate documents
       Assure proper privacy, accuracy, property, access and people
       Assure proper estimates
       Assure specifications are fully understood
       Assure environmental issues addressed
       Promote max productivity and min costs

PROFESSIONAL PRACTICES (Himself/Herself)
       Accept responsibility in engineering decisions for safity, health and public
           welfare; disclose endangering/abusive factors.
     results must be judged from the standpoint of society as a whole
          meet changes as they occur.
          departure from the norm can be justified
          define "usual circumstances" should be a matter of
             professional judgement.
          understanding of broad fundamentals.
          neutrality in preparation
          not serve a special interest
          professionalism is to put the public's interest
             ahead of self interest

       Put forth best effort
       Show inicitive on projects
       See through to successful finish
       Don't try to do it all yourself
       Don't ignore signs of trouble
       Don't dodge the issues
       View matters from others points of view
       Accept full responsibility
       adequate technical training and proficiency
          independence in mental attitude

Due professional care
adequately planned and supervised.
Present fairly
Professional skepticism
Establishment of Quality Control policies and procedures.

Avoid conflicts of interest; disclose.
Reject bribery.
No paybacks from contracts
No political contributions, gifts, commissions, etc. for award of contract
Not accept outside work detriment to regular work
Not represent adversary interest without consent
Do not use employer equipment on outside engineering
No pirated soft/etc
Respect ownership

Service only in areas of competence
Faithful agents or trustees
Non-association with fraudulent businesses
Signature to only areas of competence
Same project-one party pay only
No decisions on services provided by self
No promotional efforts without consent
Salary appropriate to professal qualifications

Honestity in stating claims.
Objective and truthful public statements
Avoid deceptive acts
Not reveal confidential facts
Not falsify or permit misrepresentation
Admit own errors
Avoid misrepresentated statements
Responsibility to detect and report errors and irregularities

No professional compromised
Not promote own interest at expense of profession
Constructive service in civic affairs
Extend public knowledge of engineering
Prepair articles

Avoid fads
Develop ethical check lists
Develop review process
Develop contingency plans
Assure data is accurate and legitimate; kept confidentiall;

authorized use
Customer fulfillment
Recognize and report problems to proper authorities, cooperate
Inform client if project will fail

PROFESSIONAL OBLIGATIONS(Others)
Improve understanding of technology.
Improve technical competence.
Improve ethical education
Develop ethical learning
Assist collegagues in professional development.
Advance professions integrity and prestige
Support the Code
Obey the laws of the country

Not review work without other engineer knowledge
Honest criticism and credit properly.
Treat fairly all persons.
Avoid injuring others by false action.
Assure employee informed
Not attact engineer falsly

Assure only qualified signatures from others
Assignments only by educated/experience
Develop positive agreement on ownership
Assign duties to utilize for potential

Assist in development of Organization ethical environment
Assure commitment
Assure employees know
         Policies and procedures
         to protect passwords/files/soft/hard
         to cooperate with proper authorities
         to work in cometent areas
         to state opinion vs fact

Assure employers and supervisors know of code of ethics
Voice concerns
Don't supplant another engr after steps have been taken
         for employment
Fair and just compensation
Never invade another divisions domain without knowledge
Give fair hearings
Don't prevent better opportunity elsewhere

NOTES

[1]   Interview of Mechler, June 11, 2002.

[2]   Mechler filed the January 1995 CFP with his other (paper) SEEPP documents.

[3]   Mechler's archive E950302A.

[4]   Mechler would later join the Engineering Manager Body of Knowledge Task Force (EMBOK), though it never (as far he knows) "got off the ground". October 21, 2003 email (Subject: Chapter 4). I have found no record of a task force with that name.

[5]   Interview of Mechler, June 11, 2002: "it really wasn't a planned idea…the opportunity was there and I jumped on it. I said, 'Why not?' If we build it up in such a way, and we put the things in there that we think…should be ethical issues—we might be stretching ethics—but if you say that you shouldn't accept kickbacks, what's the difference in saying, 'Well, you should follow the process to get the job done.' …most of the software people, and the people that were loading the software, building the software, testing the software, had no idea of any process. They just did it."

[6]   Mechler's Archive, E950313 (Tipton); E950313A (Barbacci).

[7]   Mechler's Archive, E950313A.

[8]   Mechler's Archive, E950421.

[9]   Mechler's Archive, E950425.

[10]   Gotterbarn could not have learned of Mechler much before June 10 since a) he did not include Mechler on the list of volunteers he sent out on that date and b) he had not yet included Mechler in the profcomp list he used on that date.

[11]   Mechler's Archive, E950610; E950610A.

[12]   Interview of Mechler, June 11, 2002. The late date he joined (March 1995) explains both his absence from all the early lists of volunteers and his sense of SEEPP's size and organization.

[13]   Mechler's Archive, E950629.

[14]   Neither Mechler nor any other volunteer seems to have written a statement about what the codes said about competence. Gotterbarn had, however unintentionally, reverted to the failed strategy of "divide and conquer" (accepting the division of labor between working groups). And, as before, it failed.

[15]   Mechler's Archive, E950701.

16   Mechler's Comments on Chapter 4 (October 31, 2003). Presumably, the deadline he is referring to is the date for the November 1995 meeting of the Joint Steering Committee. But I can find no mention of that meeting date in any of the June or July memos.

17   Mechler's Comments on Chapter 4 (October 31, 2003).

18   Interview of Mechler, June 11, 2002.

19   "I also understand from Jayaram that Mario thinks we are working on the project; that is why he is cc." (December 4, 1995)

20   The email was actually sent (and received) on December 6. In those days, I wrote emails as if memos, leaving it to CSEP's secretary to turn the memo into email, often losing a day or two in consequence.

21   Again, it seems to have been Jayaram who told Mechler that Cabrera had replaced Barbacci as chair (when Barbacci had become IEEE-CS President): "Do you have an e-mail address for Louis-Felipe Cabrera? I [Mechler] will send him of [sic] of a copy of what we have been doing and see where he wants to go. I assume you will still work with us even if our leader will not." Mechler's Archive, E960319A (email to Jayaram).

22   The three contributors Mechler may have intended would be El-Kadi and Jayaram, each of whom had done some code summaries Mechler may have seen, and I, who had made a few suggestions. Mechler (E960708), a note to Norman a few months later, confrms the small contribution of even these three: "You have contributed more than half of the small group. Only three have contributed. My next message will point this out. Of course the small group has done at least a million times more than the large group." Mechler was politic enough not to point out in his "next message"—or in any other he sent to his volunteers—how little they were doing.

23   See, for example, March 20, 1996 (in an email to Jayaram with cc to rest of his volunteers): "I am cc this message to the remainder of our new sub-task force SEEP[P]/E (like the name? – no imagination)….I am also sending it to the SEEPP/E because your excuses." The single P in the first use seems to be a typographical error.

24   Mechler's reasoning turns out to have been simple: "The reason I wanted you to write the good words, Mr. Jefferson, was that I thought all the [other] participants were software engineers." Email: October 31, 2003.

25   The earliest of these was "The Moral Authority of a Professional Code", *Authority Revisited: NOMOS XXIX* (New York University Press: New York, 1987), pp. 302-337.

26   The most important of these are: "Thinking like an Engineer: The Place of a Code of Ethics in the Practice of a Profession", *Philosophy and Public Affairs* 20 (Spring 1991): 150-167; and Michael Davis, "Codes of Ethics, Professions, and Conflict of Interest: A Case of an

Emerging Profession, Clinical Engineering", *Professional Ethics* 1 (Spring/Summer 1992): 179-195.

27   "Civic Virtue, Corruption, and the Structure of Moral Theories", *Midwest Studies in Philosophy* 13 (1988): 352-366.

28   Some years after this event, Gotterbarn asked me why I had not checked with him before accepting Melcher's offer. I had no clear memory but I did have the impression that Mechler at least had Gotterbarn's tacit approval. Mechler had used Gotterbarn's distribution list to send several messages, and had included Gotterbarn on some others, all without any objection from Gotterbarn.

29   Fax (Gotterbarn to Davis), December 1, 1997 (Archive).

30   Gotterbarn\Volunteers\Members 1995 (6/10/95) as well as Gotterbarn\SEEP VOL_10_94. Omitted from this June 1995 list are: IIT's three (Burnstein, Weil, and me), Mechler, and Sullivan. Gotterbarn seems to have begun updating the June 1995 list a few days after returning from England. See Gotterbarn\94-96 Misc, for the various working group lists including "PCOMPENT-WG list" (file date February 21, 1996).

31   See Gotterbarn email to Davis, June 5, 2003.

32   For those who find Gotterbarn's forgetting Jayaram's location implausible, it is worth pointing out that Mechler's April 10 email records an even more implausible oversight that Mechler himself committed (and admitted): "I should have thought of this earlier. I could have visited Burnstein [in Chicago] and Sullivan [in Washington] and I don't even travel that much." Since Mechler knew (in some sense of "knew") that Burnstein was part of IIT's research group, he should have realized that she was in Chicago just as the other two members of that research group were. But he did not realize it. Apparently, he made the same sort of mistake Gotterbarn did.

33   How many days later? The only documentary evidence suggests that the date was at least a month later (much later than my memory suggests). On May 1, 1996, Weil wrote Mechler as if she did not know that I was to work on the code:

> The starting and stopping is exasperating but I hope you will not drop the project. At the moment you have a good list that has to be organized—that's what I meant by "categorized" weeks ago. Some injunctions have to do with competent and responsible work, "put forth best effort;" others have to do with customer, etc. A preamble about computer engineering and developing programs is needed to give an organized list some context. I hope these comments are of use.

Mechler's response the next day (May 2) is worth quoting in full: "It is EXASPERATING but I think necessary. I will not quit until someone says so and after a fight. Thanks for the input."

May 2 was the same day he wrote reminding me that I had said I "would add the 'good' words' to the ethics outline".

³⁴ Mechler Archive, E960325. It was Mechler who informed me of Vivian's contact (in a way that did not register at the time). See E960326, March 26, 1996: "Also Vivian has suggested a form for the ethics project and I have invited her for lunch to discuss; told her to see you. I forgot you two are at the same place."

³⁵ My original (handwritten) response given to the secretary for sending had the "O.K." as a question. The question mark was lost in transcription.

³⁶ The question of sending diskette versions arose because CSEP was having trouble receiving large attachments at this time. The cause may have been either that CSEP's electronic mailbox was too small (and some large messages just never arrived) or that the program CSEP's secretary had to use to open attachments (PINE) was too complicated for her. CSEP was then having both sorts of problem.

³⁷ As if to add to this confusion, the same email—"Diskette (with a somewhat revised version of code you saw is in mail)"—was sent again on July 19 (E960719) and withdrawn a minute later (E960719A).

³⁸ In fact, I had by now forgotten Gotterbarn's emails of the year before. I was simply following the ordinary practice of legal codes.

³⁹ For details, see Paula Wells, Hardy Jones, and Michael Davis, *Conflict of Interest in Engineering* (Kendall/Hunt: Dubuque, 1986).

⁴⁰ Interview of Sullivan, October 10, 2002; Interview of Jayaram, February 25, 2003.

⁴¹ Like most of the other late additions, this was Burnstein's.

⁴² Compare Mechler's comments (November 1, 2003): "shortly after the first version [of the Code] was released we received an e-mail, 'that might interest us', about one of the other subgroups [Miller's]. It was good work but we couldn't determine how to place it into our work at that time. The other subgroup was somewhat related to the original eight working groups but we thought we couldn't use their work at that time. To this day, we do not know what happened to their work."

⁴³ Mechler archive, E960930.

⁴⁴ October 6, 1996, p. 1.

⁴⁵ Gotterbarn\Version 0\ACODE4, p, 1.

⁴⁶ Mechler's September 11, 1996 memo treats my revisions as just another set of suggestions: "We had some last minute suggestions; I have added and attached."

⁴⁷ October 31, 2003 (Subject: Chapter 4).

⁴⁸ Gotterbarn\Version 0\ACODE4, p, 2.

⁴⁹ October 6, 1996, p.4.

⁵⁰ That is, the email to Cabrera did not go through Version 1 provision by provision giving the source for each. Mechler would provide such a provision-by-provision analysis to Gotterbarn a few months later. See Chapter 7.

⁵¹ Shaw is a bit gentler: "The last sentence of the second-order bullets being incomplete sets of examples is pretty obscure"—but, it should be noted, not so obscure that she did not understand it. Gotterbarn's Archive, Version 0, ACODE4, p. 2.

⁵² See, for example, Mechler's response to Shaw (October 7, 1996): "The question is, Where does responsibility begin? It must start at the SE Professional. I think too much 'Thou shall not' or 'Thou shall' is being read into the Code's Items. They are guide lines."

⁵³ This is the interpretation I now give this debate, knowing what I do of the authors of the criticism. The impression we at IIT had at the time was quite different. Weil's official report to NSF (July 21, 1998) gave this interpretation (Report on Grant #9523650):

> There followed comments from the Chair of the Task Force Review group, who criticized the draft for vagueness, for requiring the impossible or what is outside the control of the software engineer, and questioned the basis for anyone outside a company or its managers defining appropriate behavior for software engineers. The comments were presented together with replies by Mechler, who remarked on the "bleak outlook" reflected in the comments. He handled a second set of similar comments in the same way. As more comments came in critical of "soft, qualitative language" and the like, they appeared to reveal a division between the perspective of academics (members of the WG) and the perspectives of practitioners (contributors of comments).

In fact, the Task Force Review Group consisted of two members, one an academic and the other a practitioner-academic. Mechler's group may actually have had proportionally more practitioners (depending on what counts as a "unit practitioner"). Whatever the cause of the disagreement, it does not seem to be the same as reported in: Stuart Shapiro, "Degrees of Freedom: The Interaction of Standards of Practice and Engineering Judgment", *Science, Technology, and Human Values* 22 (Summer 1997): 286-316.

⁵⁴ If "second review" means the response to Shaw, this phrasing must be a slip of memory or pen. Mechler seems to have sent out that response the day before.

⁵⁵ These emails seem not to have survived. We know about them through Mechler's email to me (October 14, 1996): "Don wanted to help me answer but one was sent and the other was being sent when I receive his e-mails….I think I finally found out what Don may have wanted."

⁵⁶ Note that this is Mechler's first contact with the ACM code even though he seems to have "asked for" that code as early as December 4, 1995. Had it become easier to get the code (or had Mechler's methods improved with Gotterbarn's advice)? It is also interesting that he now asked the IEEE-CS whether it had a code of ethics of its own and learned several days later (October 14, 1996) that it did not. Even after a year's involvement with SEEPP, he was clearly not an "insider".

⁵⁷ Gottebarn\Version 1\DFCOMMENTS (October 4, 1996); Gotterbarn\Version 1\CMTMARY—1996 (October 7, 1996).

⁵⁸ By this time, Mechler also knew "Cabrera didn't write the two reviews but two people, Dennis and Mary [did]."