Impasse reached in supercomputer access talks

Galen Gruman, Contributing Editor

Negotiations between several federal government agencies—including the Defense Department, State Department, and National Science Foundation—on rules restricting access to US supercomputers by Soviet and Soviet-bloc researchers have stalled. "The major players just don't seem to be able to reach any agreement," said Arthur Kusinski, the NSF's assistant general counsel.

The federal government issued proposals restricting access by Soviet-bloc researchers late last summer, but withdrew them after an outcry from the academic community, especially from researchers involved in five NSF-sponsored supercomputer centers. (Although the academic community has been particularly vocal, any restrictions would cover all supercomputers: private, government, and academic.)

In retracting the original proposals, the government established the Senior Interagency Group on Technology Transfer last September to formulate rules that the academic community might more willingly accept.

Representatives from the five supercomputer centers (at Carnegie-Mellon University, Cornell University, Princeton University, the University of California at San Diego, and the University of Illinois at Urbana-Champaign) expressed their concerns directly to the group in several meetings, while the NSF has represented them in the ongoing interagency talks. (Other participants in the group are the Commerce Department, Energy Department, Central Intelligence Agency, National Security Agency, and National Aeronautics and Space Administration.)

By January, the group had agreed that some sort of security measures were needed to keep supercomputer technology away from the Soviets and their allies. However, despite initial optimism from some officials in the talks, there has been no overall agreement.

The stumbling block is whether the restrictions apply to all foreigners on the Commerce Department's sensitive-technology embargo list in all situations or whether the restrictions would have an "exception to the general policy," Kusinski said. "We would allow an exception for what we considered legitimate scientific research—not a KGB agent." (The embargo list applies to most communist nations and includes any technology the Soviets might not have. When organizations in allied or neutral nations receive such embargoed technology, they must promise not to pass it on to an embargoed nation.)

The NSF and the universities have proposed that Soviet-bloc researchers with legitimate research interests in areas not threatening US national security be given exemptions on a case-by-case basis and that undergraduate-level supercomputer courses be exempt from the restrictions because of their generally low-level access to the machines.

However, the Defense Department has balked at the proposals. "State is trying to act neutral, as a middleman. Defense just doesn't buy it," Kusinski said.

George Menas, a Defense Department representative in the interagency talks, would not discuss the specifics of the negotiations, but did confirm they had stalled over the two issues. Michael Marks, a State Department technology-transfer policy analyst involved with the talks, also confirmed there were two unresolved issues.

Kusinski said the impasse might force the National Security Agency to take a direct role in the access proposals, something that it has so far left to the interagency group. When asked if this were a

Gerhart appointed to Editorial Board

Susan L. Gerhart of the Microelectronics and Computer Technology Corporation (MCC) has been appointed to a two-year term on the IEEE Software Editorial Board. Gerhart's primary responsibilities, according to Editor-in-Chief Bruce D. Shriver, will be to solicit articles and to manage their review.

Gerhart joined MCC's Software Technology Program in August 1985. She is active in importing and studying design technology and in evaluating design issues.

Before joining MCC, she was a professor in the School of Information Technology at the Wang Institute of Graduate Studies. There she developed and taught courses within a professional program of software engineering studies and pursued a research program assessing Prolog as a software engineering tool.

Gerhart has also been a research staff member and project leader at the USC Information Sciences Institute, a member of the computer science faculties of the University of Toronto and Duke University, and a member of the technical staff at Software Research Associates.

She has served on numerous program committees, on advisory committees for
possibility, David Wilson, deputy director for East-West trade at the State Department, responded, “I just can't say at this point.”

The universities and the NSF are in no hurry to have limits placed on them. “This policy is going to be looked on by the university community [something] that they’re not going to like,” Kusinski said. When told late last fall that no policy proposal was expected until late this summer, Sidney Carin of the San Diego Supercomputer Center responded, “Good. I won't have to worry about it until then.” That attitude was reflected by various members of the supercomputer centers contacted by IEEE Software. Kusinski concurs with this attitude. “No policy certainly doesn't hurt our operations,” Kusinski said.

Many in the academic community are skeptical about some of the Defense Department's motives and concerns (see Soft News, September and November 1985, IEEE Software). Kusinski said a major intent of the access proposals is to pressure the Europeans and Japanese to enforce the technology embargoes and restrict access to their own supercomputers. The US defense and security agencies apparently believe that it will be easier to pressure the allies if the US has its own restrictions.

Furthermore, “I think they were to some extent exaggerating the case,” Kusinski said. Those original concerns included fear that Soviet agents might use US supercomputers to run Soviet military programs because the Soviets have no supercomputers of their own. “You don’t run your sensitive, high-security programs in a hostile country,” Kusinski added.

Still, Kusinski said he expects some acceptable policy to be proposed eventually, whether by the interagency group or by the National Security Agency itself. The universities and the NSF do agree that some security measures—such as visa controls—should be taken. However, they feel the federal government should assume the burden of enforcing any measures. Classroom content and academic freedom should not be affected, they argue.

As the number of supercomputers increases and the realization grows that the universities will be the homes for many of the machines, the federal agencies will become more amenable to the NSF and university proposals, Kusinski said. “You need the cooperation of the academic and research communities. Defense knows this,” he explained pointedly.

Study says DoD ‘wastes millions’

Because it incorrectly anticipates its needs, the Department of Defense wastes millions of dollars on software maintenance, says Pamela Samuelson, an intellectual property legal scholar at Carnegie-Mellon's Software Engineering Institute.

DoD's software procurement regulations “are needlessly complex and fail to give DoD critical rights it needs, like the right to create derivative software. And DoD policy diverges needlessly from standard commercial practices and conflicts with software acquisition regulations that theoretically apply to all federal agencies,” Samuelson concluded.

Her report urges DoD to honor these federal acquisition regulations, saying this would clarify procurement policy for both DoD and industry and result in substantial savings by ensuring that DoD has the rights and documentation it needs to modify software.

Warnier Prize seeks nominees

The Warnier Prize Foundation is now accepting nominations for its fourth annual prize for excellence in information science.

Established in 1983 to honor Jean-Dominique Warnier, one of Europe's leaders in information engineering, the prize is intended to encourage research and development and to publicly honor such contributions. The award was initiated and funded by Ken Orr and Associates and consists of a $3000 honorarium and commemorative medal.

Previous recipients of the award are Alan Kay, a fellow with Apple Computers; Barry W. Boehm, chief engineer of TRW Defense Systems Group's Software Information Systems Division and a member of the IEEE Software Editorial Board; and Enid Mumford, a professor of organizational behavior at the Manchester (England) Business School.

Nominations concerning qualified candidates should be sent by May 15 to Gerald Weinberg, Chairman, J-D. Warnier Prize Selection Committee, 1725 Gage Blvd., Topeka, KS 66604.

Japanese well-matched software activity

Ware Myers, Contributing Editor

Three characteristics of the Japanese are particularly relevant to effective execution of the processes of software engineering, Les Belady, now vice president for software technology of MCC, Austin, Texas, said in his March 6 plenary address at Compcon Spring. One is the sharp separation of planning and implementation. The second is the willingness to do everything well, even if some tasks are boring. The third is their strong motivation to cooperate with each other.

Still, there is a dark side to these characteristics, Belady observed. Thorough planning tends to make the Japanese relatively inflexible in execution.

During the 18 months before his retirement from IBM, Belady was assigned to form a software technology research organization within the four-year-old Japan Science Institute, part of IBM's worldwide chain of research organizations. Belady immersed himself in Japan, even making an effort to learn the language. “I was the only non-Japanese-speaking person in that IBM building,” he said. “Everybody working for me was Japanese, and my management was mostly Japanese.”

Planning and implementation distinct. In Japan, planning and implementation are sharply distinguished activities. “This observation is mine,” Belady noted. “I have never heard it stated in that fashion.”

We in the United States are great improvisors, he continued. “You never know whether we are planning together or even planning at all. Or maybe we are actually building something.”

In Japan there is “no rush” in the planning mode, he emphasized. Much information is gathered. They examine many alternatives. Lots of time is spent on the details. The answers come slowly because they examine many courses of action before they settle on one. They seem to have a “built-in desire to plan things.”

Belady did not find that all the Japanese believe the same thing. What they do is take the time to understand each other's points of view thoroughly. When planning is finished, they understand the entire context and all aspects of the project that has been planned. Then, many of the same people go on to the implementation phase.
Williness to work. At the end of planning, tasks are assigned for implementation, but the tasks are less likely to be broken down by specialties than they would be in the United States, Belady said. The Japanese tend to divide a project in terms of problems and to chop the problems into subcases, which are then assigned to the participants.

At this point in development, the participants demand that the assignments be as detailed as possible. "In my Western style of management I often did not do that," Belady admitted. "I left things to the imagination; I thought many things were implied. In Japan you shouldn't do this, because you will be taken literally. You should be very specific."

It sounds a little like the mechanical processes of procedural programming, he went on. In fact, to our manner of thinking their way of implementation may seem a bit like mindless execution of the plans. But they make at least one exception. They will not do sloppy work just to keep to schedule. They spend all the time necessary to do it right.

Motivation to cooperate. The main source of satisfaction for a Japanese is the contribution he can make to his organization, Belady reported. They respect each other; they seem to be more selfless than we are in spreading know-how.

Perhaps part of the basis for this personal cooperation arises out of the very difficulty of their written language, which is based on Chinese characters. Handwriting is tedious and very slow, he pointed out. Hence, very little written communication is possible at the quick notification level. But there is lots of oral communication. This very circumstance may be more conducive to cooperation, he surmised.

Cooperation, in turn, leads to optimization of the entire system, Belady feels. They recognize that suboptimization is just that. This total optimization may well be the result of the great deal of oral communication and the habit of working on problems together. Moreover, the expectation of cooperation is a very good thing to have in large organizations.

The dark side. The Japanese have the ability, in terms of their personal and cultural traits, to carry out the processes of software planning and execution very well, Belady concluded. But there is an underside to their virtues. They have difficulty handling exceptions, that is, cases that were not part of the original plan. There are signs of a tendency to become obsessed with the beauty of the well-planned activity and carry it on, even after the point where it becomes obvious that it is not working out very well.

Another way of putting this idea is to say that the Japanese have some difficulty in coping with change, Belady continued. In some sense the best way for Americans—with their characteristics and national traits—to compete with the Japanese is not to try to do Japanese kinds of things, but to do American kinds of things well.

"We should strive to become a moving target," Belady said, "because that is in keeping with our flexibility, and a moving target is very difficult for others to follow."

Software engineering tutorials set

A professional education program consisting of four software engineering tutorials, an executive summary of issues, and a methodology exposition is scheduled for July 7-25 in Boulder, Colorado. The program is sponsored by the Rocky Mountain Institute of Software Engineering, a nonprofit organization supporting software engineering research, development, and education.


All methodologies covered in the tutorials will be represented in the exposition, which runs concurrently and is free to registrants. The methodology tutorials will be followed by four on project management July 15-18, four on object-oriented technology July 21-24, and nine on tools and environments July 21-25. The two-and-one-half-day executive summary is scheduled for Wednesday, July 16, through Friday, July 18.

For additional information, contact the Rocky Mountain Institute of Software Engineering, PO Box 3521, Boulder, CO 80303; (303) 499-4782.

Softopia 86 Tokyo

"Japan is one of the largest potential software markets, but contacting American software manufacturers to tell them about opportunities there is proving to be a difficult task," says Robert Sterns of Pacific Partners. "Many of them are not listed in standard directories."

Pacific Partners is working with Japanese organizations, such as the Nomura Tourist Bureau, JETRO, and the Softopia International Trade Fair Association, to provide personalized marketing assistance to American software companies.

For information on the program available for Softopia 86 Tokyo, to be held August 16-30, contact Pacific Partners, 22704 Ventura Blvd., Suite 449, Woodland Hills, CA 91364.

Software Engineering Workshop reports progress, experiences

Frank McGarry, NASA/GSFC

Leon Jordan, Computer Sciences Corp.

The greatest improvements in software quality over the past five to 10 years have been in tools and methods, according to respondents to a Software Engineering Laboratory questionnaire. Seventy percent of the respondents collect some data on software development, and a similar percentage use SEL documents or SEL workshop results.

Metrics and management, cited as areas of greatest improvement by 10 percent of the respondents, were also the greatest disappointment to nearly half.

That result may be related to high expectations that were not met because of implementation difficulties for these programs, said William Agresti of Computer Sciences Corporation, who presented the survey to help mark the tenth anniversary of the SEL workshop.

The Tenth Annual Software Engineering Workshop convened December 4, 1985, at the NASA/Goddard Space Flight Center in Greenbelt, Maryland, to report and discuss members' experiences in measuring, using, and evaluating software methodologies, models, and tools. The workshop was organized
by SEL, whose members represent GSFC, the University of Maryland, and CSC.

Interest in software engineering is growing, John J. Quann, deputy director of GSFC, noted in opening the workshop. The growth of the space station program and the increasing use of Ada, he said, make programs such as the SEL workshop ever more important.

Twelve papers were presented in the four workshop sessions. In the first session, "Research in the SEL," representatives from three principal SEL members described the laboratory's work over the last 10 years. The speakers were Victor Basili of the University of Maryland, Gerald Page of CSC, and Frank McGarry of GSFC.

Tools. The opening speaker for the second session, "Tools for Software Management," was Donald Reifer of Reifer Consultants, Inc. He described experiences in inserting project planning tools into more than 100 projects producing mission-critical software and in using a project manager's workstation and the SoftCost-R cost-estimation package.

Reifer found that the most useful tools are work-planning oriented, the most-used tools are time-management oriented, and the most-wanted tools are what-if oriented. Users should worry, he said, about bridging between tools. They should not assume that this is easy to do. They should also realize that tools may act as a catalyst for organizational change.

The next speaker, Jon Valett of GSFC, described a tool that uses a knowledge base of soft data and managerial experience to support project estimation and assessment of development progress in the flight dynamics environment. The tool comprises rules that define relationships and weights between specific parameters and system goals—for example, change rate and stability.

Next, John Knight of the University of Virginia described an experiment to assess error seeding as a technique for validating programs. Error seeding relies on three assumptions: indigenous errors are hard to find, indigenous and seeded errors are independent, and seeded errors are as hard to find as indigenous errors.

Knight concluded, however, that all of the assumptions are questionable. He also concluded that the basic assumption of N-version programming—that independently written programs will fail independently—is unjustified.

Productivity gains of 40 percent, based on one program, were reported by Greg Wenneson of Informatics General Corporation. Wenneson reviewed procedures to control software quality.

Inspection tools include standards, materials preparation criteria, checklists for errors, exit criteria, and written records and statistics. The inspection process comprises team selection, overview, preparation, inspection (may be desk inspection), rework, and followup.

Environments. To begin the third session, "Software Environments," Chris Gill of Boeing Computer Services described a research project to apply artificial intelligence to software engineering. The system consists of an integrated set of tools covering the entire life cycle, project management, software development support, and configuration management. After one year, the groundwork in the module representation formalism has been done, and a model of software development activities has been created.

Ann Reedy of Planning Research Corporation described an automated product control environment developed to reduce life-cycle cost and increase automation of the software development process. This framework provides automation for real-time status tracking and reporting, configuration management of software, documents, and test procedures, traceability of requirements and change impact, testbed generation, and component and system integration.

Loyd Baker of TRW Defense Systems Group evaluated an integrated environment for the specification and life-cycle development of software. The environment consists of integrated methodologies, languages, and tools. He presented a detailed comparison with three other commercially available products.

Ada. For the last session, "Experiments with Ada," Dan Roy of Century Computing assessed a 1200-line project using George Cherry's Process Abstraction Methodology for Embedded Large Applications and DEC's Ada Compilation System under VAX/VMS. The TBD package was used for top-down designs and design templates; Ada was used as a PDL. The tools and templates had a dramatic effect on productivity and code consistency—30 lines of code per day during development and 13 LOC per day for the entire project life.

Next, Mike McComb's of Mitre Corporation described an experiment to study a standard Common APSE Interface Set implementation. CAIS is a tool that encapsulates machine dependencies and interfaces with operating systems. The underlying model is a directed graph with attributes.

Finally, William Agresti of CSC described an SEL experiment to develop a system in parallel in Ada and in FORTRAN. The project is estimated to be 40 KSLOC (Fortran) in size, will take 18 to 24 months, and will require 8 to 10 staff-years of effort. Agresti described the team structures and training methodology and reported current status.

The workshop proceedings are available from the National Technological Information Service. The next workshop is scheduled for December 3, 1986, at GSFC. For further information, contact Frank McGarry, Code 552, NASA/GSFC, Greenbelt, MD 20771.

SDI 'infeasible'

A system meeting requirements of the Strategic Defense Initiative is "technologically infeasible" according to a statement signed by 36 of the 61 attendees at the Workshop on Fault-Tolerant Distributed Computing.

The workshop, held March 16-19 in Pacific Grove, California, brought together researchers in the theory and practice of reliable computer design with emphasis on systems that can operate in the face of computer failures and unreliable communication links.

"During the course of the workshop," noted attendee David D. Redell of Digital Equipment Corporation, "it became apparent that a majority of the participants were convinced that the computing needs of the Strategic Defense Initiative could not be met."

In what Redell described as a "grass roots" movement, the following statement was drafted and signed: "The effective defense from nuclear annihilation of the lives, homes, and property of the American people, as embodied by the Strategic Defense Initiative (Star Wars), requires highly reliable computer systems of unprecedented complexity. As experts in reliable computing, we strongly believe that a system meeting these requirements is technologically infeasible."

ADAPSO joins ICCP

The Association of Data Processing Service Organizations, a trade association representing more than 800 computer software and services firms, has joined the Institute for Certification of Computer Professionals, ICCP President Thomas W. Briggs announced. This brings to 13 the number of ICCP constituent organizations, one of which is the IEEE Computer Society.