

Dr. William K. McHenry, assistant professor at Georgetown University's School of Business Administration, made three trips to different parts of the Soviet Union last year to learn about the state of the computer industry in that country. He was interviewed by BCS Update contributing editor Simson L. Garfinkel.

What were some of the highlights of your trips?

We were in Alma-Ata, capital of one of the republics in the south, for a conference on software engineering.

In Novoskbirsk we were hosted by the computer center of the Academy of Sciences. Then we went back to Moscow and visited a number of dif-

ferent places. What sort of computers is the U.S.S.R. using?

They have the full range of computers, going from microcomputers up to high-speed computers. What is a common scientific or engineering computer?

One of the most widespread ones is the BESM-6. In the business computer range, they have a whole series of machines that are copies of IBM 360s and IBM 370s, used for data processing and some scientific computing. What kind of Western machine is a

BESM-6 equivalent to?

It doesn't have a Western equivalent. It was designed in 1964. It is a second-generation transistor machine, nominal speed of 1 MIP.

They use it for computer-aided design, high-speed scientific research, and geophysical research—typically the kinds of applications that we might think would fall into the highend workstation range, mini-supercomputer, or even into the supercomputer range in the West, although this machine is clearly not in the supercomputer class.

Is it a single-user machine?

No, it's a multi-user machine. [Perhaps four or eight.]

How much memory?

That's one of its biggest problems. It is very constrained: 256K max. How many of these machines are there? There are probably around 250 in the whole country.

It runs on a lot of assembly-language programs. They have an interactive [graphics] monitor, and lots of scientific subroutines.

Are there any modern workstations? Not until very recently. The

Jachine they have now is called the BESTA-88.

What is that?

I got two different reports. (I saw one with my own eyes, but I didn't look at the board.) One source told me it was Motorola 68020; another source told me it was a SPARC. One source told me 150 computers per month are being produced; another told me that 100 per year is expected. It is possible that there might be two machines. They sell it within the Soviet Union for a combination of hard currency and rubles. The one with the 68020 was supposedly going for \$10,000 dollars plus 120,000 rubles (equivalent of about \$12,000 on the black market.)

What about PCs? Are they popular? Popular is the wrong word to use. Popular applies to the American context where you have a choice. In the Soviet Union, you use whatever you can get your hands on—that is more likely to be a PC machine or a PDP-11 machine. A PC can refer to an 8-bit CP/M machine, a 16-bit IBM-PC clone, or a 16-bit DEC instruction-set machine.

According to the numbers that I have, I think that the 8-bit machines predominate. There may be as many as 500,000 PCs in the Soviet Union right now. I think that the number of Has the U.S.S.R. been hurt by the United State's export restrictions? To answer that with one word would be misleading. They have been hurt by three things. One is simply their own internal constraints that have kept their computer industry from developing: restrictions on travel by their scientists, restricted access

to Western journals, and the economic system that has not provided the incentives for large-scale development of computers.

ment of computers. The second thing they have been hurt by is the fact that the economic climate in the Soviet Union has not been favorable for Western business: The market is small, and Western companies are very oriented toward short-term gains, while the Soviets demand that their business partners be there for the long haul. Plus, without intellectual property rights guarantees, Western companies were loath to put their products in the Soviet Union.

You mean there is no copyright protection?

Exactly

In addition to those two things, you have the third factor of the Export Controls.

What is export controlled?

Basically, things that are bigger than a 286 are still controlled. 386 machines are still controlled. The 68000-based workstations are all controlled.

So a Macintosh is controlled?

I believe so.

That means you cannot export it? No. It means in order to export, you

have to have a validated export license. You have to have some forms



IBM-PC machines is 150,000 to 200,000. These estimates are very rough. One thing that we don't know is if they refer to the total number of machines actually produced or the total number working today.

[A few years ago] they made a copy of the Apple II. They didn't have the right chips, the 6502, so they did it with bit-slice technology. The machine was so unreliable that the users would order five so that they could have one to cannibalize for spare parts for the other four. that are signed by the end-user, where the end-user assures that it will not be used for military purpose. They have to represent to the Commerce Department that the machine is not too powerful [for the indicated task].

So how do they get the 68000 or the SPARC chips?

They get them on the Southeastern Asian market.

The [Export Controls] are not effective in the sense that they keep everything out, but they are effective in the sense that they have seriously retarded the ability of the Soviets to get their hands on the items. Consequently, the Soviet computer users have had a lot less power to work with.

On the other hand, you have to ask yourself the question, "How much hard currency do the Soviets have to buy these items?" Even if some of them were available, it is not clear that the Soviets would have bought them.







What about software?

There are a number of different parts. One part of the software industry is to maintain and develop the operating systems for all these machines. That is left as an exercise in continuing to reverse-engineer or modify stolen code, and write drivers. I don't think that part of the their software industry is all that advanced.

Then there is a large group of programmers who are out there programming things like accounting systems or process control systems. I think that the bulk of those programmers are poorly trained, don't use things like software tools, don't use things like software tools, don't produce good documentation and the level of their work shows it.

Within the Academy institutes and within some of the cooperative enterprises, there are groups of top-notch programmers. World-class programmers. I don't know how to characterize their work. One example is at the Interbranch Scientific Center for Software Engineering in Kiev. They've done a set of software tools, which are CASE tools that give a visual representation of programs. The name of the product is called R-Technology.

Are they going to sell that over here? They are working on that. They have approached Microsoft and Borland. I've served as the middleman. . . A paper is about to be published in the journal of visual languages and programming. How did things get so bad?

The Soviet tradition of computers goes back to the 1950s. They were third in the world with the storedprogram computer. But because the commercial industry in the 1950s did not take off the way it did in the United States, their industry did not develop very well. By the time we got to the 1960s, the United States was way ahead of the Soviet Union. At the end of the 1960s, their leaders recognized that the Soviet computing industry was lagging and decided to copy IBM. It put in a built-in lag. It took the Soviets as long to copy the IBM as it took IBM to design the IBM 360 initially.

I don't want you to walk away with the impression that they have no high-speed machines. A lot of work has been done in recent years, especially in parallel processing. They were supposed to have a one-GIPS [1000 MIPS] machine by 1990.

What's going to happen?

I think that depends on what export controls do. The reason that the workstation market has been a category of machine that has been controlled is CAD—traditionally, it has been a weak spot for the Soviets, and the U.S. military does not want the Soviets to be able to use this workstationclass machine for weapon design.

You don't think they can do it by themselves?

No. I think that the Soviet microelectronics industry is in very bad



Another thing the programmers are doing is taking Western software and making small add-ons to it. Someone gets their hands on *dBASE 3* and makes an extra package that somehow enhances it.

Do they program in Western programming languages?

Sometimes. Their most commonly used programming languages are PL/1, FORTRAN, assembly language, and COBOL. Over the last couple of years, there has grown a large group of people who use C.

Of course, they've created many indigenous languages as well, but because they were using all these copies of Western hardware, a and Western systems software, it became inevitable that they would use Western languages.

One of the problems that the software people face is the preponderance of copies of Western software. [Soviet programmers are essentially competing against Western ones.] It's as if you had to compete against a powerful competitor who had a great product and was giving it away for free. shape, and they are going to have trouble producing the components needed. This isn't to say that their theoretical research or laboratory samples haven't reached the submicron level, but they have definite problems with the mass production.

I think that we may open up the 386, possibly the 486 chip, although I'm sure that there are a lot of people who would not want the 486 decontrolled.

Is it really that bad?

It is very difficult to think of any area of computing where they have truly had a triumph, where you can look at that area and say, "Everything else is pretty bad, but in this area they are doing great." There just isn't an area where you can say that.

Simson L. Garfinkel is a freelance journalist living in Cambridge, Mass. Copyright 1990 by Simson L. Garfinkel.