EXPERT INSIGHT ON . . .
Systems

A conversation with STUART FELDMAN
President of ACM and Vice President, Engineering, Google

My Background . . .
I am one of the original computer brats—I learned to program on a vacuum tube machine in the early 1960s as a kid at a summer course. I was enthralled by computer programming, and the ability to create programs that did new and surprising things.

Throughout my computer career, I’ve worked as a computer science researcher at Bell Labs, a research manager and software architect at Bellcore, and as Vice President for Computer Science at IBM Research. I am now a Vice President at Google (and responsible for engineering activities at Google’s offices in the eastern half of the Americas), as well as President of ACM (Association for Computing Machinery)—the largest computing society in the world. Overall, my career has been spent in research at very high-tech companies, working on the cutting edge of computing. It’s fun and exciting.

It’s Important to Know . . .
The world of data has shifted radically. I can remember when a megabyte was a lot of information. Today, a gigabyte fits on a thing in your pocket, a terabyte fits on an inexpensive disk, and many large companies manage petabytes—and organizations managing an exabyte of data are coming soon. The types of information to be managed are also shifting—most information today is visual, audio, or executable (not rows and columns of numbers).

Programming languages last a long time. While most programmers write in dynamic languages (such as PERL and Python) today, COBOL and FORTRAN programs are still being written and variants of C are still being born. And even more people do programming without thinking about it (such as creating or modifying word processing macros, spreadsheet formulas, and Web gadgets). We will almost certainly see a continuing expansion of the spectrum—a hard core of experts supporting basic systems and tools, and millions (perhaps billions) of people doing occasional programming and customization.

The impact of systems on society is tremendous. System capabilities have made enormous increases in efficiency possible, and have also opened new types of business and social activities. Think about how banking has changed in the last decade, and about how you look up information and find people. Also, think about how personal communication and expectations have shifted from sending letters with a stamp, to sending e-mail, to texting on a mobile device. Perhaps our attention span has shrunk, but our ability to reach out has increased. Information systems support globalization and rapid business change—sharing of information, shifting of jobs, and the creation of new jobs and whole new types of careers.

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Stuart Feldman is currently the President of ACM and a Vice President of Engineering at Google. He is a member of the Board of directors of the AACSB (Association to Advance Collegiate Schools of Business), a Fellow of the IEEE, a Fellow of the ACM, and serves on a number of government advisory committees. He is a recipient of the 2003 ACM Software System Award for creating a seminal piece of software engineering known as Make, a tool for maintaining computer software. Stuart has a Ph.D. in Mathematics from MIT.
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How I Use this Technology . . .
I spend a lot of time writing papers and presentations, so I use the Google Docs applications and the Microsoft Office suite—both complex systems that maintain data and perform reliably. I use secure, integrated financial systems when I perform online financial transactions. Of course, my favorite system “application” is the World Wide Web, which is a remarkable linkage of data servers, application providers, and communication systems. I use it many times a day for research, communications, shopping, and amusement.

What the Future Holds . . .
The cost of computing, measured in cost of instructions executed or information stored or transmitted, will continue to drop. This exponential curve will drive many of the improvements we will see in the future. In addition, the value of information and knowledge that is encapsulated in computer programs will increase—once something is in code, it can be used and replicated at low incremental cost. This will continue to drive our digitization and automation of activities.

There will also be the increasing ability to do massive amounts of computing for enormous numbers of users, and to apply computing resources to problems that were too expensive to address just a few years ago. This will be facilitated by the increased use of integration and by using available software and services in innovative ways, as well as by dynamic languages and the increased use of Web standards.

There will be new service computing models, ranging from enterprise SOA to user-based mashups to entirely new service industries like Google search tools and remote medical advice. For program development, we’ll see increasing agility—shifting from waterfall and rigid development methods to more exploratory, prototype-based methods. Verification and testing will continue to be essential.

Perhaps the biggest shifts will come from our increasing dependence on information and access, the risks when things go wrong, and the possibilities of new applications that can improve our lives. For instance, as information arrives and can be examined more easily, we can do a better job of managing our health, our activities, and our personal interactions.

My Advice to Students . . .
IT jobs, computer applications, programming languages, approaches to system development, and business needs are always changing. The best preparation for a long and successful career is to understand the fundamentals of computing deeply, and be able to apply them to new situations. You need to become expert in some area—such as a programming language, a methodology, or an environment—but you also must always be prepared to learn new technologies and gain new expertise.

Discussion Question
Stuart Feldman points out how our expectations for the systems we use today have shifted, such as in terms of demands for faster communications and information retrieval. What are your expectations when you send an e-mail message or text message? Do you expect an immediate response? Are you more impatient today with personal communications than in the past? How does the instant access to communications, news, and other information affect our society today? Be prepared to discuss your position (in class, via an online class discussion group, in a class chat room, or via a class blog, depending on your instructor’s directions). You may also be asked to write a short paper expressing your opinion.

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