IEEE President (p. 6) “I am writing to the IEEE Computer Society to share with you three things that I believe: (1) The computer revolution is having and will continue to have a profound effect on the people of the world; (2) electrical and computer engineers and scientists need to be involved in the public policy changes that must result from the computer revolution; and (3) the IEEE is the most effective organization through which these professionals can influence public policy.”

Standards Activity (p. 7) “Standards have contributed much to progress in the computer field. Those pertaining to input/output formats and media (e.g., the ASCII character set and presentation of data on magnetic tape), or to programming languages (Fortran, Pascal), are probably familiar to every reader of Computer. Yet, many areas that could benefit from standardization have not received adequate attention.”

Multiple Microprocessors (pp. 23) “The idea of using more than one processing element to improve system performance preceded the development of microprocessors, but that technology now permits the use of computing power in a wide range of applications that had been impractical because of the computer’s cost and physical size. The use of multiple microprocessor systems extended the range and capabilities of single microprocessors to more complex areas previously in the domain of large computers and has led to other system enhancements; for example, improved reliability and ease of design.”

Modifiable Compilers (p. 35) “What I am proposing here is not a language but rather the concept of a compiler that would enable programmers to add new instructions and macro instructions to the language according to their individual needs. These might include report generation, field validation, searches, data structure operations, or matching and merging of files.”

Record Structures (pp. 41) “In this article, I define the basic pseudo living system, identify the markers whose patterning conveys or bears informational symbols, outline the support facilities to create living systems, and propose a new type of call (symbol and its associated code) and symbol library storage facility. Ideas resulting from this study may include a method for achieving a marker service using a two-media information storage, processing and distribution system.”

US Defense (p. 52) “The Department of Defense [DoD], which has consistently moved to ensure the vitality of the US computer technology base, has established the VHSIC [Very High Speed Integrated Circuit] and Ada programs to further develop this important technology. Now, the DoD is preparing to launch a software initiative to complement the VHSIC and Ada programs. One of its objectives is to develop the systems and software techniques through which we can maintain our lead in this important industry.”

The Software Challenge (p. 60) “A little informal research on the topic of software yielded some startling numbers. The number of people involved in software is increasing by 30 percent per year, and 250,000 students are enrolled in software courses. These mind-boggling statistics indicate just how important this topic is. To bring it into perspective, I will approach it on three fronts. The first is software-related activities at Bell Laboratories. … The second is the software development process, with particular emphasis on software productivity and quality. The third is the future.”

Software Quality (p. 66) “The evolution of the man–machine interface has tended towards increased software intelligence and reduced effort on the human side. ’Software intelligence’ refers to capabilities imparted to the computer system by the software. Users want their systems to function at a level approaching human capacity in routine handling of ideas and tasks.”

The Computerized Factory (p. 73) “Today, those who engineer or produce technical products must deal with a complex blend of technologies, processes, and materials. Almost every production process involves a computer, whether a large mainframe or a microprocessor. Manufacturing a
**Introduction** (p. 40) “Information technology has made major strides this past decade, improving significantly the process of doing business and outpacing all industries in its contribution to three key economic indicators: industrial output, employment, and productivity. These changes have permeated every aspect of our life—from grocery shopping to banking to manufacturing to managing a profitable business. And the trend is expected to accelerate as we move into the new millennium.”

**IT in Manufacturing** (p. 42) “Although its role in manufacturing has been more to support processes, IT is evolving to become a catalyst for process and product change. In this case study, an apparel manufacturer used a modeling framework developed by Georgia Tech to implement multiple IT solutions. It was then able to rapidly shift production resources between two separate product lines.”

**IT in Telecommunications** (p. 50) “To illustrate the growing impact of IT within GTE, here we chronicle the evolution of GTE’s Network Management System. Although we focus primarily on the NMS, we broadly identify three major phases in the application of IT within GTE: the initial, reengineering, and reinvention phases. Each phase exemplifies the larger forces at play, both from a business and an IT perspective.”

**Electronic Commerce** (p. 67) “Electronic commerce is possibly the most promising information technology application that enterprises have seen in recent years. It has revolutionized supply-chain management and has enormous potential for retail merchandising and brokerages. These benefits do not come without careful planning, however. Most of the business community acknowledges that intensive use of any information technology means transforming the current, often core, business models and processes.”

**Cryptography** (p. 108) “Since it is impractical for a system designer (or even a design team) to analyze a completely new system, a smart designer reuses components that are generally believed to be secure, and only invents new cryptography where absolutely necessary.”

**Stakeholders** (p. 110) “Jointly developed by the ISO and IEC in 1995, the ISO/IEC 12207 standard, Software Life Cycle Processes, provides specific guidance in defining the roles and responsibilities of various stakeholders in the life cycle of a software project, product, or service. And the software community is beginning to take heed.”

**Scientific Objects** (p. 115) “Scientists are slowly coming to appreciate the merits of OO [object-oriented] languages, unit testing, sophisticated source control systems, and other modern techniques. From a scientist’s perspective, the most important thing about reusing a component is not the time saved, but the reliability gained.”

**Innovation** (p. 120) “The computer science community hasn’t lost its ability to innovate, but it is grappling with a fundamental shift. The rules of engagement—what ideas are developed and how they are nurtured—have changed radically.”

---

**32 & 16 YEARS AGO**

product from concept to design through production and marketing has entered a new age. Manufacturers and engineers of durable products face a rapidly changing, increasingly sophisticated, competitive world.”

**Haptic Keyboard** (p. 86) “Berg-Torseth’s touch-sensitive membrane keyboard panel provides tactile feedback for operators and requires as little as 6 to 10 ounces of pressure for key actuation. Permanently sealed with polyester or polycarbonate layers, the panel is designed to be impervious to accidental spills and environmental contaminants.”

**March 1999**

www.computer.org/csdl/mags/co/1999/03/index.html

**Letter** (p.4) “There may be no oil crisis today, but we should still be doing all we can to reduce our dependence on fossil fuel. Providing Web services and other conveniences in the car only increases our dependence. Of course, maybe the vehicle was electric, but then where did that energy come from?”

**Home Networks** (p. 11) “During the past couple of years, an increasing number of households have acquired more than one PC. To permit the users of different computers in a home to access the same files, play video games against each other, and share Internet access and peripherals, a growing number of consumers are networking their homes.”

**Internet Telephony** (p. 15) “After several years of talking the talk, service providers say 1999 will finally be the year that IP telephony begins walking the walk. Industry observers say this is the case because both the technology and the marketplace are about ready for large-scale user adoption.”

**The Turing Test** (p. 27) “Did Deep Blue ace the Turing Test? Did it do much more? It seems that the IBM creation not only beat the reigning world champion but also took a large step, in some people’s eyes, toward true artificial intelligence.”

**Beyond Spreadsheets** (p. 31) “The complexity and long development time inherent in building decision support systems has thus far prevented their wide use. A new class of tools, DSS generators, seeks to cut the lead time between development and deployment.”

**Stakeholders** (p. 110) “Jointly developed by the ISO and IEC in 1995, the ISO/IEC 12207 standard, Software Life Cycle Processes, provides specific guidance in defining the roles and responsibilities of various stakeholders in the life cycle of a software project, product, or service. And the software community is beginning to take heed.”

**Scientific Objects** (p. 115) “Scientists are slowly coming to appreciate the merits of OO [object-oriented] languages, unit testing, sophisticated source control systems, and other modern techniques. From a scientist’s perspective, the most important thing about reusing a component is not the time saved, but the reliability gained.”

**Innovation** (p. 120) “The computer science community hasn’t lost its ability to innovate, but it is grappling with a fundamental shift. The rules of engagement—what ideas are developed and how they are nurtured—have changed radically.”

---