Book Review

Information Technology Research and Development: Critical Trends and Issues.
Oxford: Pergamon Press, in conjunction with the US Office of Technology
Assessment, 1985. 342 p. £56.90. Hard cover. ISBN 008-033648-5.

Bruce R. Guile, ed., *Information Technologies and Social Transformation.*
Washington, DC: National Academy Press (distributed by John Wiley & Sons),
1985. 173 p. £15.85. Soft cover. ISBN 0309-03529-5.

Herbert I. Schiller, *Information and the Crisis Economy.* Norwood, NJ: Ablex,
1984. 133 p. £24.95. Hard cover. ISBN 0-893391-278-6.

Information technology (IT) markets are driven by an ebullient industry, a
corps of advertising agents, and a gaggle (for want of a better collective noun) of
enthusiastic journalists. There is not yet much evidence of a demand pull—on the
contrary it is the inertia and suspicion of the market which mainly dictate the
pace, so that it is appropriate to review together books about R&D trends and
policies and about the people out there who may be affected by them.

The particular areas of IT chosen for case studies in the first publication are:
advanced computer architecture, software engineering, fibre optics, and artificial
intelligence. These studies are preceded by much information about the R&D
effort in different countries. Chapters about the effects of AT&T's de-regulation
and divestiture, education, the role of the universities and industry, US policy,
and foreign activity follow, rounded off with a good index.

The statistics include a list of the US IT companies which spend the most either
as a percentage of sales, or in dollars per employee (1983)—which is tantamount
to listing the leading small/medium high-technology companies since there are
no large companies on the list. Top is Telesciences (31.6%). Dysan, specialists in
high-quality disks, spends 19.4%. Ultimate, another disk manufacturer, spends
over $37,000 per employee, and Cray and Amdahl, manufacturers of big
number-crunchers, $16,500 and $15,400 respectively. The big R&D spenders
(1982) in absolute terms, shown on another list, are AT&T with $2,126M, IBM
$2,053M, General Electric $781M, and ITT $519M.

The way defense policies influence R&D spending is clearly shown in a set of
year-by-year graphs. The ratio of civilian R&D expenditure to GNP for West
Germany and Japan has steadily advanced to nearly 2.5%. For the US, France,
and the UK, it hovers around 1.5%. Another interesting statistic is the Japanese
dominance in foreign US patents. The Japanese share is 44%, West Germany
18%, UK 9%, and all others 29%.

Table 1
Computer production, by country – 1982

Country	Production ($M)
US	33,550
Japan	7,179
France	3,834
W. Germany	3,511
UK	1,929
Italy	1,076

The figures given for 1982 computer production in the countries responsible for nearly 90% of the total are shown in the accompanying table. The overwhelming dominance of the US and the poor showing of the UK—once on a par with the US—are equally obvious.

The chapter about de-regulation and divestiture is almost entirely taken up with the possible effect upon the research done by the Bell Laboratories. Bell Labs is an extraordinary establishment by any criteria. It has produced more Nobel Prize winners than the combined total produced by all the other organisations in the same field. But nothing is said about possible effects on the research done by other organisations. One of the main reasons advanced for a change was the need to diminish AT&T's telecom monopoly power while permitting its still very large arm's-length subsidiaries to compete in a range of IT fields. Presumably a more competitive industry will increase the need for competitors to increase their research effort.

The book's unspecified author singles out a number of establishments for special mention in the chapters about manpower, education, and the universities —of course including MIT and Stanford. Less well known are the microelectronics centres in North Carolina and at the University of Minnesota, and the innovation centre at Rensselaer in New York. Two major cooperatives are also mentioned: the Semiconductor Research Corporation, which funds research in this field; and the Microelectronics and Computer Technology Corporation, owned by twenty US companies.

Foreign activities in this area usually receive scant treatment in US publications, but in the OTA book 140 pages are devoted to foreign R&D—reflecting US concern about maintaining the lead, and the effects of the outflow of technical information. In the excellent review of foreign research, Japan gets 25 pages, France 15, and the UK 12. (West Germany, for some reason, is not reviewed.) ESPRIT is discussed in the five pages following.

The other two books here under review look at the *effects* of information technology. In the first of these, Bruce Guile has assembled chapters by different authors, each of whom examines the pros and cons of a particular facet of IT. The second book is not very new, but the contrast in styles is interesting. Schiller's viewpoint is made perfectly clear from the outset: "Information is being applied

to the production side of the economy in a particular way, for private, corporate advantage. Yet it is also being applied to the human side. Here it is being used to make people accept and believe that current developments are benign, if not beneficial. It is being applied to minimizing or deprecating opposition and to denying alternate options that might provide a more humane direction to the emerging information based economy." I shall consider whether Schiller is able to substantiate this viewpoint in a moment.

Returning to the book edited by Guile: Melvin Kranzberg (Professor of the History of Technology at the Georgia Institute of Technology) and Harland Cleveland (Professor of Public Affairs at the University of Minnesota) both consider, on balance, that the effects of the information age will be beneficial. Kranzberg thinks that although the most highly industrialised societies have many defects, they have also "in large measure, provided for freedom and a humane life for all .... The Information Age promises to carry those hopes for the good life even further. While it might be evolutionary, in the sense that all the changes and benefits will not appear overnight, it will be revolutionary in its effects upon our society."

Cleveland's theme is the "Twilight of Hierarchy", and the "Obsolescence of Ownership". Some of his philosophical remarks are well worth quoting. "The push for participation by all kinds of people and the inherent leakiness of information combine to produce the modern executive's most puzzling dilemma ... which can be summarised in one question: How do you get everybody in on the act and still get some action?"

"Openness then", continues Cleveland with a flourish, "is the buzzword of modernization. In its firmament the deities are the public hearing, the news conference, the investigative reporter .... Its devils are also well known: smoke-filled rooms, secret invasions, hidden or edited tapes, and expense account luncheons at which The Establishment decides what to do next."

"The new tide of information technologies makes the ownership of intellectual property more detached from reality with every new invention. Dynamic high technology keeps developing better and faster techniques of piracy—xerography, videotape, the backyard dish for picking up signals from satellites. The knowledge explosion produces new kinds of works (computer software), new means of delivery (microfiche, videocassettes, computerised videotex over a telephone line), and new ways to assemble great complexities of facts and ideas in more readily accessible form (computerised data bases, inventory controls, energy use data, online reservation systems for airlines and car rentals)."

"The good news is that information is leaky, that sharing is the natural mode of scientific discovery and technological innovation. The new information environment seems bound to undermine the knowledge monopolies which totalitarian governments convert into monopolies of power .... My hunch is that the fusion of computers and communications will further empower the many to participate in making policy in domains to which the few, with their moth-eaten monopolies of knowledge, will have to yield more and more access."

Walter Bauer, of the Times Mirror Company in Los Angeles, quotes the

famous passage from E.M. Forster's short story "The Machine Stops"—a vision of the future written at least fifty years ago: "... And in the armchair there sits a swaddled lump of flesh—a woman, about five feet high, with a face as white as a fungus. There were buttons and switches everywhere ... to call for food, for music, for a hot bath." But Bauer does not think that this is a likely prospect. "Information technologies in the home ... support ongoing changes in life-style choices,... relationships at the school, the office, and other societal institutions. ... By empowering individuals' decisions at home, information technologies can enhance the functions of the home in an information-rich society."

Herbert Schiller, Professor of Communication at the University of California at San Diego, however, would probably endorse Forster's vision. His opinions are backed up by an assembly of examples and quotations covering what he sees as the misuse of information—an indictment of Big Business, Privatisation and Materialism in the Western World at large and in the United States in particular. Schiller protests too much: I searched in vain for a single redeeming feature in his review of the information age today and in the future.

The effect upon the reader of this extravagant attack is to discount much of it, but Schiller succeeds in generating unease by making a number of telling points as the following quotations will show:

"It is a mistake to believe that the changes required to overcome the global, national, and local disparities in human existence will be facilitated by developing telecommunications systems. In fact the opposite effect may be expected. Existing differentials and inequities will be deepened and extended with the new instrumentation and processes despite their loudly proclaimed and widely publicized potential benefits."

"Library information capability undeniably is greatly enhanced. Yet this benefit is accompanied by the abandonment of the libraries' historical free access policy. The public character of the library is weakening as its commercial connection deepens. No less important, the composition and character of its holdings change as the clientele shifts from the general public to the ability-to-pay user."

"When the ability-to-pay criterion becomes the standard for information access—which is precisely what occurs when information provision and dissemination are turned over to market enterprises—the divisions in society deepen. The poor become poorer because they are excluded from the means by which their condition could be improved. The rich become more affluent than ever because they have the means whereby to consolidate and extend their power base."

"Throughout the economy the privatization and commoditization of information are being accompanied by commercial charges that separate and stratify users by their ability to pay. What hypothetically could be a truly information-rich society is on the way to becoming a community divided into information haves and have-nots. The commercialization of information knows no bounds ... there is the spectacle of information deprivation in the midst of information abundance."

I cannot help thinking that Schiller's book would have carried more weight if he had, with equal vehemence, argued the need to promote a climate for the generation of wealth. That wealth, wisely distributed, is the prime requirement for redressing the inequalities that he lists.

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