

tion from the central topic of discussion, the book serves well the purpose of stressing the importance of information in economic development. Concepts of social and business intelligence are well addressed in a reasonable diversity of contexts and embedded in a consistent perspective which contributes to the development of an increasingly strategic perception of information.

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On-the-job learning in the software industry: corporate culture and the acquisition of knowledge by *Marc Sacks*. (Quorum Books, Westport, Connecticut, 1994) pp.216. US\$55.00, ISBN 0-89930-865-1.

This book has the flavour of a PhD thesis recast for wider consumption. It describes the experience of computer programmers and others in related jobs, and focuses on the processes of learning involved in writing commercial software. Using an ethnographic approach, it discusses evidence from 28 people, most of whom worked at a small US cellular-phone company ('Cellsoft'). The author himself was employed at the firm as quality assurance manager in the information systems group, and the research draws on interviews conducted in the period 1989 to 1990.

Sacks begins with a very gentle introduction to the industry and the life of programmers to the non-specialist reader. He goes on to explore the backgrounds and education of his subjects, and then explores a series of themes: thinking styles, the use of manuals and documentation, debugging and so on. Much use is made of extensive quotations from interview transcripts, which are enjoyable and make the book readable. Indeed, as some of the subjects crop up in several places, it would have been interesting to include them in the index; the reader could cross check and get a more rounded view of the individuals concerned. The overall picture which emerges is of an industry in which the tasks of programming and the means of learning reflect a loose mixture of the formal and informal. Even within this sample, there is considerable variety and ambiguity in approaches to work and knowledge, and there is no simple pattern. The reports of the ordinary experience of the industry rang true with my own memory of working in similar environments, and this perhaps points to the book's key failure. The book is too narrow to be of interest to a wide readership, yet holds no surprises for anyone with a passing knowledge of the industry.

We learn, for example, that programmers use documentation in a variety of ways, and that they like examples to be given in manuals. They also sometimes keep notes. Programmers analyse problem by reading relevant material and then thinking about them, sometimes making prototypes and then playing around with them. If they get stuck, sometimes they ask other people for help. This banal reportage occasionally reaches poetic intensity:

In a way, to work in a programming environment like Cellsoft is to be a ceaseless asker and answerer. People constantly approach one another with questions of all sorts...However, people differ quite a bit in how often they will consciously question others. (p.123-4.)

This lack of precision, the leaden language and the sheer inanity of the commentary become annoying as the book progresses. Theoretical issues are referred to but rarely tackled

head on; classifications are introduced or borrowed but not justified. In the early part of the book, the nearest the author gets to an argument is to take issue with the Braverman-inspired work of Philip Kraft although this is weakened by tackling at length only the seriously out-dated 1977 book *Programmers and Managers*; later work appears in the references but I could not find this in the text.

The literature review is kept for the penultimate chapter, and whilst offering a tidy summary on the literature on models of the learning process (in particular the work of David Kolb), it makes no connection whatsoever with the evidence presented in the rest of the book. The eleven-page chapter of Conclusions and Recommendations revisits five rather bland questions introduced on page two, and provides a series of vague and inconclusive answers. The last of these concerns the relationship between learning style and workplace design, and the author takes space to point out that 'I did not have sufficient information to answer this question'. The recommendations for both research and practice that follow are all plausible, but, having no force of argument or logical consequence from the data, are little more than folksy platitudes.

Two other limitations weaken this book. Despite its subtitle, the book says nothing of consequence about corporate culture. The vast literature on this is untapped; an opportunity was lost here. Secondly, the book provides little hint as to what might happen as the technological basis of the computer industry develops. The author cannot be blamed for not dealing with today's 'live' issues, such as object-oriented languages, graphical programming and systematic software re-use, but the research gives no clues to the impact new developments may have on the programming function and learning. The weakness of doing such highly 'situated' research is that it can tell us little about what might be important in the future.

However, the book does have its uses. Firstly, it provides a good example of how too superficial a reading of ethnomethodology and 'grounded theory' can lead research down a black hole. Secondly, it reminded me how much I enjoyed Douglas Coupland's *Microserfs*, which is a much better vision of software culture, and is also funny.

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Coordination and Information: Historical Perspectives on the Organization of Enterprise edited by Naomi R. Lamoreaux and Daniel M.G. Raff (University of Chicago Press, Chicago, 1995), pp.viii + 337, £stg. 17.95, ISBN: 0-226-46820-8 (cloth), 0-226-46821-6 (pb)

This National Bureau of Economic Research conference report builds on an earlier volume¹ which brought together business historians and economists in order to achieve an exchange of ideas. Economists are moving beyond black-box conceptions of the firm and their elaborate body of theory can, in the editors' judgement, enhance work in business history.

In the earlier volume, authors looked at what actually goes on inside firms: at the ways in which entrepreneurs combine capital, labour and raw materials and how firms handle information. The firm as an institution was presumed, its organizational tasks, boundaries, priori-