

to ask. This implies not a need for a new taxonomy, but a demand for a greater precision in articulation, and self-consciousness of the problem, among scholars in this field. Some questions can be put in neo-classical theoretical terms. Others will clearly engage us in the kind of interdisciplinary dialogues Lamberton anticipates, incorporating, for example, cultural, social and psychological factors. Others may lead us into the realm of linguistics, politics and philosophy.

If that is so, where does it leave 'information economics'? Is it a hollow phrase? An impossible quest? Far from it—indeed it is increasingly a critical undertaking for anyone who has a sense that we are moving into an 'information economy'. But before setting out to develop a taxonomy in which nearly every example may be a 'species' unto itself, perhaps information economists might undertake a short-term approach which asks, with as much precision as possible, what, exactly, are the questions information economics is trying to answer?

That should more sharply delineate what 'information' means in a particular context, and correspondingly exclude other areas. Such an approach still provides ample scope for economic questions of critical importance. Perhaps someday there will be a 'grand unified theory' of information, but the readings in Lamberton's latest volume suggest we are not a great deal closer to that than we were in 1971.

The author of this review, a non-economist, wishes to express his appreciation to Yale Braustein, an economist, who assisted by commenting on a draft.

*Richard D. Taylor*  
*The Pennsylvania State University*  
*Pennsylvania, USA*

### **Forbidden Fruit. An Analysis of Bootlegging, Uncertainty and Learning in Corporate R&D**

Peter Augsdorfer

*Aldershot, UK, Avebury, 1996, xi + 225 pp., UK £35.00, ISBN 1 85972 333 0*

Augsdorfer defines bootlegging as research carried out in companies by motivated individuals without the authorisation of responsible management and without the formal allocation of resources. In its purest form, bootlegging remains undetected by management; more commonly management is at least half aware that bootlegging is going on and chooses not to intervene. Perhaps this is because bootlegging is quite distinct from moonlighting in that it is performed for the good of the company rather than just that of the individual. In the jargon of R&D, this is Friday afternoon work, under the counter work, work behind the fume cupboard, long accepted as part of corporate R&D culture, with little concern shown by either managers or those who study R&D for its prevalence, its importance or its motivation. Augsdorfer is concerned and provides a fascinating glimpse of just what is going on.

One of the many failings of those who investigate how organisations work is that they are prone to concentrate instead on how organisations should work. If they enter organisations at all, it is to ask managers about corporate success and about how clever they have been at achieving it. To elicit information from managers about corporate failure and particularly about their own limitations is much more difficult. Yet this is precisely what Augsdorfer has done: in dozens of interviews in 57 companies in France, Germany and the UK, he has interrogated both R&D personnel and their managers

about what should not have been going on. This is no mean feat and that he has succeeded is itself evidence that corporate culture is not faithfully replicated in the R&D department. Augsdorfer finds bootlegging just about everywhere, the only real variation being in how openly it is carried out. But this is not the bootlegging of legend, the sort that is said to have produced a Tagamet while Smith Kline and French researchers were meant to have been busy with their allotted tasks. Bootlegging is very much more likely to yield incremental than radical innovation. And bootlegging is not a dominant activity: between 6 and 8 per cent of researchers engage in it, and it occupies 9 or 10 per cent of research time. Of course, there is no means of knowing quite how vital a contribution to overall R&D output this bootlegging makes. The indirect contribution of bootlegging may be more valuable than the direct: there is evidence that it is the most creative of researchers who engage in bootlegging and that the activity allows them to maintain their creativity in a world of corporate R&D which may sometimes be less than inspiring.

That management generally seems to know bootlegging is going on and tolerates the activity might indicate that its value is recognised, or simply that management is powerless to stop it. Neither sits well with the importance so widely accorded technology management and corporate strategy. Surely the need to control and to justify the allocation of resources makes it essential to stamp out bootlegging. Probably, but the relationship is complex. During the 'seventies, companies accepted that curiosity was a fundamental research ingredient and so there was little need for bootlegging. These days, company strategy has no place for curiosity and the demands of efficiency leave few resources spare for bootlegging. This suggests that bootlegging thrives when there is some compromise between curiosity and control. In fact, it would seem that bootlegging also thrives when control becomes overbearing. Tight control means that there are no spare funds available for bootlegging, so fictitious accounts are maintained to provide both the funding required by bootlegging and the return on investment figures required by senior management. Tight control means that research projects must be fully justified before they can be supported by senior management, which means that bootleg research becomes essential if formal support is ever to be won. Augsdorfer's focus is firmly on bootlegging research, but the questions he raises about the relationship between corporate strategy and R&D are not without their interest.

The pirate and the highwayman have an instinctive attraction in their ability to inject life and excitement into humdrum existence. We can enjoy their exploits the more because we revel vicariously, safe from danger and free to condemn what we enjoy. And perhaps we also take some pleasure in the snub to authority of their activities. But is undercover R&D at all comparable? Is it reasonable, is it constructive, to see scientists and engineers as rogues resisting the force of authority? Well, perhaps it is, and for two reasons. The first is that managerialism has driven the romantic underground, allowing the assumption that everything can be managed and that any inadequacy simply requires better management of the system. R&D is no exception. The second is that those who study innovation tend to study it as process, their purpose to make policy and strategy recommendations. The goal is maximum output for minimum input, with all manner of monitoring, assessment and evaluation along the way. Not much romantic about that. What is often forgotten by managers and academics alike is that R&D requires creativity; without creativity, the ratio of what goes into R&D to what comes out may be extremely favourable, but the activity itself may yield nothing worth having. Also forgotten in the drive for efficiency is one of the least tangible inputs to R&D: the interest of R&D personnel in what they are doing. It is hard for the creative mind to take much interest in R&D which has become automatic and routine. Curiosity is kept alive by uncertainty

and stifled by certainty. Odd, then, that uncertainty is so commonly seen as a disadvantage of R&D.

Forbidden Fruit is Augsdorfer's Ph.D. thesis and turning a thesis into a book is never easy. More effort could have gone into converting what satisfies examiners into what appeals to readers. The latter do not find hypotheses presented solely to be proved or disproved particularly attractive, they are not assisted by citations and even whole topics that are obligatory rather than relevant, and they are intolerant of vast appendices of such matters as the precise dates of interviews. Particularly tedious for readers is the retention throughout the text of the company coding which assured examiners that each piece of information actually came from a real and specific company. A separate but related complaint arises from the sometimes odd English and the occasional careless mistake in presentation. These are forgivable in a thesis, when the candidate must do everything himself, but not in a book. Yet, in the light of the interest and importance of the topic, these are quibbles. They may even bestow some benefit in reminding readers that not all doctoral theses are safe and dull. There are still students, perhaps particularly in the Science Policy Research Unit at the University of Sussex, where Augsdorfer undertook this work under the supervision of Keith Pavitt, who seize the opportunity to do real research. At many other institutions such activity would be considered bootlegging.

*Stuart Macdonald*  
*University of Sheffield*  
*Sheffield, UK*

### **Convergence: Integrating Media, Information and Communication**

Thomas F. Baldwin, D. Stevens McVoy and Charles Steinfield (Eds)

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The authors argue that the telephone, cable, broadcast and computer industries, relatively independent in the past, are now converging to create a broadband communication system which will integrate voice, video and data with storage of huge libraries of material available on demand, with the option of integration as appropriate. The telephone, cable and computer industries provide the technology for this integration, and the television and information industries provide the substance. They give an extremely thorough introduction to all the relevant technological, managerial, political and economic issues involved. Beginning with chapters on existing technologies and the situation in telephone, information services, and television, they proceed to survey emerging technologies and the services they will make possible, and then discuss, in consecutive chapters, management issues, the market, advertising and shopping, competition, communication policy, and multinational full service networks (this last contributed by Joseph Straubhaar and Joonho Do). There is a thoughtful final chapter on the social and economic—and even, briefly, ecological—impacts of these developments.

Be reassured: this is not a book of breathless hype on the new world which is unfolding. There is no presumption that what is becoming technological possible will happen: the authors' feet are firmly on the ground of what can reasonably be expected to succeed commercially. Unfortunately, the feet and the ground are very much American: apart from the Straubhaar and Do chapter, there is hardly a word on the