more than a decade in Australia. The placing of the social elements of the ESD debate on centre stage is well overdue in the discussion over sustainable land use, the sustaining of rural economies and societies, the appropriateness of landcare initiatives and the carving up of the bounteous National Heritage Fund made available through the partial sale of Telstra. Vanclay and Lawrence have shed much needed light on the subject area of land use policy from a sociological perspective, and have set the challenge for policy makers, agricultural and other bureaucrats, researchers, regulators and teachers to integrate social realities into what has still to date been a very technical and physical terrain of ESD discussions and policies.

The Environmental Imperative manages to launch a range of challenges both at a researcher and teacher as well as a policy level. In terms of policy, the book is quite scathing in its attack on the demise of the culture of state intervention and support for the agricultural sector. The authors argue vigorously for the reinstating of state-backed (but modified) extension services, as well as rural social and technical schemes which encourage community and individual farmer movements towards more sustainable land use practices. Harking to the calls for more sociologically informed scientific, policy and extension staff training would go some of the way towards changing present agricultural practices from the top level down, the authors argue.

The specific area of rural sociology and its relationship to extension science is comprehensively, if necessarily fleetingly, dealt with. A manifesto of possible future research priorities as well as challenges to the field are laid out. Of highest importance is the need for researchers to 'study farmers on farmers' terms' (p. 169) in order to increase the 'usefulness, validity and effectiveness of the research and extension process' (p. 172). Such calls, if heeded, are likely to prove as radical and far reaching in the changes that would ensue to agricultural science as are required and called for in the practice of agriculture itself. One can only hope that books like this one play the significant role they deserve in the reorienting of Australian agriculture and science towards real, as opposed to virtual, ecologically sustainable land use.

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The Trouble with Computers: Usefulness, Usability, and Productivity

Thomas K. Landauer

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This book sets out to promote an approach to the design, development and deployment of computer systems which is intended to overcome current shortcomings in the usefulness and usability of such systems. Landauer uses his book to set an explanation and justification of his approach in the context of the so-called 'productivity paradox'. In doing so he produces a valuable and comprehensive review of the literature addressing the evident gap between investment of time and money in computer systems and any corresponding improvement in organisational performance. Landauer's remedy is presented as 'User Centred Design' with its necessary counterparts of user centred development and user centred deployment and in justifying and explaining this approach he draws upon a wide range of literature describing experimental research and industrial experience.

The book's chapters are grouped into four sections. Part 1 addresses the 'productivity puzzle' and presents a detailed review of literature that in many respects began with Paul Attewell and Jim Rule's attempt to discover some empirical evidence of the benefits of computers to organisations.[1] Landauer points out that even now much of the literature extolling such benefits turns out on closer examination to be describing anticipated rather than documented gains. The productivity paradox is simply that most empirical measures of computer adoption and use fail to provide any correlation with organisational performance or any other measures of benefit. Landauer argues that those gains that can be demonstrated are associated with increased volumes of work handled, particularly in the service sector, rather than any identifiable productivity improvement.

Part 2 examines conventional explanations of the discrepancy and part three suggests that there are obvious shortcomings in many implemented systems which undermine their potential benefits. Landauer points out that justifications for gains from the decreasing cost of computing ignore the distinction between technical capacity and usefulness, while the presence of computer systems tells us little about the alternatives which might have emerged in their absence. Thus a decade of falling costs in desktop computing has been negated by the corresponding increase in power of the standard office machine, without any corresponding increase in effective functionality. The succinct analysis of psychological addiction given on page 192 is intended to explain why technically committed users persist with systems which yield progressively less benefit. It also prompted me to remove Microsoft's Solitaire game from all my own computers.

A definition of desirability based on a combination of usefulness and usability is put forward in Part 3 as a means to defining and achieving more substantive gains and Part 4 presents definitions for user-centred design, user centred design methods and user centred development. These are illustrated by a number of examples, including a 'SuperBook' concept which demonstrates the value of iteration in design and development. Landauer extends his analysis to the issues of deployment which links technical design to a broader set of organisational issues. The book concludes with some speculative descriptions of the potential of effectively user-centred products.

The book works from a technical and determinist frame towards a social and organisational definition of systems in use. It seeks not just to improve understanding of the core design process, and in particular the need for successive iteration of design solutions to allow development, but it extends the notion of design into the area of deployment. Notoriously, post-implementation evaluations of computer systems are often limited to checks conducted immediately after completion, and the lessons which should be carried into the life cycle of the product in use are rarely learned. A detailed justification of the effectiveness and value of iterative development is given in Chapter 13, and its quantitative framework is available in more detail in Nielsen and Landauer.[2] The same chapter also introduces the concept of formative evaluation, borrowed from education theory to argue that the development of feedback to designers and users is of greater value than the summative evaluation of specific design goals.

Landauer's treatment of the productivity paradox, the apologists for and critics of current practices is a valuable resource for both practitioners, students and educators concerned with the improvement of information systems practice. In presenting the range of attempts to quantify the usefulness of computers in organisations it exposes the essentially 'black box assumptions of the econometric models of computer use, bringing to mind Nathan Rosenberg's (1980) critique of economists' views of technology generally.'[3] Elsewhere the book reappraises debates entered into one or two decades ago in other areas of design. Thus the user centred model advanced reflects debates in architecture and product design from the 1970s about the incorporation of users into the

design process. The shortcut paper and pencil prototyping described in Chapter 12 brings to mind the work of Tony Gibson in the 1970s and 1980s where deliberately low-tech media were selected in order not to intimidate lay contributors to community based design exercises.

While the book provides access to a wide range of supporting research, it also demonstrates a strong US focus. North American literature is carefully assessed and related to the strands and development of thinking, while comparable European sources are either not mentioned, or are simply referred to as 'the so-called Scandinavian School of systems design' (p. 280) with no further citation. Thus the clear explanation for the nonemergence of the paperless office advance by Buchanan and Boddy as long ago as 1983 is not acknowledged in the identical analysis provided here.[4] Similarly, action research frameworks derived from the Scandivanian framework are not represented, although these both meet the requirements of Landauer's approach, and achieve a connection with the broader organisational realm.

These echoes of earlier literature and research serve as a reminder of the interdisciplinary nature of all design issues, and the continuing need to evaluate work from a variety of disciplines and sources. Landauer himself, as an academic psychologist with a former role as Director of Cognitive Science Research at Bellcore, is in a good position to do this. The failures of connection in no way reduce the impact of the arguments advanced, but serve to emphasise that the book provides a necessary but not sufficient component of the reorientation of effort needed to overcome the deficiencies it reports. It makes a valuable contribution to the armoury of educators in particular, but computer science remains a discipline in which post-doctoral research issues find their way in to undergraduate curricula in a three-to five-year time-frame. Such a flow of raw content places great pressure on any contextual material that may be perceived as 'soft' by either professionals or curriculum designers. Thus, while the book offers a framework for education in user centred development, such innovations are difficult to sustain if a profession remains dominated by reductionist and technicist explanations for its shortcomings.[5]

The value of this book lies both in its extensive presentation and analysis of the 'productivity paradox' and its enumeration of a set of techniques and practices which provide a user centred alternative to much current practice. The author presents a clear and well-supported account of the genuine shortcomings of systems currently implemented in conjunction with a specific formulation for a way out of the impasse presented in Section 2.

The productivity paradox is, however, also amenable to an explanation derived from the shortcomings of analyses based on aggregated data. Categorising organisations on the basis of measures such as 'total IT investment' makes no allowance for those which make good or poor use of the technology, nor can it distinguish those who are reactively copying competitors from those who are acting on a sophisticated understanding of their own capabilities and objectives. Interpretive or ethnographic studies reveal a much more complex story around the success or failure of information technology. Landauer cites Suchman's formulation[6] of 'situated action' to describe the implications of such a shift in focus, as well as the notion of 'informating' the organisation advanced by Zuboff.[7] These represent two key attempts to engage such complexity, and within the information systems research community there are an increasing number of workers seeking an interpretive understanding of the relationship between the technical and organisational dynamics which determine the outcomes of technological initiatives. It is the growing number of ethnographic studies such as that by Yetton *et al.*[8] which are producing evidence of both genuine productivity gains through the use of computer-aided design,

familiar chronological periodization of space affairs to tell his story. Through Chapters and the subsequent extension and elaboration of the range of design services and customer expectation which to some extent counteract the raw efficiency gains. Such findings contrast with the interpretation of the more aggregated studies underpinning the discussion of Chapter 2. However, Landauer concludes with a statement that human mental capacity reflects not simply the capability of the individual, but also the wealth of stored human knowledge, and the power of shared mental tools. In ending with this statement he calls to mind the emerging body of work utilising a Vygotskian frame of reference[9] and provides a necessary connection from this wider context to the technical core of information systems.

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The Politics of Space: A History of US-Soviet/Russian Competition

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This book is hailed as the first post-Cold War political history of US–Soviet/Russian space relations. As such it offers a post mortem on the rise and fall (and rise again) of 'the intersections of the world's two biggest space programs' (p. 2). Though it works with new historical evidence that has only become available since the disintegration of the USSR, *The Politics of Space* really only contributes to the refining of established themes in the history of space and astronautics rather than presenting enormously original historical thoughts. This is not a shortcoming of the book, however, as it maintains a good standard of argument throughout most of the pages of its eight main chapters.