An impressive surge of activity at state level is documented by several examples. Michigan has created its Industrial Technology Institute, hoping that an 'Automation Alley' will emerge along the Ann Arbor — Detroit corridor. (What about the Sydney — Wollongong corridor? or the Melbourne — Geelong corridor?) Ohio and Pennsylvania have attached names to their programs: Thomas Edison and Ben Franklin respectively. From New York State, the Rensselaer Polytechnic Institute describes the 'RPI model'.

Much enthusiasm emerges from these descriptions. Pennsylvania has no less than twenty 'incubators' offering low rent and shared services to help entrepreneurs start up. But Edward E. David, formerly Science Advisor to President Nixon, sounds a cautionary note: not every state can realistically expect to duplicate the conditions that created California's Silicon Valley, the Route 128 complex in Massachusetts, or North Carolina's Research Triangle.

Don't miss the charming chapter by Marcia L. Rorke and Harold C. Livesay. ERIP, the federal Energy Related Inventions Program, has enriched the folklore about lone inventors with several more cases. The story of the wad of fibreglass blown by a breeze off a shelf into a beaker of citric acid solution, which surprisingly stripped it clean of resin, is worthy to take its place alongside the story of the *Penicillium* spore that blew on to Alexander Fleming's culture plate.

All this is fascinating and important stuff. The book gets alpha for content, but unfortunately gamma for presentation. The editorial standards are those of a random collection of emergency typists. Typos are legion. The print is smaller, and on some pages fainter, than a newspaper could get away with. Dealing with technological innovation demands far-sightedness, but exceptional visual acuity shouldn't be necessary. And this is presented in hard covers! It is a case of misleading packaging, and just as unacceptable as putting alcoholic coolers into fruit juice cartons.

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Structured Chaos: The Process of Productivity Advance *by Richard Blandy, Peter Dawkins, Ken Gannicott, Peter Kain, Wolfgang Kasper and Roy Kriegler.*
(Oxford University Press, Oxford, 1985) pp.viii + 111, $8.95, ISBN 0-19-554687-3.

At the beginning of the twentieth century Australia was one of the most socially and industrially advanced countries in the world. Per capita income was higher in Australia than any other country. Since then per capita income has generally increased, but not nearly as rapidly as in most of the older industrial countries of the northern hemisphere and the new industrial countries of east Asia. Today more than 25 countries have higher per capita incomes: Australia is falling further and further behind the rest of the world. This timely book investigates the reasons for Australia's relative decline and makes numerous suggestions for reversing this trend.

The key to economic growth, according to the authors, is productivity. Per capita income in Australia has failed to keep pace with other countries because of limited productivity increases. The reasons for the relative decline in productivity are many, but at the centre are the social arrangements which regulate society and enterprise. Reducing the 'productivity overhang' requires the elimination of archaic social arrangements which are deeply entrenched. The authors state their thesis succinctly and eloquently:

> Productivity advance in a rapidly changing world requires social arrangements which have *evolutionary capacity*, a capacity to accomodate the unforeseen and unforeseeable, a capacity to sail on the shifting socio-economic winds rather than trudging relentlessly on with fixed structures to ultimate defeat in an increasingly hostile environment (p.9).

Government intervention in the Australian economy takes a variety of forms and is identified as an important reason for the lack of productivity and competitiveness of Australian industry. Government regulations, sometimes intended to protect industry, generally have the opposite effect. Tariffs, quotas and other barriers to trade are classic examples. The short run, static damage to efficient producers, consumers and the nation as a whole has long been recognised. The authors argue that an even greater problem of protection is that it reduces the incentive for organisations to be flexible, innovative and productive. In a dynamic world, protection leads to bureaucratic and inflexible organisations less able to cope with uncertainty. Other forms of government regulation can also have unintended side effects, usually negative. The authors cite the case of the banking sector which, until recently, was highly regulated.

Many contemporary writers have stressed the importance of research and development (R & D) and manpower training in promoting technological change and productivity increase. The authors of this book take a broader perspective which emphasises the two-way causality between technological change on the one hand and R & D and education on the other. Increasing government expenditure on R & D and education offers no guarantee of technological break-throughs and productivity increases. Government regulations and the attitudes of the public, management and trade unions may reduce the effectiveness of these expenditures. What is required is a socio-economic environment which acknowledges the importance of innovation and change as fundamental to increases in productivity and per capita income. Increasing per capita income requires a social climate conducive to technological change. Thwarting technological change by limiting productivity will ultimately result in job losses as industry becomes increasingly uncompetitive. Even in the short-run, technological change is likely to create more jobs than it destroys. In the longer run it is absolutely essential for Australia to achieve increased competitiveness, without which relative living standards will continue to decline and no job is safe.

The pressure of competition is the best guarantee of efficient, innovative and competitive industries. Monopolies (private and public), cartels and government regulated or licenced oligopolies are ill-adapted to change and hence are unlikely to be innovative and conducive to rapid productivity growth. An unjustified fear of monopoly power in Australia has led to government policies which not only result in inefficient production, but they

also exacerbate monopoly power. Regulations and protection inhibit the entry of new, innovative firms. The authors argue that the fear of monopoly in a country like Australia with a small domestic market is generally misplaced. First, economies of scale are not as great as is widely envisaged. Beyond fairly low levels of output, problems of communication, co-ordination and the inability of bureaucracy to respond to change, result in diseconomies of scale. The static advantages of bigness are replaced by the dynamic advantage of smallness. Second, the threat of entry of new firms and overseas competition in a free trade regime, minimise the effect of any short run monopoly power. Only monopoly power that is enshrined by legislation of government ownership presents a danger. But it is the problems of inefficiency and stagnancy, not the misuse of power, that threaten the long term growth of the economy and the living standards of the people.

Australia's problems are not just the result of misguided government policies. Management and unions must also share the blame for retarding productivity. The authors suggest that poor labour relations have stunted innovation and productivity in Australia, just as they have in Britain. Unions often fail to see the necessity of productivity increases to accomodate wage increases. This is particularly true in the government sector. Consequently, unions are often reactionary and hinder productivity when, in fact, they have enormous potential for improving the efficiency, productivity and competitiveness of the firms in which they work. Australian managers are equally at fault for maintaining conservative and outmoded management practices. They are too often paternalistic and fearful of losing prerogatives in decision making. Consequently, they exacerbate the narrow and shortsighted attitudes of unions.

The authors' suggestions for improving productivity flow directly from their assessment of the problem. First, government should encourage and not restrain competition. This can be achieved by reducing tariffs, quotas and other barriers to trade, by reducing excessive regulations that exist in many sectors and by eliminating government monoplies through privatisation. Labour-management relations can be improved by greater employee participation: both representative or indirect participation (industrial democracy) and direct participation through the involvement of all workers in the decision making process through autonomous work groups and quality circles.

Probably the most important contribution of this book is to draw our attention to what is obvious but easily forgotten. Long run increases in living standards require significant productivity increases. Public concern during the past twenty years has concentrated on the problems of unemployment, inflation and inequality. Government policies and union/management goals and practices, designed to increase employment or reduce inflation and inequality in the short run, have been largely counter productive. By reducing the sources of productivity and efficiency gains they have weakened Australia's competitive position and made it more difficult to reduce unemployment and maintain price stability with an equitable income distribution.

Although in general agreement with the authors, I have three major reservations about the book. First, they assume, without documentation, that the decline in Australia's economic position is due to sluggish productivity

increases. Other possible explanations such as long term declines in agricultural and mineral prices, or a decline in total hours worked relative to the entire population, are not even mentioned. Second, they downplay the contribution R & D and education can make to productivity increases. In my view, autonomous increases in R & D and human capital can initiate significant productivity increases and economic growth. Finally, they underestimate the importance of economies of scale. I do not share their faith in the dynamic competitiveness of small firms. It is well documented that many Australian industries are fragmented with too many firms producing uneconomic levels of output under the protective cover of tariffs, quotas and other legislation. The extent of economies of scale should be determined by competitive forces and not by government policies. As the authors would probably agree, whether economies of scale are exhausted with one or 100 domestic firms does not matter as long as potential or actual competition, both domestic and foreign, is allowed to check any abuses of economic power.

The authors have made a lively and interesting contribution to analysis of productivity in Australia. Unlike most discussions, theirs is neither technical nor abstract, but is perceptive and provocative. Although the book may be faulted by some for its lack of analytical rigour, it offers many useful insights into the causes and solutions of a major, though neglected, problem in the Australian economy.

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Telecommunications in the Information Age: A Nontechnical Primer on the New Technologies, *Second Edition by Loy A. Singleton*
(Ballinger Publishing Company, Cambridge, Massachusetts, 1986: first published 1983) pp.x + 256, US$52.95, ISBN 0-88730-098-7.

Telecommunications in the Information Age is a general compendium on modern technologies for the delivery and distribution of video images and other information service. This revised edition, appearing in print after a relatively short span of three years since the first one, attests to the fluidity of several mutually reinforcing trends shaping the telecommunications landscape of post-industrial societies in general and the United States (US) 'information economy' in particular.

The currently revised volume is not only necessitated by innovations which make hitherto infeasible technologies the practical realities of modern telecommunications, but also by entrepreneurial initiatives pertaining to the timely exploitation of commercial opportunities and, more importantly, by regulatory changes which delineate the ground rules for the operation of existing services or the introduction of new ones. The recent developments that are ostensibly covered by Singleton include: (i) the passage of the *Cable Communications Act* in 1984 which requires large cable systems (with 36 or more channels) to provide commercial leasing of channels by third parties; (ii) a 1985 Federal Appeals Court decision which overruled the Federal Communications Commission's (FCC) signal-carriage requirements (the