fears could indeed be well-founded. International forums such as the United Nations and the International Telecommunications Union should be used to ensure that the transmission from a regulated monopoly supplying international satellite transmissions to a competitive market arrangement is achieved smoothly, allowing for adjustments with minimum distortions to existing trade patterns.

Summing up, this book is informative and interesting and covers the major developments in telecommunications, giving an important update and overview of the events. In some places it is difficult for the non-technician to read due to the plethora of technical terms and abbreviations used, but overall it is well written for a complex topic integrating economics, engineering, politics and behavioural strategies. For public policy makers, economists, bureaucrats and equipment manufacturers interested in recent developments and potential directions in the area of telecommunications and technological change, their book shelves should not be without a copy.

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The Tender Ship: Governmental Management of Technological Change, *by Arthur M. Squires.*
(Birkauser, Boston, 1986) pp. xix + 247, SFr62, ISBN 0 8167 3312 X.

Arthur Squires, University Distinguished Professor of Chemical Engineering at Virginia Polytechnic Institute and State University, is deeply concerned that 'our culture (in the United States) is at grave risk' if we do not drastically change the power of the 'sterile, obstructive governmental bureaucracy' over engineering development for public needs.[1] He writes, in a discursive popular and semi-technical vein, to sensitise the educated audience 'outside technology' to the way in which bureaucratic practices have led to costly abandoned ventures and recognised failures in the United States (US) government-supported technological innovation in the post World War II years. By offering proposals for reform, he hopes to stimulate debate on needed changes.

Squires bases his argument on the contrast between the successful management, during World War II, of problems such as enriching Uranium-235 fuel for the atom bomb and the postwar mismanagement and sometimes tragic conclusion of poorly understood development problems such as matching the M-16 rifle with appropriate ammunition for Vietnam combat. His diagnoses of what went right or wrong and his remedies draw on his own mixed experiences with government development, including an extended apprenticeship on the U-235 project; extensive sifting through failures and

successes studied by Layton, McNaugher, Melman, and others; and thoughts on bureaucracy from Parkinson and Tullock.[2]

The model administrative and technical management practices that Squires finds, somewhat idealistically, in several large World War II endeavors, are not unfamiliar. The flexibly organised teams of industry technologists, drawn together by industry contractors on an *ad hoc* basis to work on critical developments, were kept relatively free from bureaucratic govenment control. They were monitored 'with a light hand' by savvy government administrators responsible for large development programs. Teams were headed by highly qualified engineering managers and, in many cases, by brilliant super-managers — 'maestros of technology' (Squires's term) — who were clearly accountable to the top administrator for meeting their project's well-defined technical objectives.

Squires identifies three groups of causal factors for the failed developments of the mission-oriented agencies in the postwar period. First, the line of responsibility and accountability for a given project, from agency administrator to technological team, has been broken by the agency's routine delegation of project monitoring to a 'low level (government) bureaucrat' many tiers away from and only 'loosely' connected to the administrator above. Although lacking the necessary engineering experience and education for the assignment, the monitor wields 'enormous power' over the choice of industry contractor and the subsequent tracking of technical progress of the contractor's team. Second, the technical specifications of the project have been drawn up unrealistically or inaccurately because political pressures on the agency have forced the premature initiation of work on development or led to inappropriate wording changes to satisfy a legislator.

These shortcomings have opened the way to acts of 'directed dishonesty' by bureaucrats and contractors. The former may wind up with a technically 'silly' or impossible to fulfil set of project requirements in the agency's Request for Proposals (RFP) inviting companies to compete for the project contract. The contractor chosen may follow an 'ethic' of responsibility, in dealing with the government, that differs from the accepted professional standards governing its commercial work. And engineers on the contractor team may have to make their peace with working on projects where failure is a built-in feature or where tests must be slanted to give the contracting agency what it wants, 'silly or not'.

Squires's relatively brief proposals for remedying this situation are all designed to 'transfer powers from. . .central bureaucracies to local institutions'. Several of these can be summarised.

First, strengthen the training of potential maestros of development, today's engineering graduates, by restoring emphasis to practical experiments of substantive content. Do this by terminating National Science Foundation support, with its 'excessive preoccupation' with mathematics-oriented engineering research, and shifting federal funding to a university-administered system of block grants for engineering research and a national system of prizes recognising quality results produced under the grants.

Second, in industry, give fuller scope to the potential of maestros by forming more company engineering departments as 'flexibly extensible organisations of few tiers' supported by a varying number of *ad hoc* technical task forces, *a la* the Japanese model.

Third, encourage freely directed industry research to improve government staples, such as tanks, by giving government R & D subventions to qualified suppliers.

Fourth, innovation in exclusively government items to 'outsiders' by establishing a government Office of Inventions to facilitate (but not manage) the development of good ideas for consideration by interested agencies and industry contractors.

How well suited is Squires's presentation for his intended audience 'outside technology'? I gather that he is addressing policy level figures in US government, influential educators, young engineers, the alert citizen, the media. My judgement: he has missed serving his readers in two important respects.

To be sure, he has very usefully called their attention to the need for fundamental improvements in 'quality control' in the development of vulnerable, technology-intensive 'public goods', at a time when serious lapses in quality control in high and low technology throughout US industry are a subject of continuing public concern. (Note: the book was completed before the Challenger failure.) And his proposed remedies may provide thought-provoking glimpses of possible ways of diversifying federal support of engineering research and development.

But Squires has failed to furnish his audience with a sufficiently broad and deep view of the government innovation problem he raises. He has, in the first instance, left the reader caught between success models from distant wartime years of intense technological pressure, on the one hand, and failures from a very different recent national scene, on the other. To balance objectively his insistent account of postwar failures, Squires needed to discuss cases of equally important postwar success and to identify how the persons or teams who achieved them dealt with the same federal bureaucracy under the same circumstances. He could, for example, have elaborated on Admiral Rickover's maestro of technology feats in developing the nuclear-powered naval vessel or provided readers with insight into how NASA bureaucracy and industry teams **managed** to develop the lunar module.

Inescapably, Squires's particular tales of success and failure illustrate the more general principle that a project's participants can jointly achieve productive results only if they are linked by mutual trust and acceptance of accountability for their respective contributions. Yet, and this is my second point, Squires misses the opportunity to impress his readers with this linkage. He gives only piecemeal consideration to some of its positive and negative manifestations: calling for probity toward the 'engineered object' on the part of the technology team and suggesting an Ombudsman for engineers who wish to blow the whistle on corrupted research; intensely criticising the low level bureaucrat whose contract management blurs the agency's development objective; viewing with sorrow the firm that confuses accountability by carrying out a 'silly' project that implies squandering of public money; applauding an alert administrator who motivates the contractor and maestro team to implement an essential public innovation. But, for the reader to grasp fully the interdependence among these participants Squires needed to bring all four on stage, together, and to describe in positive terms their necessary obligations each to the other and to the 'public' paying for the project, including the gist of the ethical norms that should ideally guide each party.

NOTES AND REFERENCES

1. The "tender ship" of the title is the American ship of state ". . . top heavy with a dead weight of . . . governmental bureaucracy" (p. 232).
2. Christopher Layton, *Ten Innovations,* George Allen and Unwin, London, 1972; Thomas L. McNaugher, *The M16 Controversies: Military Organizations and Weapons Acquisitions,* Praeger, New York, 1984; Seymour Melman, *Profits Without Production,* Alfred A. Knopf, New York, 1983; C. Northcote Parkinson, *Parkinson's Law,* Houghton Mifflin, Boston, 1957; Gordon Tullock, *The Politics of Bureaucracy,* Public Affairs Press, Washington, D.C., 1965.

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Japanese Participation in British Industry, *by John H. Dunning.*
(Croom Helm, London, 1986) pp. 207, £ 25.00, ISBN 0-7099-4500-0.

Japanese overseas investment in manufacturing has increased greatly in recent years, especially in the developed countries of the Organization of Economic Cooperation and Development (OECD). Today, Japan is the largest exporter of capital in the world, although this is mainly portfolio investment attracted to United States (US) bonds. The new wave of investment in manufacturing has been welcomed by most countries for the jobs it helps create and the injection of new technology and managerial techniques.

Nonetheless, many people in Europe and America, as well as here in Australia, are fearful least this increased participation in industry should lead to loss of control by local firms and adversely affect their technological sovereignty and national development potential. It is this concern which accounts for the subheading of John Dunning's new book on Japanese participation in British Industry: 'Trojan horse or catalyst for growth?'.

Up until recently there have been few indepth studies on Japanese business activity abroad, how extensive it is, how Japanese practices differ and what difference they make. Dunning's research, whilst not the first in this field in the United Kingdom (UK), attempts to cover the entirety of Japanese investment in UK manufacturing up to 1984, and to assess its economic impact in a number of key areas. Originally commissioned by the UK Department of Industry, the research gives special attention to the extent to which direct investment by Japanese companies has aided the transfer of acceptable Japanese management styles and technologies to the UK economy.

The book is divided into three main parts. Part I describes the extent and structure of Japanese involvement in British industry and the reasons for it. This shows that at the end of 1983, when the field surveys underlying the research and its conclusions were commenced, Japanese direct investment in the UK was still in its infancy and had still not 'taken off'. In passing, Dunning notes that although Japanese companies are now seen as desirable examples of high productivity which are to be emulated (for example, Sony's colour TV factory in Wales won the Queen's Award For Export Achievement in 1987), this was not always the case. The majority of the ventures set up in