and expectations of high turnover are easily entertained. Rewards systems would have to be overhauled, with length-of-stay and non-disclosure contracts. Of course, the zero cost assumption will not be fulfilled: for example, any collection of PVWs will give rise to coordination problems and costs.

And there are other cost aspects that deserve much more attention than they are given in this book. Compatibility problem with PVWs and CVWs (Corporate Virtual Workspaces) loom large and will continue to do so, a suggestion for a cyberspace "green card" notwithstanding. There is the basic issue of "cognitive overload" (p.395). Consider too the eventual cost consequences of "vast data bases that constitute the culture's deposited wealth, every document is available, every recording is playable, and every picture is viewable" (p.2).

Do conditions favour the cyberspace corporation? Pruitt and Barret say, yes. Little start-up capital is required once a good profit opportunity has been detected (p.403); workers and their PVWs are mobile. To an extent this thinking is in line with the emerging economic growth theory orthodoxy that adds knowledge to the neoclassical capital and labour. Knowledge is embodied in the PVWs. However, a society needs to be able to organize for the use of knowledge and it does so through the continuing interactions made possible by organisation, the mysterious kind of capital that has rightly been dubbed the real wealth of nations.

Three other weaknesses might be noted. First, the role of organisation may provide a basis for even more massive economies of scale and scope than did the old-fashioned scale production conditions. Second, markets in information do not work very well and even the profit sharing on which this new kind of corporation supposedly rests may prove very difficult in practise — cyberspace entrepreneurs would do well to study the problems of Chinese joint ventures. Third, what happens on the property right front? If, as these authors imply, we are in only the early stages of the information age, the limitations on our ability to define clearly property rights in information must have an increasing impact.

Overall, in reading this attractively written and produced volume one should keep in mind the disclaimer in the Introduction: "Cyberspace — as described in this book — does not exist". It is very doubtful that it ever will; but equally the technological and economic pressures and the thinking about cyberspace reflected in these pages will together ensure that the future differs greatly from the past. Their interactions contribute to our knowledge and so to economic growth and institutional change.

D. McL. Lamberton
Australian National University and CIRCIT

Feminism Confronts Technology *by Judy Wajcman*
(Allen and Unwin, North Sydney, 1991) pp.x + 184, $22.95, ISBN 1-86373-100-8.

The question of the relationship between technology, human beings, broader society and the tensions between them is undoubtedly complex. Wajcman attempts to analyse this relationship by examining the diverse feminist approaches to the question of technology and social change. Her book thus represents a

time of re-assessment for the feminist project *re* technology, but she is successful in pushing the debate on and opening up possibilities for further exploration. Essentially the book argues that there is a circular interplay between society, those who design, construct and use technology, and the changes that new technology produces in society. Wajcman refines this approach in terms of gender studies and argues that technology and the changes it produces are guided by existing social relations. Her strategy is then to synthesise a historically aware and culturist approach and then bring this to bear on the existing literature.

Wajcman's starting point is to succinctly represent, critically compare and assess the history of feminist thought on issues of science and technology. She starts with the broad definition of technology as consisting of the interlocking cultures of knowledge and science as well as the actual concrete artefacts and systems of technology. Technology is thus partially a series of discourses and social relations. Looking first at feminist biographies and histories of women's participation in science and technology, Wajcman highlights the 'hidden' participation of women in technology. She then reviews feminist arguments around science, including, eco-feminism; liberal feminist approaches to women in science; gender-neutral as opposed to a feminine science; and more recent deconstructionist notions of science as a masculine culture. Wajcman shows that feminist theory pertaining to technology has followed these debates while remaining less developed.

The second chapter deals with gender relations and technology in the workplace. Wajcman argues that new technologies do open up possibilities for change but women are in structurally weak positions in the conflicts and negotiations that surround these changes. Men, typically through the rearguard actions of craft associations, can defend their positions; women with lower rates of organisation tend to enter at the so-called low-skilled points of technological change. When women do manage to capitalise on technological change and appropriate traditional male skills, these tend to lose value over time. Wajcman demonstrates persuasively that these processes have occurred in ways that have reinforced men's position in the work-place, through creating sites of potential change and conflict from which the most organised groups tend to benefit.

According to Wajcman, the male professionalisation of medicine had a similar effect in disempowering midwives and traditional female practitioners while building the power of doctors, who have since used further specialisation and technological developments to enhance their rights and prestige. Reproductive technologies are the focus of much feminist debate over medical technology; Wajcman contrasts the feminist approaches here. First, she elucidates the radical critique that sees this technology as an attempt to appropriate the last women-centred process. Second, she appraises the school of feminist thought that views technology ambivalently and instead tries to separate power relations from technology and its applications. The strength of the second approach for Wajcman is that it contextualises technology and recognises that it has different meanings for different women, but tends to fall into the technology use-abuse model, which the radical critique avoids. However, one could argue that the radical school presumes that female values are antithetical to (male) science, a view Wajcman rejects in the first chapter. Wajcman determines that existing social forces shape reproductive technologies and tend to reinforce them, even the supposedly liberating technologies of contraception. In the case of medical technologies, "there is a complex web of interest ... those of professional and capitalist interests overlaid with gender" (p.73).

Wajcman then shifts her attention to the home. Drawing on the work of Ruth Schwartz Cowan, she demonstrates that the introduction of domestic technology has not liberated women. The home has not shifted neatly from being a unit of production to consumption, although this has occurred in some systems of technology and domestic labour. Empirical evidence also suggests that the gender distribution of household labour has not changed markedly, and in some cases the introduction of technology reduces participation by men. Technology arrives in the house already "gendered", implying a reinforcement of the sexual division of labour required by that technology. The social conception of the household, including domestic labour and its attendant technologies, remains profoundly influenced by notions of public and private. Wajcman shifts the technology debate away from high-tech and heavy industry, arguing that the designs of living space, houses, cities and infrastructure are also powerful manifestations of technology that can provide great insight into the cultures that produced them.

The final chapter deals with technology as masculine culture. Here Wajcman demonstrates that it is the "ideology of masculinity that has this intimate bond with technology" (p.137). Male sexual metaphors pervade the language of technologists such as those involved in the Manhattan project. Wajcman draws on other literature to show that this is a common feature of male technological endeavour. The crucial question though, as Wajcman proposes, is whether this is an inherent feature of all discourses of technology or merely a euphemistic form of legitimation, indicating an intertwining of cultures. One striking example supporting the latter proposition is that of a naval warship that depends on electronics to function. The production of electronics is a predominantly female industry; however the culture of military technology excludes recognition of this fact. Military technology is thus typified by an absence of female culture. Wajcman argues that these cultural processes also construct feminine identity as a lack of technical competence, which goes beyond stereotyping.

What is missing from Wajcman's story is close analysis of technology as artefact and system itself. She perceives technology as a type of mirror that reifies existing social relations, much like any other cultural process, event, or discourse. What are the implications of the interactions of one human being with technology? Technology (as culture and artefact) enmesh the individual in systems of institutional and discursive power; it always involves the compromise of the user in a Faustian bargain. An objection to Wajcman's thesis might arise from this Habermasian perspective, which would view technology as an intrusion of systemic rationality not open to guidance by language.

Wajcman states that: "the relationship between technological and social change is fundamentally indeterminate. The designers and promoters of a technology cannot predict or completely control its final uses" (p.104). If this is so, then we should take more account of impact and possible subversion of technology at the local level, perhaps looking at technology as Latour and Woolgar do at the social processes that occur in the production of science. This method can co-exist with Wajcman's central thesis of the social shaping of technology; her analysis demonstrates that technology has been, and is, used to strengthen the position of men in a variety of contexts. Wajcman's scholarship is impressive and her arguments compelling, pointing the way for the next generation of feminist scholars of technology in an accessible yet theoretically aware book. The implied strategy for feminism to successfully confront

technology must then involve social actions that challenge the social relations and cultures that produce technology.

Antony Marsh
University of Wollongong

The Virgin and the Mousetrap: Essays in Search of the Soul of Science *by Chet Raymo*
(Viking, New York, 1991), pp. xix + 199, $US18.95, ISBN 0-670-83315-0.

What Happens when Science Goes Bad. The Corruption of Science and the Origin of AIDS A Study in Spontaneous Generation *by Louis Pascal with an Introduction by Brian Martin*
(University of Wollongong, Science and Technology Analysis Working Paper No. Technology Studies, University of Wollongong, PO BOX 1144, Wollongong NSW 2500.

The first of these two publications takes its name from one of the essays contained in the volume and which in turn is entitled after a fifteenth century Flemish triptych altar piece depicting the angel Gabriel announcing to the Virgin that she is to become the mother of Christ. The triptych is illustrated on the book's frontispiece (it is the only illustration in the book), and readers are directed to some of the details contained therein, including a supposedly "clever mechanical mousetrap" among tools and various accoutrements on Joseph's bench in a back room. Unfortunately the smallness of the reproduction makes it extremely difficult for the reader to identify this device (I couldn't even with a magnifying glass), so that the author's argument that in this painting the artist "captured the spirit of his time: mechanical, inventive, forward-looking, preoccupied with matter and force" is not easily endorsed. One can nevertheless subscribe to Raymo's main point in this essay, and that is that in the century following the painting of this altar piece, western science and technology "consolidated a new alliance that led to the Scientific and Industrial Revolutions, and to a new era of health and material well-being for a large part of humankind" (p.198).

Raymo, a professor of physics and astronomy at Stonehill College, Massachusetts, and a regular science writer on a wide range of topics in journals such as *The Boston Globe* (the Publisher's information page advises that 'some' of the essays are based on material in these articles, but the reader is not told which ones), wishes to counter what he sees as overly negative perceptions of science and technology. "Knowledge cannot be unknown and the gifts of technology are seldom refused, yet many of us are alienated from the scientific instruments of knowledge, frightened by the darker excesses of technology" *(ibid).* There is much good material in this book, and the author is genuinely seeking a balanced view of science and technology, and the benefits that these human activities can offer. And while Raymo's evident enthusiasm for scientific research shows through in most of the essays, he does have some hard things to say about the misuse of science and technology, and also about their very practice. Raymo quotes, with apparent cautious approval, the octogenarian