Introduction

This book is about information. It is not just another book about how information is changing all our lives. There is already scribbling aplenty on the 'information revolution'. In particular, there is much discussion of information technology, of the wonders it can perform and of the social and economic consequences of performing them. What is not much considered, despite its apparent relevance to information workers toiling with information technology in an information society and information economy, is information itself.

The argument to be presented here is that what is done with information, be it ever so clever, and therefore what results from what is done, is influenced—sometimes even determined—by the nature of the good. It is necessary to step back from applications to consider just what is being applied. It is necessary because what is being applied is not like other goods, other resources. And while some of the strange characteristics of information allow wondrous things to be done, others constrain and prohibit. If the direction and success of our endeavours is so influenced by these characteristics, it would surely be wise at least to know what they are. Wiser still would be to understand how they affect what is done with information and how best to deal with this situation.

The argument heads into uncharted territory: whence it has come also has no clear map. Its provenance is to be sought in the efforts of many who have explored their own routes, most commonly those who have abandoned the safety of a disciplinary core to seek their fortune at the periphery and sometimes beyond. There are clear signs of the thinking of those who have journeyed from the heartland of Economics to explore elsewhere the peculiarities of information and the mystery of innovation. There is evidence of the investigations of those who once called the History and Philosophy of Science home and were drawn

towards Science and Technology Policy. Many of these have continued their journey from policy towards the strategic concerns of Management, though they have not abandoned their empirical roots to swing from the treetops with the Management gurus. There are traces of those disciplines which claim the world as their preserve—History, inevitably, for everything is History; and Geography, though everything is certainly not Geography just because it has a spatial dimension. And there are signs of thinking mined from deep inside disciplinary strongholds, from Physics and Engineering, though to bracket the two suggests a misunderstanding of both; from Political Science, Law, and Sociology. And there is thought stolen from such subjects as telecommunications, agriculture, and patents, convoluted enough to consider themselves disciplines and to mark their territory with boundaries. Major contributions have also come from beyond the academic pale, from the vast and unruly world of empirical information where academic writ does not run. In short, the argument presented here has no conventional academic foundation. It is a creation of the very situation it explores—how information is found, acquired, and mixed with other information to create something new, in this case an argument about how this happens. The argument may not be correct or convincing, but its very existence as the product of information drawn from so many sources is itself indication that an information perspective is relevant to the understanding of innovation.

What, then, is an information perspective? The explanation is embarrassingly simple: an information perspective puts information first. It sees information as the primary concern in any issue. We all use information; we all have information and are surrounded by very much more of it—a familiarity which breeds not so much contempt as complacency. Just as most of us survive without knowing in any detail, or wanting to know, how our bodies work, so we feel we can manage well enough without bothering too much about how information works. And just as we abdicate responsibility for our bodies to doctors and medical technology, so we leave information problems to information specialists and information technology. This confidence that there are experts somewhere who do bother about information on our behalf, to whom an information perspective is second nature, is misplaced. True, there are information experts galore,

but they are a diverse lot. The librarian is as much an information expert as the telecommunications engineer, the teacher as much as the advertising manager: they have little in common, and certainly not their approach to information. The econometrician who lets information equal I only mystifies and infuriates the sociologist worried about freedom of information. If the experts have little to convey to each other, they offer still less to those who are not information experts.

Whatever this book might offer, it is certainly not a crash course on how to become an information expert (of any sort). Its information perspective is based on nothing more sophisticated than the observation that information has some very odd characteristics, and that these seem to be fundamental to just about everything that is done with information. The more that is done, the more appropriate the perspective would seem to be, but as nothing is done without information, it could be argued that an information perspective is universally applicable. What the perspective reveals most starkly is how the awkward characteristics of information tend to be ignored in favour of its more convenient ones. It is exceedingly handy that information can be stored and processed in such vast quantities by computers; that it can be transferred so cheaply in similar quantities by telecommunications; that it can be owned through the intellectual property system; that it is sufficiently nebulous to satisfy the requirements of government policy and programmes; that it can be contained and administered by organizations, reinforcing their systems of structure and control in the process.

This is a convenient view of information as amorphous stuff, its characteristics endowed entirely by the systems in which it plays a part. Established economic and social systems have within them information systems; it is as important for the validity of these greater systems as it is for information systems themselves that information be seen as explicit and neatly codified, that existing channels are accepted as capable of its transfer without the inconvenience of transactions. The nearest this formal, institutional view of information comes to acknowledging any inadequacy in its systems is its concern that they are too capable, that they can handle too much information. It is fascinating how information overload, the rights of access of the many to so much information, and the accuracy and security of

databases are perceived as problems of abundance, simply the result of too much of a good thing. Concern about the productivity paradox—the observation that investment in information technology does not always yield increases in productivity—is equally intriguing. To paraphrase Solow, the concern is evident everywhere except among IT specialists and those who invest in IT. Note that, when something does go wrong with an information system—not an infrequent occurrence—it is frequently argued that responsibility should lie with those who designed the system rather than the system itself, as if it is inconceivable that a proper system could ever be deficient. If systems fail, whether they be the dedicated systems of information technology, or the systems of the organization, or the systems of the market, it is because of imperfections in these systems, not because of any inherent weakness in the notion of system. Perfect systems would not fail.

It is change which challenges this assurance. Existing systems cope very well with information that is already in use, with what is already being done. They cope less well with anything different, with anything new. From an information perspective, change is seen to require the addition of new information to that already in use. This raises questions: how is such new information found? how is it acquired? how is it mixed with that already in use? Such questions present not the comfortable problems of information transfer, but the almost intractable problems inherent in information transactions. No longer is it possible to evade the awkward characteristics of information, for these are the very characteristics at the heart of information transactions.

Part II of the book applies an information perspective to a selection of issues. They have little in common (one chapter sets semiconductor electronics cheek by jowl with eighteenth-century threshing machines) except that each involves change, and for each there is an established perspective from which change is viewed. Here an information perspective has been brought to bear on each, throwing a different light on the issues and suggesting conclusions which would not otherwise seem appropriate. Much of the change is technological change, but that is just because the fortunes of funding have pushed much research in this direction. Examples of any other sort of change would have revealed much the same thing. Thus, what has long appeared

to be an organizational rejection of the efforts of independent inventors seems from an information perspective more like organizational resistance to all new information, whatever its source (Chapter 6). Nations and firms alike are anxious to secure exclusive use of the information most crucial for innovation, and yet, from an information perspective, their attempts seem more likely to discourage than encourage innovation (Chapter 7). Common notions of how high-technology firms acquire the information they need for innovation are inspired by the ease of its transfer rather than the difficulty of transactions in such information. An information perspective finds that technology parks are unlikely to facilitate the complex information transactions underlying the rapid pace of innovation in high-technology industries (Chapter 8). Greenery and ducks are no substitute for information exchange networks. The attempts of policymakers to acquire information overseas for innovation in firms back home seem equally absurd from an information perspective: foreign information obtained at marginal cost does not find its way to firms quite so cheaply (Chapter 9). The belief that information for innovation in eighteenth-century agriculture was dispensed through an agricultural establishment, that labourers and farmers learnt from their betters, is upset by an information perspective suggesting that labourers and farmers are much more likely to have exchanged information with each other (Chapter 10). And the same perspective reveals the patent system, that bastion of innovation policy, as often ineffective in disseminating and protecting the information required for innovation (Chapter 11). Lastly, the information perspective is turned on organizations to examine their strategic change (Chapter 12), a topic normally examined from a strict organizational perspective. The requirements of information would seem to be in conflict with the requirements of organization.

It is not just the desire for fun, the love of contention, which yields conclusions that are so often so counter-intuitive. The conclusions emerge from the application of a perspective from which information cannot be taken for granted as a ubiquitous, undemanding, and infinitely flexible resource. Information is not like that at all; it is tricky stuff. Part I of the book explores the oddities of information, and is inevitably less fun. It tries to explain what is actually very simple, though what is very simple

is often very hard to explain simply. What has emerged may be too naïve for some, too convoluted for others; it may be too strange for many, too obvious for a few. Despite its exhortations to look beyond the simplicity of information transfer to the complexity of information transactions, this book may not achieve even the transfer of information from author to reader. That will depend as much on the reader's existing perspective of the world, and on its ability to accommodate another, as on the information contained in these pages.