Information management is the subject of eight papers in Session 4. Of particular note is Ferreiro's Keynote Address which identifies restraints to the implementation of information management concepts in Latin American countries. These include the absence of a conceptual framework for understanding information management, insufficient indigenous research, poor communication of findings, the ad-hoc diffusion of new methodologies, mostly from the USA and Britain, and inadequate professional education and training.

The theme of information management is taken up again in Session 7 in the context of professional development needs. Boon addresses the problem of designing a curriculum in information management relevant to South Africa. Training in the management of information resources also figures prominently among Zitara *et. al*'s proposals for a syllabus for the establishment of a centre of excellence for post-graduate studies for information professionals in Argentina. By contrast, the papers by Dickson and Tam, and Marcella, describe innovative course programs already in place at the Technology Management Centre, Victoria and Robert Gordon University, Aberdeen respectively.

In the remaining paper in Session 7, Froehlich highlights some of the ethical problems facing information professionals in an international context (e.g. whether access to information is a right, the growing gap between the information rich and the information poor; the paucity of databases containing information appropriate to the needs of developing countries, and the domination of the information marketplace by databases for which the English language is the only key to access).

The papers in this collection are of uniformly high quality. Despite some minor difficulties in reading papers where English does not appear to be an author's native language, the contributions in this volume offer some fascinating insights into the difficulties faced by information researchers in other countries. However, given the large number of papers in the volume, and the range of subjects covered, an introduction and overview by the editors would have been a helpful addition. The two year lag between the Conference and the publication of the proceedings in 1994 is also a little disappointing, especially given the pace of developments in areas such as information technology.

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Work for All or Mass Unemployment: Computerised Technical Change into the 21 Century *by Chris Freeman and Luc Soete* (Pinter Publishers, London/New York, 1994), pp ix + 193, £ 35.99 (hb), £ 10.99 (pb), ISBN 1 85567 256 1

The problem about writing on the subject announced in the title of this book is that the whole notion of employment, and hence unemployment, has become almost too fuzzy to form the basis of well focused discussion. Such as assertion is, of course, an exaggeration but it points up a central issue which is never properly dealt with by the authors.

Freeman and Soete are motivated by the recognition that 'the vast majority of human beings need the opportunity for active participation in the work of society' (p142). They themselves admit however, that the expression 'active society' better conveys their real concern than the idea of 'full employment'. And this indicates the unresolved tension. Full employment's a concept that makes more sense in a world of well-defined, clearly structured full-time jobs than in an environment in which individuals, in effect, design their own packages of income-earning activity and choose whether, how and for how long to work. It is this latter type of world which Freeman and Soete are writing about as they explore the employment implications of information and communications technology (ICT). Although they look in some detail at how the nature and organisation of work is being changed by ICT, they do not give enough weight to the idea that 'work' may take several distinct forms (unpaid as well as paid; for personal pleasure as well as for the profit of others, etc). Their analysis therefore tends to underplay the role that individuals can and do play in turning ICT to their own advantage - not just in contracted employment but in forgoing for themselves an interesting and creative life as members of an 'active society'. Nonetheless, this book is a good read for anyone wanting a wide-ranging, up-to-date survey of what ICT is doing to the world economy, and what that might mean for any individual operating within it.

A good place to start might be with two extreme scenarios for ICT-based employment canvassed at various points in the book. An optimistic picture forecasts the continued very rapid diffusion of ICT and almost boundless growth of new computer-networked services, together generating vast new demand for the products of the new computer industry, telecommunications business, the education system, all manner of information services and software activities. On the supply side, parallel processing, virtual reality and multi-media are presented as only a selection of the major instances of technological opportunity opening up to engage software applications skills. On the demand side, interacting with what is on offer, firms' changing needs and organisational structures are viewed as challenges to those who possess software skills to be ever more creative and sources of new employment for those prepared to develop the skills. As demand for ICT (among households as well as firms) continues to grow, a further source of much new employment could also be found in the industries involved in installing physical infrastructure.

At the other extreme there are those like John Lippman (who writes for the *New York Herald Tribune*) who deride this sort of technological optimism as media hype. Lippman, quoted at length in the book, reports on the failure to take off of interactive cable TV in the Cerritos suburb of Los Angeles. He records that the interactive TV project 'generated a flood of attention over how residents would bank and shop at home, obtain city permits, hone up for college entrance exams, play games and access movies at the flick of a button. But after a prolonged opportunity to serve as guinea pigs for the TV of tomorrow, hardly any residents subscribe' (p65).

The authors agree that sceptics like Lippman are right to have their doubts - to some degree. But they believe that the transition to a new 'techno-economic paradigm' based on ICT is pretty much inevitable. And well they might, for although their analysis is by no means narrowly economic, they make the important point that it is the *time-saving* characteristic of ICT which is one of the major factors contributing to its pervasiveness. Given that 'time is money' and that time-saving has always been a principal goal of producers, economic factors related to cost-saving are bound to be important drivers of the transition.

In addition to the time-saving advantages of ICT, the authors draw attention to its capacity to enhance *flexibility* in both processing and the potential to customise products. Moreover, stunning falls in the *price* of ICT inputs make it too cheap to ignore.

The implications for employment are hard to pick partly because ICT is so pervasive in its

reach that analysis of its impact cannot be limited to isolated sectors while the nature and extent of its impact varies from sector to sector. Inevitably, ICT must at the first round substitute for labour inputs and it is no surprise that annual hours per person worked appear to be falling around the Western world - though Australia's experience in this respect is not reported. On the other hand, cost-cutting should also lead to price cutting and increased demand, while enhanced scope for customised products creates the potential for widespread new employment for those prepared to assemble the packages required to fill a myriad of specialised niches.

In the short to medium term, the authors worry that although the technologies associated with ICT have a vast range of current and potential applications, they do not yet match the skill profile, management organisation, industrial structure or institutional framework we have inherited from an earlier age of Fordist mass production. In what they see as a crisis of structural unemployment resulting from this mismatch, OECD countries have suffered additionally, they suggest, from the success of East and South Asian countries engaged in 'catch-up'.

While, as in pre-Keynesian prescriptions, one response to these pressures is to cut wages to raise employment, the authors see better prospects in changing the organisation of work and improving the ways the workforce acquires new skills. In connection with organising labour inputs, this review has already argued that the authors have taken insufficient notice of the sorts of re-thinking of the nature of work that Charles Handy, for example, has described. Such re-thinking, we would argue, is central to the 'active society' notion that Freeman and Soete espouse, but would also require them to use a more flexible definition of employment than they appear to have in mind in their analysis.

To get employment up again through ICT it is heavy investment in education and training that they recommend, along with infrastructural investment to support 'Information Highways and Byways'. They also want to foster a 'sheltered' second tier economy based on non-traded services, construction and environmental improvement. There is marked flavour of Keynesian style interventions here, though justified more in terms of resolving structural imbalances at the micro-level than with a view to creating new sources of aggregate demand. In fact, the rationale is more fundamental still in some ways - and the authors call on new jargon to make the point:

> Physical infrastructures and human settlement patterns provide a 'vertebrate' structure for any economy without which it would be difficult to sustain any ordered pattern of growth or confidence in future investment decisions. A purely invertebrate economy would be one in which it would be impossible to form any stable expectations. The problem for the transition from one techno-economic paradigm to another is ... one of reducing rigidity in some areas while introducing greater stability and a stronger regulatory framework in others ... With respect to employment, this could mean ... new 'rigidities' which make it workable for individuals to invest in education, training and the acquisition of new skills. (p122).

Engaging though the notion of 'vertebrate' structures might be (the idea is closely linked to institutions), it is not easy to identify the characteristics that the authors would consider most appropriate for ensuring full employment in a world built around ICT. Yes, there must be the prospect of long term employment to make people want to invest in themselves and make them employable in future. But does this imply that 'de-hiring' should be made more costly (a strategy which only discouraged private sector hiring in the first place in Australia), or that governments should offer life-time contracts to all their employees (with all the counter-incentive effects they bring with them)?

Much of the employment creating potential of ICT lies with the imagination and skills of

the individuals, or small group of individuals, offering flexible, customised service based on innovative software design. But not all ICT-related employment requires high-level software design skills: much of it calls for person-to-person skills in education, health, leisure activities and so on. These are areas of work which use ICT but will induce individuals to train for them for the same reasons as in the past - because people want to work with people and will pick up whatever skills they need in order to do so.

It is hard to see what sort of new 'rigidities' would unambiguously bring social gains in this context. As always, there are good arguments for publicly providing and/or financing general education at all levels, and that routinely encompasses the provision of IT skills these days. But more than ever before, individuals are going to have to structure their own work/employment/activity packages in future - and what is required is all the flexibility we can get to allow individuals to invest in the skills they need *and want* as the techno-economic environment evolves around them.

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Science Policy: New Mechanisms for Scientific Collaboration between East and West
edited by Valentin A. Koptyug and Jean Klerkx (Kluwer, Dordrecht, 1995), pp. xxxiii+256, US$ 145.00, ISBN 0-7923-3227-X

Six years after the collapse of the Soviet Union, the Russian Academy of Sciences and its numerous research institutes and centres are still experiencing traumatic times, facing such problems as finding research funds, lack of infrastructure, brain drain, legislation changes and establishing research priorities. In addition, the total turmoil and criminalisation of the Russian economy, the decline in living standards and political instability do not facilitate this transition period. On the other hand, after the years of separation and isolation during the Cold War, there are Western research institutions which are interested in cooperating with Russia and carrying out joint research. This book is a collection of papers from a workshop on finding ways for scientific collaboration between the Russian Academy of Sciences and the West organised by NATO (held in Novosibirsk, Russia in November 1993) and attended by scientists from 17 countries representing research institutes, universities and international organisations, such as NATO's scientific bodies, UNESCO and the Council of Europe.

For people who are interested in science policy (understood as policy for science rather than science for policy), the book reflects the language of the 1990s placing the discussions in the context of ecologically sustainable development and the Agenda 21, networking, and global problems. The openness about research programmes, locations, participants, funds and timeframes is an important aspect although some of the papers take this to the extent of apparent similarities with institutional annual reports and lack any analysis or policy implications.

As with most published conference proceedings, the materials from this workshop cover a variety of themes, approaches and writing styles. There is no other uniting concept than the willingness and initial attempts for cooperation in fundamental research expressed by the Russian scientists and their counterparts from the developed countries. The most common barriers for collaboration relate to finding research funds. The research areas range