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In the early period of telecom reform from the 1960s to 1980s, William Melody's commitment to change was clear. Some might speculate that his motivation for change was simply to destroy the monopolistic power of the incumbent firm, AT&T. But others would argue that Melody's principal preoccupation in mobilising forces for change is to achieve improved responsiveness of industry to what he takes to be the public interest in communication and information. The public interest in an efficient and affordable telecom infrastructure extends far beyond the interests of firms. For Melody, it always includes the interests of consumers, citizens and small businesses. In fact, Melody's commitment to change is motivated by his fundamental interest in, and commitment to, what happens *next*, after reform. What society-wide developments are likely to spring from renewed innovations in the voice and data services markets? Where will new concentrations of power congeal as we become increasingly dependent on digital technologies and information services?

Even during the hectic days of preparation for testimony before regulatory agencies and the courts in the most contested periods of telecom reform, not just in North America, but in many other regions, Melody has found time to write and lecture about the significance of information society developments. He has argued, for instance, that:

the functioning of society depends upon information and its effective communication among society's members. Information, and the means for its communication, have a fundamental and pervasive influence upon all institutions. The economic characteristics of information and communication systems affect the nature of the information that is generated and the conditions under which it is used and interpreted (Melody 1987b: 1313).

For Melody, investigation of the economic characteristics of information requires attention to both the supply and the demand sides of the market. The term economic has to be considered carefully here. Melody's definition of the

‘economic’ is drawn from Institutional Economics, a field of inquiry that embraces features of many other disciplines. For this reason, the distinctive uses and cultural and social variations in the interpretations of information are always of concern in his analysis.

There is no necessary law of progression from one stage of economic or social development to another. Melody’s consideration of questions about what next is always measured and open to the potential of alternative pathways. Since societies have always been information-based, the problem is to understand how new means of creating and distributing information might lead to new risks, uncertainties, and, potentially greater opportunities especially for the disadvantaged. These issues cannot be examined without understanding the underlying fissures and conflicts in the long-run accumulation of capital in society and in the application of new technologies. Except for resolving very specific and narrowly-defined economic problems within a market context, Melody gives short shrift to the neo-classical preoccupation with the concept of information conveyed by short-run price signals. In fact, he observes that,

In this market environment neoclassical price theory is somewhat akin to a set of decision rules for optimising the arrangement of the deck chairs on the *Titanic* ... The price signals tell us nothing about the speed and direction in which the economic ship is headed. Short-run prices are likely to be very misleading as guides to resource allocation (Melody 1985c: 534).

It is always much more important to consider the determinants of social change from the vantage point of the long-run. It is this perspective that informs Melody’s analysis of information society or knowledge economy developments. Thus:

The most significant application of the concept of information is with respect to the long-run accumulation and diffusion of knowledge in society. Its direct connection to the economic problem of the long-run accumulation of capital is through the concept of technology. If capital accumulation is stimulated by the application of new technologies, then the accumulation of information is at the heart of the capital accumulation process (Melody 1987b: 1318).

The analytical frameworks for answering questions about information society developments are most appropriately devised by constructing bridges between branches of economics and science and technology studies (and other fields of

research). The intellectual heritage for the former comes from Commons (1959), Hamilton (1919) and Veblen (1904) who studied institutional formations and their stabilities and instabilities. For the latter, it comes from Schumpeter (1943; 1961), Freeman (1982), Freeman and Soete (1997) and Nelson and Winter (1982) who laid the foundations for examining the importance of innovations in technologies and their implications for the economy. Melody states that, ‘although this line of research is not often associated with institutional economics, it is operating within the same theoretical framework’ (Melody 1987b: 1320-1).

Since digital technologies have become commonplace, discussions about the information society often centre on whether this new generation of technology is the main driver of change. The ‘technology push’ proponents have been challenged by the proponents of social shaping, but Melody has followed neither of these groups. Instead, he argues that ‘the assumption that technology is autonomous has characterised both the utopian and the critical literature on communications technology’ (Melody 1983: 2). He has been consistent in claiming that,

... if history has taught us anything, it is that new machines will not solve old economic and social problems. They may significantly change power relations in society in favour of those who control, and benefit from, the new machines. But there is no magic embodied in new technologies that will suddenly transform the nature of social and institutional relations in beneficial ways (Melody 1986b: 2).

Because of his commitment to institutional reform, he engages mainly in promoting collective action as a means of shaping technology rather than in the analysis of the reflexivity and the power of individuals.

Melody offers insights into the trends and possibilities of information societies based on his analysis of the predominant trajectories of technological innovation and the likely stabilising and destabilising factors in society. For Melody, institutions matter; therefore, the outcomes of developments in information societies are certain to be differentiated and varied. This is because ‘the characteristics of information define the state of knowledge that underlies all economic processes and decision-making structures’ (Melody 1986a: 3). The contributors to this section are all concerned with how information societies around the world are unfolding. They are intent on demonstrating how technological innovation, institutions and a variety of social, cultural and political practices are intertwined through time, giving rise to societies in which the power

of information – often highly unequally distributed – brings new risks and benefits to human endeavour.

Ian Miles follows Christopher Freeman's lead in developing a socio-technical approach for examining the implications of new information and communication technologies. Miles asks: in what sense should we think of the information society as a radical break from previous ways of organising society and the economy? He suggests that there are discernible phases of learning and organisational change that accompany rapid diffusion of advanced microelectronics-based technologies. He argues that there are signs that, as a result of organisational change, in the industrialised economies at least, firms are beginning to benefit from the new socio-technical paradigm. But Miles warns against generalisations. He argues that 'the' information society simply does not exist. Regions, countries, cultures and social groups are defining new and distinctive patterns of organisation. This view resonates with the networking knowledge theme that is central to Melody's work. Miles emphasises the role of learning in shaping information societies and highlights the uncertainties that accompany a world of interpenetrated global and local networks. He has advocated the need to monitor developments in technologies and society using combinations of formal and informal statistics. The next contribution by John Houghton illustrates how such empirical research can yield insights for policy makers.

Progress can be made in mapping and measuring information society developments by using national official statistics and data provided by organisations such as the OECD. Despite their limitations in accounting for the intangible value of information services, these data can support research that may signal the need for policy interventions at the national or regional levels. In his contribution, *John Houghton* takes up a hotly debated issue. All countries are facing difficult questions about whether they should be primarily 'users' of information and communication technology systems. Abramovitz (1986), and Perez and Soete (1988) suggest, for instance, that developing countries can leapfrog the experiences of the industrialised countries by applying the latest technologies. Questions about whether it is necessary to invest in producing and using new technologies in order to remain a player on the global stage occupy policy makers in the industrialised countries as well. Houghton demonstrates how liberalisation of the Australian telecom industry has been accompanied by increased trade deficits in information and communication technology products. Houghton wants Australia to become a leading user and producer of the new technologies. This is a difficult area for policy. Investment allocated to encouraging research and technology development in the hardware and software

(as well as content) industries may jeopardise investment in other important areas. Efforts to demonstrate causal links between investment in digital technologies and economic growth are controversial. Houghton shows how difficult it is to persuade policy makers of the need for action that may alter the pattern of information society developments at the national level.

In his contribution, *Knud Erik Skouby* comments on the way many policy makers have turned to information and communication technologies as a means of galvanising social and economic development in exactly the manner that Melody so often advises against. Rather than attempting to understand the distinctiveness of a new generation of technologies, policy makers often treat the new technologies as just another component of industrial policy. Skouby observes that all social communication depends upon and is shaped by technology, always within socially-and historically-specific contexts. Like Melody, Skouby insists on the use of empirical evidence within an interdisciplinary framework to interpret social, economic and technical trends. He gives highest priority to scrutinising interactions between supply and demand in order to assess the benefits and risks of industrial restructuring that accompanies the diffusion of new systems and services. Skouby's emphasis on the social context is informed by another strand of social science research on the changes associated with ICTs. For instance, Slack and Williams (2000) and MacKenzie and Wajcman (1999) are sensitive to the social processes that shape and embed advanced technologies within society.

Roderick Sanatan worked at the heart of the telecom reform process in the Caribbean region. He is closely involved in the development of training programmes that aim to build up the skills base to take advantage of the potential of ICTs (Sanatan and Melody 1997). He shows why it is important to develop sectoral policies for telecom and broadcasting reform if the aim is to ensure that new technologies support economic and social development goals. The distinctive characteristics of information societies are partly a result of how technologies are absorbed. This depends on the way institutions influence the absorption of the new by the old. Sanatan also suggests that de-linking labour policy issues from telecom market reform is not viable in small, low income states. Like Melody, Sanatan wants equitable reform that will sustain the growth of economies in the region. Systems of innovation (Lundvall 1992; Nelson 1993) are comprised of institutions – norms and practices – that can be destabilised by technological and other socio-economic developments. Sanatan shows how difficult capacity building can be for smaller, low-income countries where financial and human resources in the education sector are scarce. Overall, he calls for better coordination of the whole system of innovation.

Institutions are in the spotlight in *Oscar Gandy's* contribution. Institutions establish the system of property rights necessary to create markets for information. Melody has always argued that it is essential to distinguish between information as a resource and as a product (Melody 1981a; 1987b). Like another Canadian institutionalist, C. B. MacPherson (1978), Melody distinguishes between the role of information as part of the information commons and its role in the marketplace. Gandy takes up this distinction to show how institutions of property ownership can reproduce structural inequalities within the social system (see also Agre and Rotenberg 1997; Mansell and Steinmueller 2000). When facing market incentives to more precisely target products to consumers, firms seek to capture and process information about individuals in greater depth (Samarajiva 1996). Melody (1986a: 7) argued that 'significant changes in information and communication networks require a reinterpretation of traditional notions of public and private information and the terms and conditions for access to it'. Gandy shows that marketing techniques can be used to pinpoint particular types of consumers in order to exclude them on the basis of race, gender and/or age. The consequences of market exclusion may be an 'enhanced sense of difference' that polarises people along class or ideological lines. The dominant trends in the organisation of markets for information also have the potential to negatively affect citizens' capacities for participating in the democratic processes.

Gandy's emphasis on the implications of the commodification of information is complemented by *Peter Anderson's* contribution which turns to the problem of managing critical information resources for safety and security. Technical change and the convergence of networks are leading to increased risk, new vulnerabilities to physical hazards, and cybercrimes. Anderson emphasises that these are not simply technical issues. Instead, the greatest hurdles are organisational. They include the need for world-wide coordination among large numbers of actors. The hurdles are also political in that there are strong national sensitivities about sharing various types of information. In addition, efforts to reduce the risks entailed in managing the critical information infrastructure have an economic dimension. Protection comes at a cost that must be borne by someone. Anderson's approach to these issues is informed by his detailed understanding of the technical capabilities of networking. He argues that these capabilities increase the complexity of networks, making policy formulation and implementation much more difficult.

In his contribution, *Peter Shields* addresses the problem of unintended consequences of institutionalised action. He demonstrates the dangers of policies informed by technology deterministic approaches. In the United States (and

elsewhere), law enforcement agencies often take the position that the Internet and encryption technologies are eroding their abilities to intercept and monitor electronic communication. They argue that they are losing control. This is a theme that recurs in many studies of technological change (see Beniger 1986; 1996) and it resonates with Melody's (1973b) concern that a technology-determined understanding of policy issues only narrows the scope for action. Shields shows that measures to cope with the perceived risks and problems of surveillance lead to further technological measures. These, in turn, produce further escalation. The resultant process can stifle the concerns of civil rights groups about individuals' rights to privacy.

Risk is a central issue for Gandy, Anderson and Shields. *B. P. Sanjay* considers the risks to developing economies of an 'ICT fetish'. This occurs when policy makers come to see investment in the new technologies as a panacea for development problems. His assessment of the opportunities and risks of joining the global knowledge society through major investment reflects Melody's (1985c: 526, 536) observation that,

... taken collectively, these changes introduce new elements of risk ... they also provide new opportunities to shift these risks away from TNC investors and managers to the particular localities where production occurs, and the institutions that reside there, that is, local government, labor, and consumers ... It would appear that Third World nations will bear the brunt of the risk and instability associated with the exploitation of information industry technologies and markets.

Some may want to argue that times have changed. After all, the Internet enables many more people – in India and other developing countries – to access global stocks of knowledge and to produce and export information services, including software. But Sanjay shows that little consideration is being given to tailoring the new applications to the needs of the majority of citizens in India. Even when access to global networks is established, the property rights regime threatens to weaken access to scientific and technical information in key fields and even to erode the perceived value of local knowledge. Like Rappert and Webster (1997), Sanjay highlights the problems that can arise as a result of the commercialisation of scientific data. In this case, investment in the telecom infrastructure cannot serve, in a straightforward way, as a catalyst for development (Melody 1993a). Many other measures are needed.

The World Trade Organization plays a significant role in governing international trade in information and communication technologies. As a global institutional

actor, it significantly influences investment in the Asian region. *Meheroo Jussawalla* contrasts the potential of the new technologies to enhance global information flows with the risk of expanding digital divides. Taking China as an exemplar, she shows that national institutions still are able to influence investment strategies. Just as Melody (1999a) argues that diversity in social and economic conditions means that there will be diversity in the institutions of regulation and market liberalisation, Jussawalla shows that China – and other countries in the region – are seeking to manage their participation in the ‘new economy’ in distinctive ways. Advances in the information infrastructure in these countries tend to aggravate political concerns about threats to sovereign decision-making. Despite a growing view that nations can no longer enforce distinctive policies in the face of globalisation, Jussawalla identifies an emergent and distinctive policy regime in China.

Gandy’s emphasis on the implications of the design and implementation of technologies for citizens and consumers is complemented by *Supriya Singh’s* contribution. She emphasises the importance of demand – not just supply – for the future of information societies. Melody’s work is motivated by a conviction that advocacy is necessary to create spaces for ordinary people to experiment with the potential of new technologies. Informed demand is the key and people are not informed if all they can do is respond to the diktats of the marketers. As long ago as 1972, Melody was stressing that policy makers should focus on the way applications of new computer and telecom systems might become more responsive to people’s needs (Melody 1972). Singh argues that if policy neglects citizen and consumer needs, there is a risk of a mismatch between the design of technologies and the social processes that underpin society. Attention to all aspects of technology development processes and use is essential for strategic information policy advocacy. Like Dervin and Shields (1990) and Silverstone (1995) in the media and communication field, and von Hippel (1978) and Rothwell (1994) in the science and technology policy field, she suggests that technology users both accommodate and, at times, resist innovations spawned in laboratories.

Jörg Becker’s summary theses on the informatisation process set out the contradictory implications of these technologies when they become embedded in the social order (see also Becker 1983; 1984; 1994). His concern, like Melody’s, is to detect and expose changes in the balance of economic power and dominance on a global scale. Those who have been marginalised in the past, stand to lose to an even greater extent from the current round of informatisation. This is because the resources available to producers and consumers in poorer, peripheral countries and regions do not match those in the wealthier countries. Becker insists on the

need for open debate and critical discussion. Social scientists, he suggests, have failed in this regard. He looks to others to identify winners and losers in the emerging information society, and to propose what can be done to balance the scale.

The contributions in this section offer insights into the effects of attempts to monopolise knowledge. Whether these efforts stem from the desire to profit from information, to control critical information flows, to seek protection from crime and to protect sovereignty or scientific and technical expertise, or from assuming that the ‘user’ cannot comprehend technical design, there are consequences for citizens and other stakeholders. This critical assessment of consequences is the essence of Melody’s (1973b) conception of the public interest in the information societies of the future. It provides the foundation for his advocacy of greater equity in the distribution of the potential benefits of the new technologies. These contributions are illustrative of social science inquiry that contributes to social problem-solving.