DESIGNING THE FUTURE: AN INTRODUCTION TO THE TELIDON IMPACT ASSESSMENT

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I. Introduction

The development of informatics products and services is a formidable technological challenge. It is also a challenge to 'people' technology - the web of social, cultural and economic arrangements which shape the lives of individuals, groups and nations. Some of these challenges are well understood. The impact of informatics on education and training, employment, economic growth, individual privacy and public life has been the subject of much speculation and analysis. The aim of the Telidon impact assessment is to examine the challenge of informatics technologies at a more concrete level - at the point of interaction between government agencies seeking to promote the development of informatics, industries interested in supplying new equipment and services, and their potential customers - in order to recommend a set of principles to govern program design.

The Telidon program, which ran from 1978 until 1985, was the largest effort ever made by the Department of Communications to support the development and application of informatics technology. In total, some $65M was spent by the DOC and other government departments during this period on a wide range of activities which included: technological and behavioural research; standards, content and product development; industry and marketing support; and raising awareness both of the potential socio-economic impact of informatics, as well as the promise of Telidon technology.

At the outset of the Telidon program, a time when talk of the 'Information Revolution', 'Post-Industrial Society', the 'Third Wave' and the 'Fifth Generation' was sweeping the world, both the general public and Canadian political leaders could have been excused for believing that Telidon was at once Canada's best and perhaps only hope for finding a place of pride in the world of tomorrow. By the end of the program, all concerned had acquired a much more sober appreciation of the opportunities and obstacles facing those involved with informatics technology.

The range and scale of the Telidon program - the sheer variety of objectives which were attempted and the ways in which they were pursued - make it an ideal case study for future informatics programs. If properly discerned and applied, the lessons drawn from the Telidon program may help us one day reach the future which shone so brightly and clearly before those who conceived, designed and executed Canada's first bold step toward the information society.

II. Major Themes

Two main themes stand out in the assessment of the Telidon experience. One is conventional, the other less so:

- The Telidon experience confirms what is often said about informatics - that understanding people's needs is critically important to the successful development of technology, and that content is more important than hardware. There is little need to dwell on these points, since they have bedevilled the developers of almost every new telecommunications technology in the last one hundred years. All past experience seems to indicate that applications of new technologies do not spring fully formed from their inventors' heads, but that they emerge over time through a process of social adaptation and discovery.

- The more pertinent question in an increasingly competitive world is over how much time and through what process this adaptation takes place. The main lesson which emerges from our analysis of the Telidon experience is that the approaches which were used to program design were unable to cope with the rapid rate at which informatics technology provided opportunities for product and service innovation. Since these arrangements, by and large, were modelled on techniques that had worked very well with previous generations of technology - communications satellites, for example - and since informatics technology continues to evolve at an undiminished rate, the apparent inadequacy of traditional approaches strongly suggests the need to invent new mechanisms to support the development, application and diffusion of computer communications technology. Indeed, this is perhaps the principal challenge posed to people technology by computer communications; its significance may well overshadow more commonly discussed issues such as education and retraining.

The validity of this proposition is obviously tied to traits particular to the Canadian situation, while its applicability to other countries depends upon the extent to which these patterns are replicated elsewhere. Some salient considerations are the following:

- The scale of much of Canadian industry, the nature of our financial institutions and a number of other factors have contributed to a business culture that makes it difficult for Canadian companies to act in anything but their relatively short term self interest. This is recognized as a problem in the economic context of the late twentieth century, and in recent years a good deal of attention has been paid to this issue. For example, there has been a wave of literature examining Japanese management practices, in the search for principles and business practices that could orient western firms towards longer term social goals, not just the bottom line.

- Canada's political and public service institutions have produced a culture in which it has been easier to launch large and relatively expensive programs than small and inexpensive ones. Somewhat paradoxically, this may continue to be the case, even during a period of fiscal restraint. In part, this reflects the inevitable desire of politicians to take on and solve, in highly visible ways, the major problems facing their constituents. In part, it reflects the fact that the bureaucratic machinery put in place to deliver programs and to

ensure that public monies are well and correctly spent, tends to be large rather than lean, relatively slow to get started and slow to change. This latter tendency is reinforced by the fact that while, as in all areas of human life, there is a natural reluctance for governments to admit error, the discipline of the political arena is rarely as severe or sudden a master as the discipline of the marketplace.

There should be nothing particularly remarkable or surprising about the observation that, in Canada as in other western societies, there is a gulf and to some degree a clash between the culture of government and the culture of business. Indeed, if we look closely enough beneath the ideological trappings of other systems, it is probably universally the case. The need to do business and the need to govern the conduct of others appear to be irreducible elements of the human spirit. The problem is not to merge one into the other, but to build bridges between them.

In order to address the question of what bridges are most appropriate to supporting the development of new computer communication services, it is useful to draw a distinction between technologies and socio-economic activities which have the characteristics of infrastructure and those which are more ephemeral in nature:

- By infrastructure is meant those technologies, industries and activities which persist in time and which underlie other social and economic activities. Transportation, communications, banking and education are obvious examples. In many countries, most if not all elements of infrastructure are provided by the state. In countries such as Canada where transportation, communication and banking services are, to a very significant degree, provided by the private sector, they are done so under close government scrutiny, supervision and regulation, even where a considerable degree of competition exists. In addition, the industries which supply the equipment required to provide these services, particularly in the telecommunications field, are often given privileged status by governments, through the form of non-tariff barriers, 'chosen instrument' policies, special consideration in government purchasing and other measures designed to insulate them, to some degree, from the realities of the marketplace. In return for these favours, companies which supply infrastructural equipment or services are explicitly or implicitly expected to behave not only in terms of their narrow, short term commercial interest, but also with a view to the welfare of the society whose activities they support.

- By ephemera is meant those technologies, industries and activities that come and go or otherwise move with the tides, trends and fashions that mark the surface of any society. Much of this activity happens largely independently of government action, as long as it does not threaten the general legal order or the values upon which that society rests. To the extent that government attempts to encourage ephemera, it generally does so by handing out money to suppliers, through the tax system, or in direct grants and subsidies. In order to achieve their

objectives, these instruments only seem to function effectively in cases where there is well established market for the product or service being supported. In Canada, at any rate, they have proven themselves very ineffective supporters of innovation.

Over time, of course, the picture is not static. Technologies, industries and activities can change status. Some elements of infrastructure fall into the realm of the ephemeral - sailing ships, certain established religions, passenger rail service and the post office all seem to have followed this route. On the other hand, fashions sometimes take root and grow to become elements of social infrastructure. The automobile, sexual equality and informatics arguably fall in this latter category. This second process appears to be the result of a two stage process:

- Over time, it is the result of fitting form to content, of adjusting new technologies and existing social relationships to newly expressed human needs.

- More concretely, it results from the invention of the appropriate machinery for fitting form to content, with the largest social and economic prizes generally going to the countries that first make this discovery. The success of Theodore Vail in turning the telephone from a toy for the rich or an adjunct to postal and telegraph service into a universally available and affordable tool of mass communication, which was accomplished by inventing a social mechanism - regulated monopoly, subsidized rates for residential subscribers and system wide pricing - is a perfect example of this process.

On the basis of these distinctions and with the benefit of hindsight, the central difficulty faced by the Canadian government in the Telidon program was the mismatch between the available tools to support the development of the technology and the nature of the technology. The sponsors of the program certainly saw informatics systems and services of the kind Telidon represented as a new element of social infrastructure. Indeed, the program was ultimately inspired by the loftiest of ideals: in a historical era when information is increasingly recognized as an important source of economic and social power, their objective was nothing less than to ensure universal access to information, and to eliminate the gap between the information rich and the information poor. One day, this vision may materialize. But it is now clear that Telidon and its competitors, during the period of the program and possibly well into the future, are highly ephemeral technologies, subject to constant change and competitive pressures.

The essential story of the Telidon program was its effort to come to grips with this unprecedented situation. It sought to do this in a variety of ways, initially by applying the instruments made available by previous experience. However, it found itself caught in a vicious circle. The ephemeral nature of the technology tended to neutralize mechanisms which had previously proved quite effective in supporting the development of infrastructure. At the same time, available means of supporting ephemera were relatively ineffective in supporting the development of a technology whose possible uses were only just beginning to

be explored, and for which no clearly identified market yet existed. Faced with this situation, attempts were made within the program to evolve new mechanisms of cooperation between government, business and potential users of the technology. Although these provided very valuable lessons for future attempts to develop informatics systems and services, they remained something of a subplot in the program, which was locked in by various bureaucratic rigidities that limited its adaptive capacity.

The Telidon program involved three major industry support activities:

- Quite naturally, the program looked first to the established providers of telecommunications services to be the vehicle for developing Telidon services and equipment. Although all the major telephone companies in Canada sponsored Telidon field trials during the first phase of the program in order to familiarize themselves with the technology and get some sense of the market for videotex services, only one went on to provide an operational service. Looked at in retrospect, their decision not to champion the development of Telidon services was perhaps predictable. The initial applications of new technologies usually occur when they are substituted for existing technologies providing closely related services, or where they tap a market that is not being served by established institutions. With the benefit of hindsight, it seems obvious that videotex did not substitute in any very evident way for existing telecommunications services. It was suited to communication in images, not words and numbers. Interestingly, the Telidon experience also showed that the broadcasting and cable television industries, which are accustomed to communicating in images, were almost equally unable to effectively utilize the new technology, fundamentally perhaps because they were not structured to function as interactive distributors of information products. Instead of being developed by any of the established telecommunications media, the market for Telidon developed most rapidly in areas where it provided an effective substitute for activities falling outside the bounds of traditional telecommunications, or where it filled a communications need that had gone unsatisfied under existing arrangements. Contrary to initial expectations, the market for videotex services and products, in North America at any rate, has developed most quickly in closed user groups and special purpose applications, rather than on publicly accessible networks, or, in the case of the Manitoba Telephone System's Grassroots service to farmers, where an effective communications infrastructure was largely lacking.

- Following the pattern set over the previous decade in the highly successful Canadian satellite communications program, a second program activity concentrated on developing an industrial capability in Canada to manufacture Telidon products under the leadership of a 'chosen instrument'. However, whereas the carefully planned and orderly process under which the space industry unfolded made it possible for Canadian governments, over the period of a decade or more, to nurture Spar Aerospace to the point where it could function as the prime contractor for Canadian communication satellites, the ephemeral,

chaotic development of informatics in the early to mid 1980s made it impossible to replicate the feat with Telidon. A mass market for standalone decoders, the original target of the Telidon industrial strategy, appears unlikely ever to materialize. It now appears that the market for standalone videotex equipment will be restricted to a variety of closed user or special purpose public access applications, while the mass market will continue to be occupied by personal computer software decoders and teletext decoder chips built into television sets. As the prospects for a chosen hardware instrument faded, attention shifted to the possibility of developing a chosen instrument system supplier - a videotex equivalent of a telecommunications or satellite services provider. This possibility also faded before the reality of a competitive, quickly evolving and somewhat chaotic field.

- When the basis of a Telidon industry began to emerge in the early 1980s, including hardware, software, content and systems suppliers, the program called into play a third set of activities modeled on existing industry support programs - essentially, grants of money given to applicants who qualified according to established program criteria. The great majority of companies that received grants to purchase hardware or develop content are still in business, and doing at least moderately well in their chosen fields, even though their performance has fallen somewhat short of original expectations. However, a detailed examination of case histories reveals that these results were more often achieved in spite of the program mechanisms put in place than because of them. It is to the credit of the program staff that they were able to make creative use of the ephemeral mechanisms they had at their disposal.

III. Lessons for the Future

Three main lessons can be drawn from the Telidon experience about the kinds of mechanisms which are most appropriate for bridging the gap between government and the private sector in developing informatics systems and services:

- The first is not to make any assumptions about the final destination of ephemeral technologies. As is suggested above, there is ample historical evidence which can be drawn from many countries, not just from Canada's Telidon experience, indicating that the absorption of new technologies requires a considerable degree of social adaptation and learning. Mechanisms designed to stimulate this process must above all else stimulate it. Learning is best accomplished in individual lives, in societies and in programs in a series of stages, with the results of one experiment feeding forward into the next until the desired level of knowledge or understanding is reached. Mechanisms aimed at accelerating the process should therefore be iterative and experimental in design, incorporating explicit hypotheses which should be assessed in terms of program results. It flies against our experience, as individuals or as social beings, to believe in one-shot approaches to technological innovation.

- As a corollary to this, the sponsorship of specific products, be they hardware, software or systems, appears to be an inappropriate focus of support programs for informatics systems and services. Because of the ephemeral nature of innovative technologies, products are likely to be highly unstable and any attempt to stabilize them through program intervention appears unlikely to succeed. Instead, program emphasis should be placed on conceptual transfer - transfering an understanding of the capabilities of innovative technologies to the private sector - on supporting the efforts of suppliers and users to find uses for new technologies, and on evaluating and disseminating the results. The more intensive the learning process created by these mechanisms, the more quickly the process of social adaptation will occur.

- Finally, while established players should obviously not be ruled out as partners in social and technological innovation, they should not be viewed as the only or necessarily the best collaborators. The Telidon experience demonstrated that established telecommunications institutions pursuing their traditional lines of business may not be very effective in promoting the development of new technologies, even when they are harnassed to considerable government will through outright ownership, or through more subtle forms of government supervision. On the evidence, it appears that they can only be effective when pursuing a distinctly different line of business which incorporates a healthy measure of concern for long term social benefits. If these conditions are not met, the Telidon experience seems to indicate that program designers may be better off looking beyond their traditional clientele to new businesses, to established organizations moving into computer communications from related technological bases, or to elements of society whose communication needs are underserved.