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TELIDON

AND THE

STANDARD- SETTING PROCESS

Background Study

Etude de base

PROGRAM EVALUATION · DIVISION DE L'EVALUATION DES PROGRAMMES

TELIDON
AND THE
STANDARD- SETTING PROCESS

MARCH 25, 1985

DOC

PROGRAM EVALUATION SERIES

This is one of five Background Studies on the Canadian Videotex industry that form part of the evaluation of the Telidon Program.

The Study was conducted by Teega Research Associates Inc. for the Program Evaluation Division of the Department of Communications, Canada.

The views expressed herein are those of the author and do not necessarily represent the views or policies of the Department of Communications.

TELIDON AND THE STANDARD-SETTING PROCESS

BACKGROUND STUDY #2
FOR AN EVALUATION OF TELIDON

Submitted to
Program Evaluation Branch
Department of Communications

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CHAPTER ONE

INTRODUCTION

This study is the second of a series of five background studies toward an evaluation of the Telidon Program. TEEGA Research Consultants Inc. was retained by the Program Evaluation Branch of the Department of Communications (DOC) to carry out this study. The other four studies, carried out by other consulting firms, focus on the following Telidon Program aspects: research and development, marketing, benefits to users, and industry viability.

1.1 FOCUS OF THIS STUDY

The aims of this study are to describe the international videotex standard-setting process, to review the history of the development of Canadian and international videotex standards, and to evaluate Canada's intervention strategy for gaining acceptance of Telidon as a national and international standard.

The report is structured in five chapters. The rest of Chapter One provides a general background on the Telidon Program and outlines the process leading to the preparation of this report. Chapter Two reviews the standard-setting process in general and describes the procedures of relevant standardization organizations. Chapter Three contains a history of the development of the international videotex standards, and a

description of the DOC intervention strategy for gaining acceptance of Telidon as a national and international standard. Chapter Four provides an evaluation of Canada's intervention strategy. The report finishes with a Concluding Comments chapter highlighting the findings.

1.2 THE TELIDON PROGRAM

The Telidon Program evolved from what was essentially a laboratory project at the Canadian Communications Research Centre (CRC). Out of the applied research undertaken at CRC, Telidon emerged as a Canadian videotex system rivaling the existing British Prestel and French Antiope systems. The Telidon videotex system was first announced by the Department of Communications in August 1978, and was quickly recognized in Canada as superior to its foreign counterparts.

Faced with the exciting potential of this Canadian invention, the Department of Communications introduced the Telidon Program, as a cooperative initiative between the Federal Government and industry. Initial funding of $9.5 million for the program was approved by Treasury Board Secretariat on March 29, 1979. The stated objective of the program at that time was to develop a range of Telidon based products and services and to ensure proliferation of Telidon in the national and international markets. In 1979, the Department began to

transfer available laboratory-level Telidon technology to industry for commercial development. The initial funding for the program was subsequently augmented by about $30 million in successive decisions by the Federal Cabinet in 1979, 1980, and 1981. The scope of the program was broadened to provide government support for setting-up the necessary infrastructure capable of sustaining a commercially viable videotex industry in Canada.

As first conceived, the program was a four year "sunset" project to be terminated at the end of fiscal year 1982-1983. It was originally intended that upon program completion, continuing DOC research efforts would provide some R&D support to industry. Although the program was to terminate as of March 31, 1983, new factors indicated that continued government support was necessary, particularly in the areas of applications development, marketing, and government exploitation of the Telidon technology. The factors leading to this second phase of the Telidon Program were discussed in a DOC submission to Cabinet, dated July 17, 1982. This document proposed a new Telidon exploitation initiative "to continue government support of and cooperation with industry and to enable the government itself to benefit directly from the use of Telidon technology." This new phase of the Telidon Program was approved by Cabinet, with a funding of $23 million over the two fiscal years ending on March 31, 1985.

The strategy developed by DOC, to pursue the Telidon Program objectives during the years since 1979, involved the following:

- subsidization of a series of field trials - the main means of subsidization being loans of terminals to field trial operators for the duration of the trials;

- encouragement of a broad spectrum of R&D activity in the private sector, by contract to DOC and internally at CRC - to develop hardware and software components of the Telidon system, and to assist industry to remain at the forefront of the development and application of this technology;

- promoting the acceptance of Telidon technology, in national and international standards forums, on at least an equal basis with competing systems;

- use of Telidon in government, to provide the vital support to Canadian industry which results from government procurements of equipment and services and to act, by example, as an incentive to other organizations potentially interested in Telidon-based services; and

- support for public interest initiatives to permit non-business and disadvantaged groups lacking

financial resources to exploit Telidon potential as a communications medium.(1)

In addition, early in the Telidon Program, a Canadian Videotex Consultative Committee (CVCC) was formed. This committee was funded by DOC and comprised of some eighty senior industry and government representatives. The principal purpose of this committee was to advise the Department of Communications and the Telidon industry in general on the introduction of videotex services in Canada. To assist it with its activities, the CVCC established sub-committees in the following areas: industry and marketing, standards, education, legal aspects, and social impacts.

Promoting Telidon as a national, North American and international videotex standard was a cornerstone of the strategy developed by DOC, to achieve the Telidon Program objectives. The Telidon standard-setting process followed by DOC is the subject of this study. The strategy developed by DOC to have Telidon accepted as a national and international standard will be discussed in greater detail in Chapter Three.

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(1) For a more detailed profile of the Telidon Program and its strategy, see Evaluation Assessment Study of the Telidon Program, prepared by TEEGA Research Consultants Inc. for Program Evaluation Branch, Department of Communications, Ottawa, September 6, 1983.

1.3 EVALUATION PROCESS OF THIS STUDY

The process leading to the preparation of this evaluation report involved a series of intensive interviews with Canadian and United States experts who were directly involved in the videotex standard-setting process, and with other individuals who were, or are currently, involved in the videotex industry. These interviews were conducted in person and over the telephone. Specifically, those who were interviewed are as follows:

- DOC officials who were involved in the standard-setting process for videotex;
- certain representatives from the private and public sectors who were/are members on the relevant standards committees of the Canadian Standards Association, in Canada, and the American National Standards Institute, in the United States;
- other individuals in the videotex industry;
- certain of the individuals who were members on the videotex standard sub-committee of CVCC;
- Telidon Program officials; and
- AT&T officials.

A list of names of persons interviewed is contained in Annex A of this report.

The personal and telephone interviews were particularly focused on obtaining, from the individual interviewees, interpretative information on key Telidon Program intervention questions such as:

> What was the overall strategy for the standard-setting process?
>
> Who were the main actors involved in the process, nationally and internationally?

Were DOC interventions appropriate?

Were interventions timely?

How important were standard-setting activities to the program as a whole?

Since the individuals interviewed had different roles regarding the Telidon standard-setting process, the focus of each interview was tailored depending on the particular interviewee's role, but within the general framework established by the above five questions. The results of the interviews are incorporated into the relevant sections of this report.

In addition to the interviews with experts, a review of the Canadian and international literature on videotex and the standard-setting process was carried out. This literature is extensive (see references used for this study in Annex C). The findings of the literature review are also incorporated in the different sections of this report.

Finally, many documents including correspondence, internal DOC memoranda, discussion papers, minutes of meetings, DOC submissions to Treasury Board Secretariat, reports on international negotiations, etc., were studied to extract relevant information for this study. Some of these documents are listed in the bibliography (Annex C).

CHAPTER TWO

THE STANDARD-SETTING ENVIRONMENT

As a prelude to discussing and evaluating DOC's Telidon standard-setting intervention strategy, this chapter provides a general appreciation of the Canadian and international standard-setting environment. The approaches and decisions taken by DOC, along the route toward the international acceptance of Telidon as a videotex standard, can only be fully understood in the context of a good appreciation of the standard-setting environment.

2.1 THE IMPORTANCE OF STANDARDS

International standards are extremely important, particulary in high technology areas such as videotex/teletext. Differing national technical requirements could become significant barriers in international marketing because they may cause companies to produce expensive variants of a product. International standards help resolve such technical barriers to marketing. The early history (pre-1981) of videotex/teletext is a good example of the competitive melee (in this case Europe vs. North America) which could result from the introduction of new technologies which have not been fully standardized at the international level.

But even when the standards are adopted, this does not ensure removal of technical barriers to trade. As will be discussed

later in this report, the battle fought over the videotex standards in the international standardization forums was actually permeated with overtones fostering trade barriers, to protect the interests of countries in their respective systems. The outcome for international videotex standardization is a "three-in-one" standard,(1) which while reducing obstacles to marketing of videotex systems within regions, has not reduced barriers between regions, particularly between North America and Europe.

When countries come to an agreement on a standard for a particular product, this simplifies production, broadens the market for each country and makes the product produced by one country interchangeable with the product produced by another country. In addition, where a set of products make up the overall system, for example as in videotex, a single international standard would mean making it possible for products of different countries to be interconnectible. Interchangeability and interconnectibility mean significant economies resulting for the producers, which could be carried over to the consumers. However, for new inventions

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(1) In fact, the standard is even more than three-in-one, since the European segment of the standard is made up of several levels, each a self-contained standard in its own right. The history of videotex standardization and the resultant international standard will be discussed in detail in Chapter Three.

which have not been standardized and for which there are competing versions in different countries, the international standardization process could become a battleground to determine which version will dominate as the accepted standard. Depending on the product(s), the benefits reaped by the victor could be measured in very large balance-of-trade gains. In such a contest, the importance of standards takes on shades of nationalism, and the interests of the local industry become paramount in determining a country's position in the international standards forums.

The ratification of standards by international standardization forums is usually intended to give users and producers the assurance that products will be interchangeable and interconnectible, and that they will not quickly be made obsolete. (This is particularly true in the information technology industry.) Standards provide the stability required for an industry to go all out in the production and marketing of its products. If the standards are international, production and marketing can transcend international borders.

Establishing standards, particularly in the international arena, is not without problems. The use of national or regional specifications for trade protectionism, as was mentioned above, is one of these problems. Another problem is that international (and national) standards

could be too restrictive, hindering creativity in a changing industry. Certainly, a computer engineer, in the information technology industry of today, would be justified in loathing a standard if it froze a computer component which could be improved on, for example through new, "non-standard" inventions of sub-components.

Another problem with establishing standards could arise when products, developed before the adoption of the standards, prove too difficult or too expensive to adapt for compliance. Standards could also be developed before an industry has matured, thereby imposing unwarranted restrictions on producers. These and other problems could be good reasons why producers may choose not to comply with standards.

Furthermore, the standardization process itself has its own problems. The costs of developing standards, for example, could be extremely high, particularly if there are competing technologies each of which end up supporting their approach with trial applications (as was the case with videotex). The real cost of developing a standard could thus quickly rise into the millions of dollars.

A further problem with the standard-setting process itself is the amount of time required to finally adopt a standard. Most standardization organizations have established procedures

(discussed below in Section 2.4), which progress slowly because they require peer review and public comment, and contain many checks and balances to prevent abuse of the process. Lengthy delays, while justified in the interest of developing a good standard, could prove costly to an industry poised for growth but arrested in anticipation of the standard.

Notwithstanding the problems associated with standards and the standardization process, the consensus across the world is that the general benefits to consumers and producers, of establishing standards, far outweigh any disadvantages. Thus standards organizations exist across the globe for nearly every major field of human endeavour.

2.2 HOW STANDARDS ARISE

In the information technology field, as in other fields, a standard usually emerges through a rigourous peer-review process. This process is lengthy and requires compromises on the part of many parties directly or materially affected by the proposed standard. Accredited standards organizations or governments set up committees to review or prepare proposed standards. By the time a particular version of a standard is approved, many changes in wording to effect a compromise, and additions and deletions, are likely to have been made. Essential to this process is widespread representation on the

designated committees, to include all interested parties. The objective is the development of a standard which represents a consensus of all parties involved in the process. Compromise and consensus are often very difficult to achieve, because among the representative parties involved in the process may be the inventors of incompatible products performing the same functions.

Some standards in the information technology industry are de facto. This happens when an original invention is imitated by most everyone in the industry and has achieved wide commercial distribution, but with no formal ratification by a standards organization. Examples of de facto standards are Microsoft Basic, Digital Research's CP/M-80 operating system, and the IBM 3740 disk format.

Technical merit is not always the guiding principle for whether one of several competing technological systems becomes the accepted standard. This could happen when a company develops a technological system and presents it to the world expecting everyone to follow suit. The size of the company, its political and financial clout, and its control of the marketplace assure its success in establishing the standard of its choice. Companies such as AT&T and IBM are in this

category -- but these companies will usually also have done their technical homework before announcing their choice for a standard. Thus, their choice may well be, but not necessarily, technically the best.

Standards often emerge at the national level and then move to the international level. The standard-setting process at the international level is filled with complexities, particularly when competing national technologies are at stake. Linkages to other issues between countries and political differences could contaminate the process. International standards organizations are intended to provide the framework for developing and negotiating international standards which represent consensus or compromise positions. The international organizations provide the opportunity for countries to "fight-out" their differences. Formally, the battles are fought on technical grounds, but back room negotiations also take place. These negotiations are not part of the formal procedures and thus could include non-technical issues.

The development of a standard, especially at the international level, typically takes many years -- eight years is not uncommon in both the International Organization for Standards (ISO) and the International Telegraph and Telephone Consultative Committee (CCITT). During this time, many

applications of systems and de facto standards could emerge. By the time a formal agreement on a standard has been reached by an international organization, participating countries could have invested so heavily in their own systems that they are unwilling to compromise -- and the standard becomes a ratification of a number of alternatives. A classical example of this is the "three-in-one" international videotex standard to be discussed in the following chapters.

2.3 EVALUATION OF STANDARDS

The technical criteria for evaluating the effectiveness of a standard will differ, depending on the standard at issue. In general, however, the following criteria are used to evaluate the effectiveness of a standard: (a) the degree to which it meets the needs for which it was designed; (b) the ease with which it can be applied; (c) the precision and clarity of its instructions; (d) its acceptability to the user; and (e) the extent to which the same results occur when the standard is applied by different people in different countries and situations.(1)

All of these criteria are usually considered during the standard-setting process. For example, these criteria were

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(1) Claire Guinchat and Michel Menou, General Introduction to the Techniques of Information and Documentation Work, Unesco, Paris, 1983, p. 286.

certainly important in the deliberations about the establishment of the "three-in-one" international videotex standard. However, the resultant videotex standard violates criterion (e), because of the competing national videotex systems. This situation will be discussed further in Chapter Three of this report. This report, however, is not intended to evaluate the videotex standards themselves, but rather to describe the standard-setting process and to evaluate DOC's strategy for gaining acceptance of Telidon as an international standard. Telidon as a standard has already been successfully evaluated against the criteria mentioned above, by designated technical committees of the relevant national and international standards organizations. These organizations are described in Section 2.5.

2.4 THE STANDARD-SETTING PROCESS IN BRIEF

The standardization process in general is divided into three stages: planning, development, and approval. Each standards organization, however, will differ in terms of its exact mandate, operating procedures, documentation requirments, membership responsibilities, voting procedures, committee structures, timing and schedules, and so on. All these aspects influence the planning, development, and approval phases of standardization. A typical description of the standard-setting

process of an organization, e.g. the Canadian Standards Association (CSA) or the American National Standards Institute (ANSI), would include observations on:

- proposal format
- initial review process
- initiation and authorization of internal studies
- selection of committees
- selection of committee members
- committee structures
- hierarchy of organization and flow chart indicating channels along which proposals are directed
- provisions for public review and comment
- voting procedures
- approval procedures
- timing and scheduling
- publishing procedures.

Standards organizations usually have documents published, describing their officially sanctioned practices for developing standards. For example, CSA has its CSA Regulations Governing Standardization and ANSI has its Procedures for Management and Coordination of American National Standards. All officially recognized standards organizations, however, follow these basic steps for shaping a standard:

A proposal is prepared and submitted to the relevant standards organization.

A series of technical studies are carried out, carefully evaluating the proposal and comparing it to any existing related standards.

A draft standard is prepared after the technical evaluation is complete.

A public inquiry is organized by the standards organization: the draft standard is distributed in the country and abroad, reactions are assessed, and, if necessary, changes are made to the draft standard.

Trial applications for the new standard are carried out and, if necessary, further changes are made.

A final, definitive version of the standard is prepared.

The standard is 'ratified' or officially recognized by the standards organization, published, and announced through the media.

These basic steps ensure that the outcome from the standard-setting process is based on a cooperative effort, and that the interests of producers, distributors and users who are directly or materially affected by a standard have been taken into account.

2.5 NATIONAL AND INTERNATIONAL STANDARDS ORGANIZATIONS

At the national level, standards organizations coordinate and disseminate the technical work which is necessary to establish standards. National standards organizations also represent the country in the international standards forums.

In Canada, each accredited standards organization operates in an agreed group of designated subject areas from which it may submit its standards to the Standards Council of Canada (SCC). The SCC is a statutory corporation created by Act of Parliament in 1970, to foster and promote voluntary standardization in Canada and to ensure effective Canadian participation in the work of international organizations engaged in the formulation

of voluntary standards (such as the International Organization for Standardization). The SCC carries out its work through the National Standards System, which consists of various organizations and committees concerned with voluntary standardization in Canada.(1)

The Canadian Standards Association (CSA) is one of the organizations which make up the National Standards System of Canada. The information technology area of standardization falls within the purview of the CSA. The CSA was chartered in 1919 to develop industrial standards, and is the largest standard-writing body in Canada. The CSA standards reflect a national consensus of producers, users and regulatory authorities, and cover 35 major areas including electrical and telecommunication standards. There are over 1,000 published CSA standards, including the North American Presentation Level Protocol Syntax (or NAPLPS -- which is the Telidon standard published in December 1983 jointly with the American National Standards Institute).(2)

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(1) For more information on SCC and the National Standards System, see The Standards Council of Canada - An Introduction, the Standards Council of Canada, Ottawa, June 1984; and the series of reports entitled National Standards System, Standards Council of Canada, Ottawa, December 1983.

(2) NAPLPS will be introduced in Section 2.6 and discussed in more detail in the following chapters of this report.

CSA is also the official Canadian member of the International Organization for Standardization (ISO) and of the International Electrotechnical Commission (IEC) and, as such, is responsible for the organization of relevant Canadian technical committees dealing with ISO and IEC subjects.(1)

In the United States, the American National Standards Association (ANSI) is the U.S. representative in international organizations such as the ISO and the IEC. As such, ANSI coordinates the standards activities for U.S. participation in these groups.

Many groups in the U.S. support ANSI as the central body responsible for the identification of and approval of voluntary standards. Standards developers and other participants contribute to the work of ANSI toward standards called American National Standards. ANSI approval of these standards is intended to ensure that a consensus of those directly and materially affected by the standards has been achieved, and

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(1) For more information on the Canadian Standards Association see George W. Lawrence, Planning and Productivity of Voluntary Consensus Standards (paper presented to ISO in Geneva, January 24, 1985), Canadian Standards Association, Rexdale, Ontario. The description of CSA provided above is derived from the presentation in Mr. Lawrence's paper.

that the needs of all parties concerned have been identified and met without conflict in their requirements or unnecessary duplication.(1)

At the international level, the principal world organization is the International Organization for Standardization (ISO), which covers all fields of standardization with the exception of electrical and electronic engineering which by agreement are covered by the International Electrotechnical Commission.

The ISO comprises the national standards bodies of nearly 90 countries. There can only be one ISO representative standards organization from each country. Around 100,000 experts around the world cooperate with the ISO, which has published approximately 5,000 International Standards. Through nearly 200 specialized technical committees, with representatives from member countries, the ISO is active in the exchange of information between member organizations, the dissemination of standards documents, and the development or revision of standards. All ISO standards are reviewed at not more than five-yearly intervals.

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(1) For more information about ANSI and its procedures see Procedures for the Development and Coordination of American National Standards, American National Standards Institute, New York, March 30, 1983.

The area of international telecommunications standards is governed by the International Telecommunication Union (ITU). ITU is an organization of the United Nations which is a 'union' of member countries. There are at present 157 ITU members.

ITU is made up of four permanent organs: a General Secretariat; the International Frequency Registration Board (IFRB); the International Radio Consultative Committee (CCIR); and the International Telegraph and Telephone Consultative Committee (CCITT). The CCIR and the CCITT are separate bodies dealing respectively with technical radio problems and technical telegraph and telephone problems. All member countries of ITU can participate in the work of the CCIR and the CCITT.

Both the CCIR and CCITT hold Plenary Assemblies normally every four years. These Plenary Assemblies set up Study Groups to study technical, operating and tariff questions, and propose standards. Strictly speaking, because of sometimes conflicting factors influencing their decisions, such as special national requirments and geopolitical concerns, the CCITT and CCIR make 'recommendations' rather than 'standards'.

The recommendations developed by the two consultative committees are acted upon by the Plenary Assemblies and

published in coloured books, with one specific colour selected for each Plenary Assembly.

Each Plenary Assembly draws up a list of technical "questions", the study of which would lead to improvement in international radio communication or international telegraphy and telephony. These questions are studied by the Study Groups who in turn draw up new recommendations based on their work on the questions, and these new recommendations are then submitted for consideration in the next Plenary Assembly. If the Plenary Assembly adopts the recommendations, they are published. The recommendations of the CCIR and CCITT have an important influence in the area of telecommunications throughout the world.(1)

The CCITT is the international body to which Canada submitted in 1979 its Telidon proposal, for study and adoption as an international videotex standard. This standardization process which Telidon went through will be discussed in detail in the following chapters. Suffice it to mention here that when Canada entered the scene deliberations had already been underway at the CCITT, in consideration of the United Kingdom and French videotex versions.

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(1) For more information about ITU, CCIR, and CCITT, the reader is referred to the document International Telecommunication Convention: Nairobi, 1982, General Secretariat of the International Telecommunication Union, Geneva, 1982.

Canada's activities at the CCITT are coordinated by the Canadian National Organization for the CCITT (CNO/CCITT). This organization was established in 1973 with the objective "to promote and coordinate Canadian participation in the activities of the CCITT." The CNO/CCITT is comprised of members from the public and private sectors of the Canadian telecommunications community. It is composed of a Steering Committee, National Study Committees and National Study Groups. The technical terms of reference of each National Study Group are the same as the terms of reference of the corresponding CCITT Study Group.(1)

Before concluding this section of the report, the description of one more organization is appropriate for reasons which will become obvious in the following chapters. This organization is the European Conference of Postal and Telecommunications Administrations (CEPT). The aim of CEPT is to establish closer relations between member Administrations and to harmonise and improve their administrative and technical services. There are 26 member countries in CEPT. CEPT was established in June 26, 1959 and meets by Plenary Assembly, generally held every two years in ordinary session. It is divided into two special committees: Postal and Telecommunications. Working groups are

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(1) Canadian National Organization for the International Telegraph and Telephone Consultative Committee: Manual, Department of Communications, Ottawa, January 1985.

set up by the Plenary Assemblies to study technical and operational questions in the postal and telecommunications fields.

2.6 FRAMEWORK FOR CLASSIFYING STANDARDS SUCH AS TELIDON

The reference model which has gained wide acceptance for standard setting in the computer communications industry is the Open Systems Interconnection (OSI) model.(1) This model, which was first proposed by the ISO in 1979, is, in the words of Jan Gecsei, "a 'metastandard', describing the general structure and relationships in a proposed system of standards whose goal, when implemented and adhered to, is to enhance interworking within distributed systems."(2)

This model is a framework for classifying standards of complex computer communication systems. It contains seven independent functional "layers" of standards. Each layer defines a set of functions. Not all layers have to be present in all systems. These layers are as follows:

> "1. The Physical Layer provides mechanical, electrical and procedural functions in order to establish, maintain, and release physical connections.
>
> 2. The Data Link Layer provides a data transmission link across one or several physical connections. Error correction, sequencing, and flow control are performed in order to maintain data integrity.

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(1) ISO/DP7498, "Data Processing--Open Systems Interconnection --Basic Reference Model", Document TC 97/SC16 N719, October 1981.

(2) Jan Gecsei, The Architecture of Videotex Systems, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1983, p. 25.

3. The Network Layer provides routing, switching, and network access considerations in order to make invisible to the transport layer how underlying transmission resources are utilized.

4. The Transport Layer provides an end-to-end transparent virtual data circuit over one or several tandem network transmission facilities.

5. The Session Layer provides the means to establish a session connection and to support the orderly exchange of data and other related control functions for a particular communication service.

6. The Presentation Layer provides the means to represent and interpret the information in a data coding format in a way that preserves its meaning.

7. The Application Layer is the highest layer in the reference model and the protocols of this layer provide the actual service sought by the end user." (1)

The seven layers may be grouped into two major categories. Layers 1 to 4 involve the transference of data while layers 5 to 7 involve how data are processed and used.

The Telidon-based videotex standard, published by ANSI and CSA as the "North American Presentation Level Protocol Syntax", corresponds to layer six of the OSI model. Most of the work of DOC for gaining acceptance of Telidon as a national, North American, and international standard, was in the context of this sixth layer. Thus, the NAPLPS standard is one which "describes the formats, rules, and procedures for the encoding

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(1) Videotex/Teletext Presentation Level Protocol Syntax: North American PLPS, (Preliminary Standard T500-1982), CSA, Rexdale, Ontario, August 1982, p. 10.

of alphanumeric text and pictorial information for videotex and teletext applications."(1) The use of the presentation layer in NAPLPS is primarily for the encoding of text, graphic, and display control information. As a "protocol", NAPLPS is "a set of formats, rules, and procedures governing the exchange of information between peer processes at the same layer."(2)

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(1) Videotex/Teletext Presentation Level Protocol Syntax: North American PLPS, ANSI and CSA, New York, N.Y., and Rexdale, Ontario, December 1983, p. 1.

(2) Ibid., p. 5.

CHAPTER THREE

HISTORY AND STRATEGIES OF VIDEOTEX STANDARDIZATION

When Canada officially entered the world of videotex with the Telidon Program, early in 1979, developments in this industry had already been underway in the international arena, particularly in Europe. A strategy was formulated at DOC, as part of the overall Telidon Program strategy, to tackle questions involving videotex standardization, and to introduce Telidon as a strong competitor to other systems being considered by CCITT in its 1977-1980 study period. This chapter reviews the history of videotex standardization in general, and describes the strategies of Canada and other countries with respect to the standard-setting process.(1)

3.1 HISTORY OF VIDEOTEX STANDARDIZATION

Although there is a natural temptation to write evaluative comments on videotex standardization, during a review of the history of the process, and although the reader could rightly be looking for such comments, the evaluation segment of this

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(1) It should be noted, at this point, that this study is not focused on the roles of individuals in the standard-setting process. Personalities naturally did make a significant difference in the process. The respective roles in Telidon and its standardization of such distinguished individuals as Herbert G. Bown, C.Douglas O'Brien, Yun-Foo Lum, and others in Canada, are immeasurable and well recognized worldwide. The context of this study appropriately precludes discussion of contributions by individuals and focuses instead on strategies, events, and government interventions. It should be well emphasized, however, that this approach is not intended in any way to diminish the personal dedication and drive of those who achieved so much for Canada in this important area of the information age.

report has largely been saved for the next chapter. The reason for this approach is purely for clarity in presentation and, hopefully, to make for better reading and economy of thought.

During the deliberations leading to a decision in 1980 by the CCITT VIIth Plenary Assembly, there were at least three competing videotex schemes at the international level, emanating from the United Kingdom, France, and Canada. A fourth scheme, from Japan, was recognized in the Recommendations of the CCITT VIIth Plenary Assembly, but at that time, in 1980, the detailed system proposals for this option were to be worked out and studied during the 1981-1984 CCITT study period. Each of these videotex schemes followed a separate schedule and process in its respective national and continental context. Developments with respect to each system are traced separately below. For this reason, the discussion of the history of videotex standards in the following pages is not strictly chronological. However, to guide the reader, Table 3.1 provides a chronological summary of highlights pertaining to the videotex standardization process. In addition, to help the reader differentiate between the various standards, Annex B provides a comparison of standards.

The Canadian videotex standards were developed over a period of about five years since 1979. The history of the development of the standards in North America--from CRC Technical Note 699, to CRC Technical Note 709 and the Bell System PLP, to the publishing of the NAPLPS standard--is discussed below in somewhat more

TABLE 3.1 HIGHLIGHTS OF THE VIDEOTEX STANDARDIZATION PROCESS

May 1978	- United Kingdom submitted its serial alpha-mosaic videotex scheme to the CCITT.
August 1978	- Canada formally announced the Telidon system.
October 1978	- France submitted its parallel alpha-mosaic videotex scheme to the CCITT.
October 1978	- Canada introduced the alpha-geometric concept of Telidon to the CCITT.
May 1979	- Canada submitted the details of its proposal for an alpha-geometric coding scheme to the CCITT.
November 1979	- DOC published the Telidon field trials specifications known as CRC Technical Note 699.
October 1980	- The VIIth Plenary Assembly of the CCITT ratified Recommendations S.100 and F.300.
May 1981	- AT&T announced its Bell PLP at Videotex '81, Toronto.
May 1981	- The United Kingdom announced the CEPT European Unified Standard (EUS)--which unified the serial and parallel mosaic schemes--at Videotex '81, Toronto.
February 1982	- DOC published the augmented Telidon specifications known as CRC Technical Note 709.
April 1982	- Canada presented to the CCITT the details of the PLP in use in Canada.
April 1982	- CEPT presented its EUS position to the CCITT.
June 1982	- ANSI and CSA announced their joint agreement on a common North American videotex standard.
August 1982	- CSA published its preliminary videotex standard T500, developed on the basis of Note 709 and Bell PLP.
August 1982	- U.S.A. submitted to the CCITT their paper for a unified videotex presentation layer, which basically was the North American PLP scheme.
October 1982	- ANSI approved a draft proposed videotex American National Standard known as X3L2/82-135, developed on the basis of Bell PLP and Technical Note 709.
December 1983	- ANSI and CSA jointly published the NAPLPS.
October 1984	- The VIIIth Plenary Assembly of the CCITT ratified Recommendation T.101, which included the European CEPT, the NAPLPS, and the Japanese CAPTAIN.

detail than developments of other systems. This is appropriate given that the focus of this study is on Canada's involvement in videotex standard setting.

NAPLPS:

In December 1983, the American National Standards Institute, Inc. (ANSI) and the Canadian Standards Association (CSA) approved and jointly published Videotex/Telext Presentation Level Protocol Syntax - North American PLPS. This standard is designated as X3.110-1983 by ANSI and as T500-1983 by CSA and is more commonly known as NAPLPS. The NAPLPS standard, as mentioned in the previous chapter, specifies the coding schemes to be used in videotex services. The NAPLPS document jointly published by ANSI and CSA states that NAPLPS is

> "an information interchange standard that permits videotex and teletext information and transaction service providers and equipment manufacturers to develop their products according to a standard interchange format. Without such a standard, information providers, service providers, and device manufacturers would not be willing to make the initial and continuing investments that are necessary for videotex and teletext services to become widely used."(1)

The significance of the development of the NAPLPS standard to the information technology industry, and to videotex and teletext in particular, is thus underscored.

NAPLPS is based on the Telidon standard described in Technical Note 709 of the Communications Research Centre, DOC,

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(1) Videotex/Teletext Presentation Level Protocol Syntax--North American PLPS, American National Standards Institute, Inc. and Canadian Standards Association, December 1983, page i.

and on the Bell System PLP of the AT&T.(1)

NAPLPS is a standard which is not tailored to any particular hardware configuration, can be used with equipment from different manufacturers, and is compatible with ASCII (American National Standard Code for Information Interchange). NAPLPS is now firmly "established as the standard for which the new information technology industry in North America will be based."(2) AT&T has already adopted NAPLPS, and IBM, recognizing its significance, supports it. Some experts have predicted that NAPLPS will replace ASCII as the industry standard for information interchange.(3) If this occurs, most areas of the information technology industry will be affected. Part of the reason for the current popularity of NAPLPS in North America is the fact that it is not only a video-graphics protocol, but an information-exchange language as well. Moreover, it has come at a time when the information industry is ripe with new technology that has outgrown existing standards for information interchange.(4)

The supremacy of NAPLPS as a videotex/teletext standard in North America did not come about quickly or easily. Following

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(1) Technical Note 709 and Bell System PLP will be discussed further in the following pages.
(2) See Herbert G. Bown and C. Douglas O'Brien, "The Information Technology Industry: The Importance of Standards", in Videotex Canada, summer 1984, page 9.
(3) Jim Fleming, "NAPLPS: A New Standard for Text and Graphics", in BYTE, May 1983, Vol. 8, No. 5, page 276.
(4) The goal of Canada and the U.S. was to include the NAPLPS standard as part of the 1984 Recommendations by the CCITT VIIIth Plenary Assembly, to achieve a Worldwide Videotex/Teletext standard. The results of the 1984 Assembly are presented later in this section.

is a review of events leading to NAPLPS, and a discussion of related developments in the international sphere.

Beginnings:

Early in 1979 DOC began its four-year Telidon Program. One of the objectives of this program, as mentioned earlier, was to establish Telidon as a national and international standard for videotex. This objective represented a recognition by DOC of the importance of following the standard-setting process to gain worldwide recognition for the Telidon invention. Pursuing this objective became a cornerstone of DOC's strategy for proliferating Telidon. By November 1979, DOC had published the Telidon field trial specifications known as CRC Technical Note 699.(1) This was the standard adopted for the Telidon field trials and for the introductory Telidon services, which together constituted another cornerstone of the Telidon Program.

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(1) Technical Note 699 obviously did not suddenly come from nowhere. It was developed by Herbert G. Bown, C.Douglas O'Brien, et al., building on their CRC work carried out prior to 1979 (see, for example, H.G.Bown, C.D. O'Brien, W. Sawchuk, and J.R. Storey, "A General Description of Telidon: A Canadian Proposal for Videotex Systems," DOC, Canada, CRC Technical Note 697, December 1978). In fact, basic research and development into interactive visual communications systems started at the CRC as early as 1969. From 1969 to 1973, CRC devoted considerable effort into building the special hardware and producing the software needed for interactive graphics communications. This work gave rise to the initial definition of a picture coding scheme which was later extended to become the communications protocols of Telidon. Between 1973 and 1976 refinements were developed on the premise that terminals would contain their own intelligence and that the picture coding scheme would be independent of hardware configurations and communications delivery systems. Further refinements from 1976 to 1978 led to the formal definition of the Picture Description Instructions (PDIs) which are the key to the Telidon system. (See H.G.Bown and W.Sawchuk,"Telidon--A Review," IEEE Communications Magazine," January 1981.)

At the international level, during 1978, 1979, and the first half of 1980, the technical experts at CCITT worked to develop a single videotex coding scheme from proposals presented by the United Kingdom, France, and Canada, respectively. In October 1978, Canada had introduced to the CCITT the alpha-geometric concept of Telidon. However, Canada entered the international arena in earnest with the 699 specifications, as a 'late comer' in 1979. The main contributors to the discussions of this period were from the United Kingdom, France, Germany, Canada, and the United States. By early 1980 it became apparent that each proponent nation wanted to preserve their specific coding schemes. Much was at stake for each country. Past investments would be vindicated and future economic benefits reaped from having a country's scheme recognized as the standard for the industry.(1) At this point, Canada had become an equal and active participant in the debate, with Telidon in the vanguard.

In June 1980, at the final meeting of the CCITT technical committees in Montreal, recommendations were approved which included all three proposals on the table. These recommendations were designated Recommendations S.100 and F.300, and they included the following options: alpha-mosaic serial (the British Prestel scheme), alpha-mosaic parallel (the French Antiope scheme), alpha-geometric (the Canadian Telidon scheme), and Dynamically Redefinable Character Sets

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(1) Canada, however, unlike the United Kingdom, had adopted a 'live-and-let-live' strategy -- i.e., to have the Canadian option entered as an equal segment of the CCITT standard, along with the U.K. and French options. This point will be discussed further in Section 3.2.

(DRCS).(1) The Canadian option included in CCITT's Recommendations was at this point based on Technical Note 699. The CCITT also included a place for the so called alpha-photographic option (of Japan). Table 3.2 provides relevant quotations from Recommendations S.100 ("International Information Exchange for Interactive Videotex") and F.300 ("Videotex Service"). These Recommendations were ratified at the CCITT VIIth Plenary Assembly in October 1980,(2) thus setting the basis for three competing videotex schemes (mosaic, geometric, and photographic), and securing Telidon as an equal part of the world standard as it had developed to that point.

The CCITT 1980 Recommendations, however, were incomplete since they did not completely define how to integrate the two mosaic schemes, the geometric scheme, the photographic scheme, and the Dynamically Redefinable Character Sets. This problem of integration of the different systems was slated as a question for further study by Study Group VIII, during the 1981-1984 CCITT study period.

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(1) Dynamically Redefinable Character Sets constitute a feature in videotex systems which allows a user to store new character shapes, such as foreign alphabets, within a terminal. These DRCS characters can be downloaded to the user terminal by the videotex information provider. The current European, North American, and Japanese videotex versions include DRCS features. DRCS features do not constitute a complete scheme by themselves in the sense that Telidon, Prestel, or Antiope are coding schemes.

(2) The CCITT technical committees which were concerned with videotex were Study Group I for the F.300 Recommendation and Study Group VIII for the S.100 Recommendation. The S.100 recommendation is the more substantive document, containing the technical specifics of the CCITT decision. Recommendation F.300 presents, in general terms, a framework for videotex network operation.

TABLE 3.2 EXCERPTS FROM RECOMMENDATIONS F.300 AND S.100

F.300:(1)

"This Recommendation describes standard parameters for a Videotex service based on public Videotex services that are in operation or are currently under consideration. It is expected that further enhancements will be developed, and this Recommendation is not intended to inhibit their implementation, but, in the interests of compatibility and interconnection on an international basis, national systems shall be compatible with the service described in this Recommendation and with the technical characteristics described in Recommendation S.100."

"As Administrations gain further experience in the operation of Videotex services, it will be possible to determine whether it is necessary to develop a dedicated international Videotex network on which a specified service can be offered or whether other existing international networks (e.g. data networks) will provide an adequate transmission infrastructure requiring only appropriate interface standards and suitable operating, administrative and tariff arrangements."

S.100:(2)

"This Recommendation describes the characteristics of coded information that is exchanged between countries participating in the international interactive Videotex service (as described in Recommendation F.300) and defines the display features corresponding to its various elements."

"Different options are offered as a choice for the Administrations to implement their national services. Substantial compatibility exist between these options, but some transcoding may be necessary to facilitate interworking."

"For the international service, four different options for representing pictorial information have been recognized: (a) mosaic character sets; (b) geometric system; (c) dynamically redefinable character sets; (d) photographic representation. These options are not mutually exclusive and it is possible that systems may develop using two or more options."

(1) "Videotex Service," CCITT Recommendation F.300, Fascicle II.4, CCITT Yellow Book, Geneva, November 1980.

(2) "International Information Exchange for Interactive Videotex," CCITT Recommendation S.100, Fascicle VII.2, CCITT Yellow Book, Geneva, November 1980.

Developments In North America:

In May 1981, at the Videotex '81 conference in Toronto, AT&T announced their specifications for the videotex Bell System Presentation Level Protocol (PLP). The Bell System PLP was quickly endorsed by Canada since it had evolved out of technical discussions carried out, following the CCITT 1980 Recommendations, between Canadian and AT&T officials. In fact, AT&T developed this document in close collaboration with the Canadian team that had developed Technical Note 699 and that was working on an augmentation of these specifications.

By February 1982 DOC had published CRC Technical Note 709, which represented an augmented Telidon standard functionally identical to the Bell System PLP. Technical Note 709 became the basis for a submission to the Canadian Standards Association for development of a Canadian videotex standard. In addition, Technical Note 709 and the Bell System PLP document now formed the basis for a joint North American videotex standard.

In June 1982 at Videotex '82 the CSA and ANSI announced their joint agreement on a common videotex/teletext standard for North America. By December 1983, after a public review process, CSA and ANSI published the joint edition of Videotex/Teletext Presentation Level Protocol Syntax - North American PLPS: the NAPLPS standard.

Developments In Europe and Japan:

In Europe, prior to the 1980 CCITT Recommendations, there were two main competitors in the videotex business: the United Kingdom and France. When Canada came on the scene in earnest, these two countries were locked in a battle to block each other's system. In May of 1978, the U.K. took the initiative of submitting a detailed proposal to the CCITT in Geneva. This proposal contained the U.K. system which used a "serial" mosaic coding scheme and was known as Viewdata (later dubbed Prestel). Later that year the French proposed to the CCITT a similar but incompatible "parallel" mosaic coding scheme called Antiope.(1)

The CCITT technical committees were considering these two proposed systems when Canada introduced the Telidon geometric scheme. The details of the Canadian proposal were presented to the CCITT in October 1979, and by 1980, as mentioned earlier, the CCITT had ratified the three approaches in Recommendations S.100 and F.300.

After the 1980 decision of the CCITT, the Europeans became somewhat more unified, at least in face of the perceived common threat of the Canadian Telidon scheme. They got together at

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(1) Serial and parallel coding techniques refer to the processing scheme of display symbols and the associated control codes.

the CEPT and concluded an agreement on a European Unified Standard for videotex (EUS). The EUS was first announced at Videotex '81 in Toronto, May 1981. The announcement was made by the United Kingdom on behalf of the other members of CEPT. The EUS was formalized by the CEPT in June 1981.(1) This standard unified the European serial and parallel mosaic systems previously ratified by the CCITT in 1980. Essentially, what the EUS did was to permit both serial and parallel attributes to be mixed on the same screen display.

As mentioned in Chapter Two, the CEPT organization is a group of 26 European nations who meet at regular intervals to discuss harmonization of new communications services being introduced in Europe. One of the working groups of CEPT, the CD/SE group, is responsible for discussion of videotex aspects. This group has facilitated the extension of the CEPT EUS standard to include features of NAPLPS and a Dynamically Redefinable Character Set (DRCS) system to allow a definition of higher-resolution small shapes. It is recognized, however, at least by the U.S.A., Canada, and Japan that the NAPLPS is superior to the CEPT scheme.

In 1980 the Japanese were still developing their photographic scheme known as CAPTAIN. Although CAPTAIN was still in an

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(1) "European Interactive Videotex Service Display Aspects and Transmission Coding," CEPT Sub-Working Group CD/SE Recommendation T/CD 6-1, June 1981.

experimental phase, the CCITT 1980 Recommendations recognized it as one of the options to be considered in the standardization process. CAPTAIN is an acronym for "Character and Pattern Telephone Access Information Network." It was designed by Nippon Telephone and Telegraph, to handle the Japanese writing. Since 1980 the Japanese have built on their videotex scheme, introducing NAPLPS features to it. At the CCITT Study Group VIII meeting, Geneva, November 1982, Japan announced that CAPTAIN would adopt the geometric coding of NAPLPS as part of their standard. Basically, there is now a significant overlap between CAPTAIN and NAPLPS, one of the main differences being CAPTAIN's inclusion of Japanese and Chinese characters in the terminal memory.

Activities Leading to CCITT Recommendation T.101:

The CCITT 1981-1984 study period was intended to be a time for gaining further experience in the operation of videotex services, and for working at the incompatibilities between the different videotex systems which were ratified in Recommendation S.100. Transcoding was to be examined further to facilitate the interworking between systems. In fact, what happened during this period was that each system evolved in its own domain, and incorporated various features of the other systems.

In 1983, under the auspices of the CCITT, a series of meetings of experts were held to explore the possibilities of a World-Wide Unified Videotex Standard (WWUVS). These meetings, were intended to develop compromise positions which would form a basis for CCITT recommendations in 1984 to replace S.100. Compatibilities were to be worked out considering the three existing systems (mosaic, geometric, and photographic) on equal status, while ensuring that no economic harm be done to any of the countries with vested interests. The U.S., Canada, and Japan interpreted this to mean that all parties should work together so that extensions to the three systems would be compatible. The Europeans on the other hand intended to replace NAPLPS and CAPTAIN with a new scheme based on the CEPT standard.(1)

During the series of meetings on the WWUVS, however, it became clear that the Europeans were divided in their positions. France, backed by the Netherlands, was in conflict with the U.K. and Germany, and in fact maneuvered to block the CEPT recommendations from introduction to CCITT. Having lost out to the U.K. and Germany in Europe, and to the proponents of NAPLPS in North America, France was trying to invalidate the proposals

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(1) See report by C.D. O'Brien to DOC on the standardization proceedings during the 1981-1984 study period. (Reference: DSS Contract, Number OST 83 - 00010). This report discusses the maneuverings of countries.

to be put forth for decision by CCITT.(1)

The final result of the 1981-1984 study period was that the three videotex systems -- as they had developed during that period, within their respective domains -- were included as integral parts of the new CCITT Recommendation T.101, as Data Syntax I (CAPTAIN), Data Syntax II (CEPT), and Data Syntax III (NAPLPS). This recommendation was ratified in October 1984 by the CCITT VIIIth Plenary Assembly. On the insistence of the French, the 1980 Recommendation S.100, since it includes the original French Antiope, was retained in T.101.(2)

Recommendation T.101:

In Recommendation T.101, CCITT recognized that different countries/regions are entitled to use their existing systems.(3) The different systems, described earlier, are rivals for adoption in a standardization and a marketing sense.

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(1) The maneuverings of countries at CCITT meetings that took place during 1981-1984 will be discussed further in the strategy section which follows. In this report, the information on these maneuverings is derived mainly from interviews with Yun-Foo Lum and C.D. O'Brien, and from C.D. O'Brien's report, ibid.

(2) The Preamble to Recommendation T.101 states that Recommendation S.100 (reference number changed to T.100) "is being retained for the study period 1985-1988."

(3) Preamble to Recommendation T.101, "International Interworking for Videotex Services," CCITT VIIIth Plenary Assembly, Malaga-Torremolinos, October 1984.

Unable to agree on which, if any, of the systems should be singled out, the CCITT in Recommendation T.101 took the easy route of recommending coding schemes based on all of them. Consequently, each country's delegation could return home claiming victory. The French argued that the Recommendation was not yet mature enough to be a recommendation, but it was ratified nonetheless, albeit with the French reservation noted. Various unresolved aspects of the questions on interworking, slated for study during 1981-1984, were deferred for further study during the study period 1985-1988.

3.2 STRATEGIES OF VIDEOTEX STANDARDIZATION

The strategy which DOC established, to pursue its objective for establishing Telidon as a national and international standard, can be described from a number of perspectives. To begin with, there is the perspective of the national domain. There are also the perspectives of the North American context and the international arena. Activities undertaken by DOC in these three settings were interrelated and together constituted integral parts of an overall strategy, which had been consciously followed by DOC officials.

Another perspective for describing DOC's strategy is at the level of the negotiating table in the standards organizations. The development of standards such as those for videotex, as

described in Chapter Two, involves technical (and sometimes not-so-technical) discussions, to effect compromises toward consensus decisions. The emergence of competing interests in the discussion process calls for negotiations. The parties around the table can thus be expected to adopt positional strategies to accomplish their goals. DOC's delegation arguing the case for Telidon in the international sphere adopted negotiating standpoints to achieve the Telidon standardization objective -- as did other delegations on behalf of their respective systems.(1)

This section of the report renders an account of videotex standardization strategies from the perspectives pointed out above. The emphasis is on Canadian strategy as followed by DOC, but the positions of other countries are also presented. While the perspectives on strategy are discussed separately, it should be noted that the activities of DOC related to the standard-setting process made up a consistent and integral whole.

National Perspective:

The Telidon Program was a joint government-industry initiative, which, from the start, set out mechanisms for transfer of technology developed at CRC to the private sector. Part of the

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(1) The Canadian standpoints can be characterized as clear, consistent, and determined. The results bear this out and the evaluation in Chapter Four vindicates the approach followed by DOC's delegation to the CCITT -- an approach which can be further characterized as being balanced and reasonable in the face of contrapositions.

strategy to transfer the technology involved field trials and an extensive consultation process. Before the field trials could proceed in full-scale, a standard for Telidon was necessary to ensure consistency and compatibility among the various parties participating in the Telidon cooperative enterprise.

Thus, as part of the consultation process, DOC set up a sub-committee to examine standards identified by DOC and to reach decisions on specifications for the field trials. The overall consultation process involved the establishment of the Canadian Videotex Consultative Committee (CVCC) in 1979. The purpose of the CVCC was to advise DOC on all aspects of videotex development in Canada. Committee members included senior executives from the broadcasting, telephone and cable industries; the manufacturing and information supplier industries; consumer, university and labour groups; and federal government departments and agencies. Thus the CVCC encompassed practically all the Canadian interests in videotex.

There were several sub-committees advising the CVCC on specific aspects of Telidon development. One of these sub-committees was the Standards Sub-Committee. This sub-committee's specific role was to advise the CVCC on all aspects of the development of an appropriate Canadian standard for videotex systems. A

main task of this sub-committee was to discuss and reach consensus on the field trial specifications identified by DOC, These specifications came to be known as the 699 standard (after CRC Technical Note 699). This standard was indeed adopted, on the recommendation of the Standards Sub-Committee, as the field trials standard.

An early component of DOC's Telidon strategy was to stave off foreign competitors (namely Prestel and Antiope) from penetrating the Canadian market. During 1978 and early 1979 several developments in Canada regarding adoption of competing videotex systems for technical trials were underway. Notable examples of these developments were: Bell Canada was conducting trials of a videotex system based on the British design and Alberta Government Telephones was in the process of deciding to buy the Prestel system. The threat of foreign penetration was therefore real. Fortunately, backed by subsidies for Telidon system field trials, DOC was able to convince potential Canadian buyers of foreign systems, in the beginning stages of videotex development in Canada, of the superiority of the Telidon option. Those who were in the process of deciding which way to go in the emerging videotex field were won over to Telidon.

This development was clearly very significant for Telidon and its acceptance as a videotex standard. If the sponsors of Canadian field trials were not biased in the favour of Telidon,

it would have been very difficult to argue credibly for Telidon in the national and international standard-setting organizations.

Another component of DOC's strategy for standardization of Telidon, from the national perspective, was to gain official recognition of Telidon in Canada by the Standards Council of Canada.(1) In response to the Standards Sub-Committee of the CVCC, a Canadian Standards Association Technical Committee, involving 55 members who encompassed the spectrum of videotex concerns across Canada, was established to develop a standard within the requirements of the state of the art. By the time this committee was convened in 1982, the state of the art had progressed in North America beyond the 699 standard of 1979. DOC and AT&T had developed the augmented version of the Telidon-based standard.(2)

In August 1982, CSA published its Preliminary Standard T500-1982, which was essentially identical to CRC Technical Note 709. The technical work toward publication of T500 was carried out by a joint CVCC/CSA Working Group. During the course of developing T500, joint meetings of the CVCC/CSA Working Group and ANSI X3L2.1 Videotex Standing Task Group were held to arrive at a common standard for North America.

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(1) This meant acceptance of Telidon by the CSA, in accordance with the Canadian National Standards System (see page 19).

(2) As discussed earlier, this augmented standard is contained in CRC Technical Note 709 and the Bell System PLP documents.

At the point of the publication of T500, the national videotex standardization strategy had achieved a clear consensus for a state of the art Canadian standard. The Preliminary Standard T500 was issued to obtain public comments, and to provide a set of proposed requirements as the basis for further investigation and field experience preparatory to finalizing the standard. The standard for Canada was finalized with the publication of the NAPLPS document, which was discussed in Section 3.1 above.

North American Perspective:

In 1979 and 1980, the standards situation in the U.S.A. was unresolved. The British and French competitors were mounting aggresive campaigns to win over the U.S. market. There were no U.S. alternatives to the Canadian Telidon or European mosaic technologies. Thus the potentially enormous U.S. market, as perceived at that time, was wide open to the Canadians and the Europeans. Although AT&T had developed an alpha-mosaic system with enhanced graphics, that was being tested in a small field trial (150 terminals) by Knight-Ridder Newspapers company, in Coral Gables, Florida, AT&T had not yet made a full-scale committment to any system. Technical tests of both the French and British systems were also underway in St. Louis, Missouri, and other places in the U.S.

Against this backdrop, DOC's strategy in North America focussed

on winning over the U.S. The absence of a U.S. standard was both a danger and an opportunity at the same time for Canada. The danger was the possibility that U.S. organizations would opt for the European technologies. If this had happened, a de facto alpha-mosaic standard would have been established, with pressure upon the U.S. government and U.S. standards organizations to formally adopt it. Consequently, it was vital to the Telidon Program to establish a strong Telidon marketing and standardization initiative in the U.S. -- herein lay the opportunity.

In DOC's North American strategy, marketing and standardization were deemed to be mutually supportive endeavours. Since the standards were not yet decided upon, and since field experience was necessary to prove the effectiveness of the system, parallel efforts in marketing and standardization were carried out to influence the U.S. videotex community. Representations were made to the Federal Communications Commission and the Electronics Industry Association. Promotional presentations were made to a number of U.S. companies -- AT&T, GT&E, and others.

By 1981, substantial progress was made in that a number of projects in the U.S. had adopted Telidon technology.(1) The most significant development occurred, however, when AT&T decided to support a Telidon-based coding scheme, and announced

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(1) Examples of this were a trial in Washington D.C. by the Public Broadcasting System at Station WETA-TV, and a project by Times-Mirror in Los Angeles, California.

in May 1981 its Bell System PLP. Although this system incorporated the features of the three incompatible coding schemes of CCITT's Recommendation S.100 (the two mosaic and the geometric schemes), in reality it owed more to Telidon than to the other two -- though it extended Telidon (for instance through additional PDIs and slight changes to the coding table).(1)

After the publication of the Bell System PLP and the publication of CRC Technical Note 709, the North American strategy of DOC was to support a joint U.S.-Canada initiative to have ANSI and CSA accept the Bell and CRC documents as the basis for a North American standard. This process culminated in the ANSI-CSA NAPLPS standard. Representatives of more than eighty companies and organizations from Canada and the U.S. voted unanimously in favour of the standard. These included leading computer manufacturers such as IBM, Control Data Corporation, Digital Equipment Corporation, Data General Corporation, Hewlett Packard, Honeywell Information Systems, and Texas Instruments Inc.; telecommunications companies such as Bell Canada, CNCP Telecommunications, and AT&T; and large-scale investors in electronic equipment such as the Canadian Bankers Association, General Electric Co., and Exxon Office Systems.

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(1) PDIs are picture description instructions, which are the basis of the geometric Telidon scheme and constitute executable picture drawing or control commands, such as 'point', 'line', 'arc', and 'polygon'.

As indicated earlier in this report (page 37), the Bell System PLP was developed in close consultation with the Canadian team that had developed CRC Note 699 and that was working on an augmentation of these specifications towards CRC Note 709.

International Perspective:

The Canadian strategy for standardization of Telidon, from the international perspective, was focussed on competing with the rival schemes in the standard-setting organizations, on conducting promotional and marketing activities, and on conducting trials at home and abroad. These activities together were intended to strengthen the case for an international Telidon-based standard. These activities were necessary because the U.K. and France had well financed, large organizations (in particular their Postal, Telephone and Telegraph Administrations) at work promoting their respective systems. They were active in the U.S., Western Europe, Australia, and several fast-growth countries in Latin America, Asia, and the Middle East.(1) In addition, a national public service of Prestel had already begun in 1979 in the U.K., and by 1982 France also had a national videotex public service.

A number of other European countries also started, during 1980-1983, to conduct field trials with systems based mostly on Prestel technology. These countries included West Germany (with their own Bildschirmtext), Sweden, Switzerland, Austria, Denmark, the Netherlands, Finland, Norway, and Italy. The West

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(1) Since 1981, the U.S. and Japan also started to become active in the videotex world market, although at a lower scale than the Europeans and in a more cautious manner.

German Bildschirmtext is that country's version of Prestel, run by the German Post Office (GPO). The Bildschirmtext service was introduced in West Germany on a large scale in 1983 by the GPO. From the start of the international discussions about standards, West Germany had concentrated all its efforts into at least achieving a European standard, taking into account the results of the international standardization organizations. Germany took on the role of mediator in Europe and aimed at (i) achieving a system amalgamating the British and French competing schemes; and (ii) improving and extending these schemes to overcome their weaknesses.(1)

To compete in this international setting, marketing thrusts were launched by Canada in Austria, Australia, Belgium, Brazil, Germany, Mexico, Switzerland, the U.S.A., and some other countries, in co-ordination with the Department of External Affairs and the Department of Industry, Trade and Commerce.(2) However, the main emphasis in Canadian marketing was on the U.S., since it represented the largest single market and, for Canada, the greatest potential.

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(1) See Ralph A. von Vignau, "Bildschirmtext and the CEPT Videotex System," IEEE Journal on Selected Areas in Communications, February 1983, p. 254.

(2) ITC has since been re-organized as a government entity.

Canada's promotional activities in the early stages of the Telidon Program, 1979-1980, were primarily centered on the attendance of national and international standards meetings and on small demonstrations. As the program matured, however, DOC promotional activities in the international sphere came to involve the following:

- entering into jointly funded activity with private companies for the promotion and marketing of Telidon internationally (e.g., a working relationship was established with Infomart);
- providing technical assistance to Canadian companies for their marketing activities (e.g., by arranging demonstrations and by providing staff to respond to highly technical enquiries and standards issues);
- creating special demonstration databases;
- creating and producing promotional materials such as films, pamphlets, etc.;
- purchasing equipment for promotional demonstrations; and
- travelling by Program staff to respond to market opportunities and to attend the frequent international standards meetings.

To assist the promotional and marketing process, a Telidon Marketing Secretariat was established within the Trade Commission Service branch of ITC. When ITC was re-organized in 1982 the Secretariat became part of the Department of External Affairs. The Telidon Marketing Secretariat was mandated to coordinate the government's efforts at promoting the export of

Telidon equipment and services; to plan, organize, and implement marketing strategies assisted by other branches of External Affairs, and by the Departments of Communications, Regional and Industrial Expansion, and Supply and Services. The Secretariat was also mandated to be a focal point within the federal government regarding export marketing for all Canadian Telidon firms and organizations.(1) The Secretariat, however, had no specific, direct role in relation to the standard-setting process.

Negotiation Standpoints:

The main standpoint adopted by the Canadian delegations, at the various international standardization meetings, was to achieve acceptance of Telidon on an equal basis with the other competing videotex technologies. In 1978, it was clear in the minds of some DOC officials that Canada's videotex technology was superior to the British and French options.(2) However, both the British and French had a headstart in the standardization forums, and already had their detailed proposals before the CCITT. In addition, the Europeans already had invested heavily in the development and proliferation of their systems, backed by generous government programs. Thus, in 1978-1979, Canada was, in a sense, playing a "catch-up" role vis-a-vis the Europeans (although, Canada was further ahead in that the

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(1) See DOC Discussion Paper No. DOC-2-82-DP, "Telidon Exploitation," July 13, 1982.

(2) See Douglas F. Parkhill, "The Evolution of Telidon," background paper presented at Videotex Canada Meeting, Toronto, March 4, 1985.

Canadian geometric scheme was a more advanced product than its competitors).

The Canadian negotiation strategy, at the CCITT meetings, was to present enough details about Telidon and its approach to convince the various delegates to accept Telidon as a viable alternative to the European schemes -- but the minimum standpoint was that it should be accepted on an equal basis. The British tried to block the Canadian initiative at the CCITT. It was due to the vigilance and skill of the Canadian delegation that complete success was achieved in averting the British maneuverings. It is important for the purpose of this evaluation to illustrate what Canada was up against in its battle to get Telidon accepted in the international arena. Thus an account of some of the maneuverings at the CCITT follows.(1)

During the 1976-1980 study period of the CCITT, a series of meetings were held by Study Groups I and VIII, to discuss the competing videotex systems. In the final meeting of Study Group VIII, June 2-4, 1980, held in Montreal, the British maneuvered against Canada's standpoint. Without prior warning

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(1) This account is based on discussions with Yun-Foo Lum and on his reports: "Report on Videotex Draft Recommendation (S.g): CCITT Study Group VIII Final Meeting," Montreal, June 1980; and "Report on CCITT Study Group I Final Meeting," Montreal, June 1980.

the U.K. put in a Delayed Paper (D6) which proposed the following:

> " (i) Deletion of the alpha-geometric (Telidon) coding section from the Draft Recommendations.
>
> (ii) Making the alpha-mosaic coding the international basic system and every terminal should be equipped for it."(1)

In the face of this contraposition, the Canadian delegation lined up support from the other participating countries. The U.S., France, and Japan were won over. The U.S. delegation immediately gave strong support against the U.K.'s item (i) and suggested a compromise on item (ii). However, this compromise was not acceptable to Canada and the U.S. later fully supported Canada's standpoint on the basis of fairness.

France also supported Canada's standpoint, since France itself was competing with Britain. On another front, France was maneuvering on the Teletex Recommendations (which Germany and Sweden wanted badly). The French warned the Germans and the Swedes that if they did not come onside for the videotex Recommendations, France would cause them trouble on the Teletex front. When the designated French delegate's turn to speak came up, in the final meeting of Study Group VIII, he presented a devastating argument against the British position.

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(1) Ibid., "Report on Videotex Draft Recommendation (S.g)", p.1.

He said that if the British arguments presented at the meeting were accepted, then the British segment of the proposed Recommendations should also be withdrawn. Withdrawal of the British segment, however, was not France's aim, but inclusion of the geometric option was. Thus the French, and with them the Germans and the Swedes, supported Canada's standpoint.

The Japanese, on their part, flatly rejected the U.K. proposals vis-a-vis the Canadian standpoint, stating quite bluntly: "we reject the U.K. proposals."(1) This unequivocal support by the Japanese was largely prompted by the fact that Canada's delegation supported Japan's "entrée" into the CCITT Recommendations, via a joint Japan-Canada paper regarding the further study of the alpha-photographic coding scheme. This paper secured a place for Japan for when they would be ready to make detailed proposals during the 1981-1984 study period.

Throughout the discussions at the final 1980 meeting of Study Group VIII, Canada took the standpoint that if Telidon was not included totally intact, the Canadian delegation would block the whole Recommendation. This was possible because the rules of procedure allowed Canada the right of veto, since the British proposal had been a Delayed Paper. Such a veto, however, was not necessary, since the U.K. delegation was isolated and Canada won the day.

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(1) Ibid., p. 3.

The U.K., however, did not concede defeat gracefully. In the following meeting of Study Group I, in Montreal, June 13-20, 1980, the U.K. delegation suddenly announced that it wanted to place on record its "strong reservation against the alpha-geometric system as part of the CCITT Standard, because it was a system used only by one Administration."(1) This statement was erroneous, since two weeks earlier the U.S. had announced their acceptance of the Telidon system for field trials in the U.S. Moreover, the CCITT Senior Councillor at the meeting immediately rejected the U.K. statement, since the U.K. had not brought the point up during the debate on Recommendation F.b of Study Group I. In addition, the Chairman of Study Group I (from Switzerland) strongly supported the Senior Councillor's point. The Chairman stood firm against the protestations of the U.K. delegation, and the Draft Recommendation of Study Group I went forth, without the U.K. reservation being recorded.

Interestingly, the ordeal was not yet over. Public claims by British Telecom in July-August, 1980, stated that the British videotex system was the scheme which was "preferred" by the international standards organizations. In fact, nowhere in Recommendations S.100 and F.300 was there any implication that

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(1) Lum, "Report on CCITT Study Group I Final Meeting," p. 1.

the British mosaic scheme was a preferred one. The Telidon geometric option was presented as an equal alternative to the two mosaic schemes contained in the Recommendations. Thus, subsequently, Canada's then Minister of Communications, The Honourable Francis Fox, released to the press a copy of a letter he sent to Mr. Peter Benton, Managing Director of British Telecom, which took strong issue with the erroneous public claims presented by British Telecom, regarding the videotex standards accepted at CCITT. Various correspondence between Canadian and British officials then ensued to diffuse the dispute, but the U.K. never quite retracted their stance. They did, however, agree to support without amendments the Draft Recommendations S.100 and F.300 at the CCITT VIIth Plenary Assembly in October 1980.

The CCITT 1981-1984 study period brought on new alliances and new negotiation standpoints. The U.S. was now more committed to the Canadian Telidon-based geometric scheme. The Europeans ostensibly banded together in the face of the North American NAPLPS threat, although the competition between Antiope and Prestel was still in full swing at CEPT.

The Europeans were using the 1981-1984 study period to enhance their systems, with the objective of replacing CAPTAIN and NAPLPS with a new standard built out of the components of the CEPT standards.(1) The Europeans (particularly the British), throughout the standardization process, argued that the North American standard resulted in high-cost terminals which were not attuned to the needs of the marketplace.(2) The British system, though resulting in low-resolution pictures, was, the British said, more suited for mass marketing. On the other hand, Canada and the U.S.A. had argued that videotex technology must be able to display high-resolution pictures created using geometric instructions. This was and continues to be perceived in North America as a definite marketing advantage.

Though the Europeans had put together the CEPT standards as early as May-June 1981, they were not unified in their negotiation standpoints. The French in particular were trying to manipulate the other European countries and the U.S. to its own ends, but it lost-out on both fronts.(3)

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(1) See report by C.D. O'Brien to DOC on the standardization proceedings during the 1981-1984 study period. (Reference: DSS Contract, Number OST 83-00010), p. 3.

(2) Geoff Childs, "United Kingdom Videotex Service and the European Unified Videotex Standard," IEEE Journal on Selected Areas in Communications, February 1983, p. 245.

(3) See pages 41-43, this report.

Canada and the U.S., on the other hand, had interpreted the 1981-1984 study period as a chance for reconciliation between the different systems. In fact, as a starting gesture of good faith, Canada and the U.S. offered a compromise to the Europeans "to include the CEPT smooth mosaics in the NAPLPS standard if the Europeans would include the additional 10 supplementary characters from the NAPLPS supplementary set into the empty positions in the CEPT supplement set."(1) This starting compromise was rejected by the European countries save for the Netherlands.

Contrary to the spirit of the study period, as interpreted by the U.S. and Canada, the Europeans continued to make additions to their CEPT standards which were incompatible with NAPLPS and CAPTAIN. Thus the final outcome of the 1981-1984 study period was that the three videotex systems -- as they had evolved during the 1981-1984 period -- were included as separate parts of the new CCITT Recommendation T.101.(2)

North America now has a unified standard, agreed upon by consensus with the full support and committment of the private industries and government agencies of both Canada and the U.S. Europe's CEPT standard, on the other hand, is multi-layered,

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(1) C.D. O'Brien, op. cit., p. 4.

(2) See pages 40-43, this report.

with each layer a self-contained standard in its own right. This will likely continue to cause problems for the European countries, to the foreseeable future, in the interchange of videotex information amongst themselves.

The future for CAPTAIN, like NAPLPS, is promising. The Japanese are continuing to develop their system. A main issue with CAPTAIN is the high cost of producing the necessary hardware to support the alpha-photographic option. However, Japanese know-how and the large Japanese indigeneous consumer market (with a population of 110 million) will probably translate, in the near future, into favourable low-cost conditions for large-scale production and marketing.

CHAPTER FOUR

EVALUATION OF CANADIAN STRATEGY

In Chapter Two, Section 2.3, the general criteria for evaluating the effectiveness of a standard were identified. The obvious issue in evaluating a standard is whether it meets the needs for which it was designed. This, however, is not an issue in the context of this report. The various versions of Telidon, including NAPLPS, have been thoroughly investigated by the experts of the videotex industry and the standards-setting organizations. The rigourous standard-setting process, in North America and at the CCITT, is a more authoritative and legitimate basis for evaluating Canada's current standard. That Telidon has past the test of the standard-setting process, verified by the field experience which accompanied this process, is proof enough of its effectiveness and acceptability as a standard.(1)

The issues at hand, however, are whether Canada's interventions on behalf of the Telidon standard, nationally and internationally, were appropriate, and whether the Department of Communications achieved the desired success for its Telidon standardization objective.

The empirical basis of the evaluation segment of this report is the evidence personally provided by experts involved in the

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(1) The effectiveness and acceptability of Telidon in the market is the subject of another evaluation study, conducted in parallel to this study.

standard-setting process, and the evidence presented in the numerous, referenced documents of the North American and international standard-setting bodies, the Canadian government, and the private sector in North America and Europe. A judicious interpretation of the evidence is always required of an evaluator, no matter the methods used, if an evaluation is to be convincing -- but a judicious interpretation is also required of the client or reader of the evaluation report. Thus, together we address the issues in the following sections, having pursued the facts at length in the previous chapters.

4.1 ACHIEVEMENT OF OBJECTIVES

One of the objectives of the Telidon Program was to have Telidon accepted nationally and internationally as a videotex standard. The realization in Canada that Telidon was technically superior to its competitors came early in 1978, and was officially recognized as such by DOC in August of that year. The Telidon Program was launched early in 1979 on the premise that Canada had invented a system worth fostering, unique among its competitors. Since this system had evolved within the laboratories of the Department of Communications, it was necessary to transfer it to the private sector for commercial proliferation. The widespread acceptance of the system, however, could not be assumed to follow automatically. Thus, one of the necessary components of the technology

transfer strategy was to get Telidon accepted as a standard. Hence, DOC undertook the necessary activities to secure Telidon as a standard.(1)

Canada never had a monopoly in the world videotex environment. In fact, in a sense, Canada was a 'late comer' up against the monopolies in Europe.(2) When Canada came on the scene, the rival technologies were already competing in the commercial sphere. Very closely linked to this commercial competition was the competition going on in the standard-setting forums. The options for Telidon standardization which were available to Canada were basically as follows:

(a) Ignore the world standard-setting forums, and go ahead with Telidon at least in North America.

(b) Ignore the world standard-setting forums, and go ahead with Telidon at least in Canada.

(c) Participate in the world standard-setting forums, but let the superiority of Telidon sell itself as a standard.

(d) Actively participate in the world standard-setting forums, and attempt to gain world domination for the Telidon standard, while dislodging the competitors.

(e) Actively participate in the world standard-setting forums, and vigourously attempt to gain acceptance of the Telidon standard as an equally valid alternative to the competing systems.

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(1) These activities were described earlier in this report.

(2) See page 34, this report.

To have chosen options (a), (b), or (c) as an objective for Telidon standardization would have been silly and naive. As was discussed in the earlier chapters, the European competitors were active in North America. If they had been armed with the sole official sanction of the CCITT, plus their generous national programs, they would have had a clear competitive edge over Telidon, in Canada and in the U.S. Furthermore, to let Telidon sell itself at its inception (option (c)) ignores the reality of the stiff competition that goes on in the standard-setting environment, particulary when it comes to promising high-technology areas.(1)

Because the British and French already had underway large-scale government programs in videotex, when Canada came on the scene, it was obvious that the U.K. and France were fully committed to their respective systems. It would have been unrealistic for Canada to expect these two countries to back down at the CCITT or in the market-place (option (d)). Total world domination for Telidon was, therefore, also not a viable standardization objective for DOC. In fact, the British and the French made the strategic error of adopting such an objective themselves, for their respective systems. The result is that the European situation is currently apportioned with incompatible schemes.

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(1) See Chapter Two.

Thus, option (e), as a standardization objective for Telidon, was the chosen route followed. Coupled with this objective, however, was the underlying goal of achieving a unified North American standard, to prevent an unchallenged penetration of the North American market by the competing systems. In this respect, once the U.S. (particularly AT&T) made a choice as to its preference for a videotex standard, it was a matter of following the appropriate procedures of ANSI and CSA to secure a North American standard.

What were the results? The answer to this question is straightforward and is a matter of historical record. The NAPLPS standard is the undisputed North American videotex standard. NAPLPS is also officially ratified by the CCITT in its Recommendation T.101, along with the CEPT and CAPTAIN standards. Thus, the standardization objective of the Telidon Program has been achieved. The reader should be reassured, at this point, that this objective is not a retrospective rendition of original rationale presented for the Telidon Program. The original, Telidon-related, Government of Canada Cabinet Documents, and the submissions to Treasury Board by DOC, in 1979 and 1980, clearly delineated the standardization objective of the Telidon Program as has been stated above.(1)

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(1) See references to these documents in the Bibliography.

4.2 APPROPRIATENESS OF INTERVENTIONS

To begin with, were Canada's negotiation standpoints at the CCITT appropriate? In 1980, Canada was primarily up against the U.K. and France at the CCITT. These countries had already heavily invested in their respective systems, and followed well orchestrated tactics to back-up their standpoints at the CCITT. They were obviously competing against each other.

Canada's approach was to gain an equal status for Telidon at CCITT. To achieve this objective the Canadian delegation exploited the trends in the negotiations quite effectively. The results attest to this, since the CCITT Recommendation S.100 included the geometric option of CRC Technical Note 699, alongside of the two mosaic systems. When the U.K. attempted to invalidate Canada's Telidon-based proposal,(1) the Canadian delegation lined up support (including the French) in the face of the U.K. contraposition. In contrast to the approach of the U.K., Canada took a balanced, 'live-and-let-live' approach, but not at the expense of losing out in the discussions and foresaking Canadian interests. Thus, the accounts of the proceedings at CCITT meetings(2) reveal a consistent and determined approach on the part of the Canadian delegation.

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(1) See the account of this in Section 3.2, pages 55-58.

(2) Ibid., and minutes to CCITT Plenary meetings in VIIth Plenary Assembly Yellow Book, Volume I, Geneva, November 1980.

This approach was carried on during the 1981-1984 CCITT study period, which was to be a period of reconciliation between the different systems ratified in S.100.(1) Canada's interpretation of the spirit of the 1981-1984 period was that it was a time to investigate the possibilities of harmonizing the incompatible systems of S.100. It became obvious, that this was not the European interpretation. It seems the Europeans intended to replace NAPLPS and CAPTAIN by introducing enhancements to their systems and by developing their CEPT European Unified Standard, which is not really 'unified' in the sense that NAPLPS is unified for North America.(2)

Again, Canada did not foresake its interests in the face of this challenge. DOC sought to consolidate its gain, which had been achieved in 1980, during the 1981-1984 period. Much activity was thus devoted to achieving a North American standard, to at least have a regional, truly unified, standard in place for the CCITT Plenary Assembly in 1984. This strategy was effective in that the U.S. (prompted by AT&T) backed Canada's geometric approach, albeit with enhancements and additions.

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(1) See the CCITT list of questions for study period 1981-1984, VIIth Plenary Assembly Yellow Book, Volume I, Geneva, November 1980.

(2) See pages 60-62, this report.

The consultation which took place between AT&T and DOC officials involved compromises on the part of both parties. The videotex experts involved in these consultations have confirmed that this process has resulted in a better standard which conforms to the spirit of the CCITT 1981-1984 study period. In fact, the resultant NAPLPS standard, as a compromise gesture to the Europeans, includes the mosaic options of S.100.

Canada's compromises with the U.S., to achieve NAPLPS, are considered by most of the Canadian videotex experts consulted for this study (see Annex A) as not confounding. In fact, the original 699 standard remains as a subset of NAPLPS. Changes to 699 introduced in NAPLPS are outlined in Annex C. These changes are the Canadian "compromises", but they can actually be considered as improvements necessitated by consultation with the giant that was and still is AT&T.

Did Telidon have to go through the CSA-ANSI standard-setting process, or was the publication of 709 sufficient? The standard-setting process in Canada brought together the full spectrum of videotex concerns across Canada. It was necessary to develop a standard in Canada within the requirements of the

state of the art. By the time the joint CSA-CVCC committee convened in 1982, the state of the art had progressed in North America beyond the 699 standard of 1979. The augmented version of 699 had been developed -- i.e., the Bell System PLP and CRC Technical Note 709. The publication of 709 represented the state of the art. However, the requirements of the National Standards System in Canada necessitated official sanctioning by CSA. Since the standard had already been accomplished in 709, the CSA process was not really lengthy in itself. 709 was published in February 1982 and the CSA T500-1982 document, essentially the same as 709, was published in August 1982 after the requisite CSA discussion period.

NAPLPS, however, was published in December 1983. The delay was primarily due to the lengthy ANSI procedures for ratification of standards. The rationale for waiting and having a joint ANSI-CSA document justified the delay. Such a document would signal to the Europeans, and to the North American videotex industry, the truly unified nature of the standard. Without such an assurance, North American information providers, service providers, and device manufacturers would not be willing to make the necessary investments for the full commercialization of videotex services. In fact, a separate, final CSA standard in 1982 would have been a 'non-starter',

since the Canadian industry would have probably still been waiting for the ANSI document. The U.S. market for videotex, it should be noted, is regarded by the Canadian videotex industry as a crucial element in its survival. Thus, the strategic decision to wait for the joint document was a necessity, in spite of the uncertainties in the industry which may have arisen during this period.

The question remains, however, as to why AT&T itself initiated and went through the ANSI process. The Bell System PLP could have become a de facto standard, given the size and clout of AT&T. The answer lies in the AT&T divestiture proceedings underway at the time. Under those circumstances, and in the face of its competition in the U.S., AT&T chose the route of ANSI to protect its interests. Canada, in the meantime, could only "watch and wait" -- there was not much choice but to consolidate our efforts at home and to focus on further developing our already considerable expertise in the videotex area. Naturally, the Canadian videotex industry was impatient, and some in the industry now claim to have lost some of the edge they had during the standard-setting period between 1981 and 1984.

The fact of the matter is that the videotex industry was privy to all the goings-on in the standard-setting arena, through their representatives in the various national and international meetings.(1) In fact, these representatives contributed to decisions taken in the face of events surrounding the standardization process.

Many of the industry representatives participating in the standard-setting process were the more technically oriented individuals in the industry. These individuals recognized the necessity of developing a state of the art standard, capable of competing with the rival technologies, for which enhancements and additions were being developed. The marketing individuals in the industry, on the other hand, were anxious to sell the videotex service. DOC, for its part, as the evidence recounted in this report shows, intervened in the standard-setting process, on behalf of Telidon, diligently and in a resolute fashion. Any final judgment on DOC's interventions should adopt a clear focus on the limitations imposed on the Department by the realities of the international videotex standard-setting process and the surrounding events.

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(1) DOC also regularly made public announcements and issued bulletins on the standardization proceedings.

ANNEX A

LIST OF PERSONS CONSULTED

A.R. Bastikar
Director, Canadian CCI Activities
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R.M. Bennett
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Telecommunications Policy
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Sam Berkman
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Bocca Raton
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Andrej Tenne-Sens
Department of Communications
(Interviewed by TEEGA Research
Consultants Inc. during Telidon
Evaluation Assessment Study, 1983)

Robert Baser
Department of Communications
(Interviewed by TEEGA Research
Consultants Inc. during Telidon
Evaluation Assessment Study, 1983)

Keith Chang
Department of Communications
(Interviewed by TEEGA Research
Consultants Inc. during Telidon
Evaluation Assessment Study, 1983)

ANNEX B

COMPARISON OF STANDARDS

This comparison between the various videotex standards is not intended to be comprehensive. It merely highlights items of interest within the given context of this report. Readers interested in more rigourous discussion of the technical aspects of the standards should consult the original documents referred to in the body of this report, and in the Bibliography. Also, for relevant dates regarding the standards the reader should consult Table 3.1 on page 30.

Prestel

This is the British videotex system. Alphanumeric information is encoded by Prestel in ASCII-like characters. Characters are displayed by dividing the screen into character positions. Graphics are produced from small blocks or mosaic characters. The terminal displays characters serially -- thus two adjacent characters cannot be displayed side-by-side if they are of different colours, without leaving a gap between them.

Antiope

This is the French videotex system. Like Prestel the screen is divided into character positions, each of which may contain an alphanumeric or a graphics character. The graphics are constructed from small blocks or mosaic characters. In Antiope, characters are displayed in a parallel fashion -- thus two adjacent characters of different colours can be displayed side-by-side without a gap.

CRC Technical Note 699

This is the original Telidon geometric videotex system. It is based on Picture Description Instructions (PDIs). PDIs are the key to the geometric scheme and constitute executable picture drawings or control commands, such as 'point', 'line', 'arc', and 'polygon'. This scheme includes the ASCII characters.

Bell System PLP

This is the system announced by AT&T in May 1981 and developed in consultation with DOC. It includes the two mosaic and the geometric schemes above. Its primary basis, however, is its Telidon-based coding scheme. It extended Telidon by adding

some additional PDIs and by changing slightly the coding table of 699. It also added "macro-PDIs" which, once defined, can be recalled for repetition in different locations on the screen. CRC Technical Note 699 is essentially a subset of Bell System PLP. The document for the Bell System PLP does not provide a guideline as to what are "acceptable" subsets of the standard.

CRC Technical Note 709

This Telidon standard incorporates virtually all of the Bell System PLP standard. The main difference is that it provides more implementation guidance than does the PLP. It was developed in parallel with the PLP.

CSA T500-1982

This document superseded CRC Technical Note 709. It is identical in technical content to 709 except for a few minor items. It was published by CSA as a Preliminary Standard in preparation for finalization and to provide a consensus standard for use by the videotex industry in Canada.

NAPLPS

This is the current North American Presentation Level Protocol Syntax, or the North American videotex standard approved and jointly published by ANSI and CSA. In Canada, Telidon and NAPLPS are identical. NAPLPS was developed on the basis of the Bell System PLP and CRC Technical Note 709, and encompasses both these standards with minor differences. Like PLP and 709, NAPLPS includes the two mosaic systems and the geometric scheme. It contains enhancements of the PDIs defined in 699, as well as "macro-PDIs". A Dynamically Redefinable Character Set and a set of supplementary characters are provided by NAPLPS.

CAPTAIN

This is the Japanese alpha-photographic scheme called Character and Pattern Telephone Access Information Network. CAPTAIN was designed to handle the Japanese writing. There is a great deal of overlap between CAPTAIN and NAPLPS, one of the main differences being CAPTAIN's inclusion of Japanese and Chinese characters in the terminal memory. CAPTAIN includes the geometric coding scheme of NAPLPS as part of the standard.

CEPT European Unified Standard

This standard combines the serial and parallel mosaic coding schemes. What this means is that both serial and parallel attributes are permitted to be mixed on the same screen display. NAPLPS features are also included in the EUS, along with DRCSs to allow for definition of higher-resolution small shapes. The EUS, however, is a multi-layered standard containing several incompatible segments, each of which is a standard in its own right.

CCITT Recommendation S.100(1)

This standard is made up of three separate segments: the 699 standard, Antiope, and Prestel.

CCITT Recommendation T.101

This standard is made up of three separate segments: NAPLPS, CEPT-EUS, and CAPTAIN, as they had evolved to October 1984.

Bildschirmtext

This is the West German videotex system, basically built on the Prestel mosaic system. It includes an enhancement colour scheme, using a redefinable colour look-up table, and enhanced graphics capabilities. It amalgamates the serial and parallel mosaic schemes, but uses adapted Prestel integrated circuits to cover the German language plus a few other enhancements to the original Prestel system.

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(1) The CCITT reference number for S.100 was changed to T.100 in 1984.

ANNEX C

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