

STANDARDS FOR A GLOBAL DIGITAL MARKETPLACE

A CANADIAN STANDARDS FRAMEWORK FOR ELECTRONIC COMMERCE

Summary

“Canada has formed a select group... representing key private and public organizations to develop a Canadian Standards framework for electronic commerce.”, *The Canadian Electronic Commerce Strategy*, September 1998.

The effectiveness of national standards efforts - at the firm level, in domestic standards bodies and within organizations at the international level - can make an important contribution to the development and use of electronic commerce in Canada. In support of such efforts, this paper and its attachments highlight the importance of standards work, clarify policy issues and interests from the Canadian perspective, and provide a practical guide to the standards players, processes and products that relate to electronic commerce. The attached documentation incorporates two “Standards Roadmaps” which were prepared for private sector organizations engaged in electronic standards development. Each of the two reports covers a major area of electronic commerce standards : the Information Highway “Roadmap” deals with telecommunications infrastructure and computer networks; the Electronic Applications “Roadmap” addresses the technology enablement of business functions and related software. Both of the “Standards Roadmaps” are designed as reference manuals for domestic and international standards work, and as a source of information to industry and government regarding the roles of standards bodies, the requirements for standards compliance, and directions for future work in standards development.

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Over the past decade, applications of communications and information technologies have begun to emerge in practically every aspect of economic activity. Their predominance in modern industry and in society as a whole has created what some have called a Digital Economy, where growth, competitiveness and wealth creation are increasingly dependent on rapid technological innovation.(1)

Electronic commerce is often considered the economic engine for growth in the Digital Economy. Its scope and impacts range far beyond Internet-based retail distribution and electronic shopping, potentially reaching most if not all business-to-business relationships across the economy. In fact, the prevalence of computer technologies, and the increasing scope and utility of information networks such as the Internet, have made possible the shifting of a vast range of industrial activities and processes to electronic form. It is this embedding of information technologies into virtually all forms of business which produces the transformative effects of electronic commerce for individual firms, entire industries and the economy as a whole.

The current and future growth of electronic commerce, and the digital markets on which it is based, relies on the existence of a number of enabling conditions equivalent to those which support the functioning of conventional markets - a secure and trustworthy market environment, clear rules for commercial exchange, and an established locus or platform on which trade can take place. Therefore, as the platform for the electronic exchange of digital products, the deployment of a high quality information infrastructure represents one of the primary enablers of e-com development and diffusion. Creating this and the other market conditions favourable to electronic commerce has become a central goal of public policy, and a primary objective of private sector initiatives as well. (2)

Standards and the Growth of Digital Markets

The effectiveness of information infrastructure rests not only on the physical availability of networks and network services, but also on their ease of access and use. Common technical and operational standards can reduce the cost and complexity of utilizing information networks and thereby facilitate access to the digital economy for both businesses and consumers. Furthermore, an open standards based approach can be a critical factor in determining the size, openness and efficiency of digital markets by maximizing access across corporate and sectoral lines. While electronic commerce on a firm-specific, one-to-one basis has many advantages, much of the efficiency gains from electronic commerce applications derive from larger scale innovation along the product value chain and across firms and sectors. Open network based approaches, based on technical standards which permit the interoperability of electronic business practices, provide the best means of capturing the potential benefits for growth and productivity across the economy as a whole.

A favourable standards environment is critical for the rapid roll-out of electronic commerce in the domestic market, and will also affect the success of Canadian business internationally. As trade in digital products increases in importance and as industrial supply chains convert to electronic platforms, access to and participation in digital markets becomes a key determinant of industrial competitiveness. Open standards can thus help ensure that Canadian industry has opportunities to participate in digital markets as they emerge around the world. The active participation of Canadian firms and standards organizations in the global standards process is a primary means of influencing the global standards process and promoting open IT standards.

The contribution of standards to the future growth of electronic commerce ultimately will depend on how effectively governments and industry address three fundamental issues which surround evolution of digital markets:

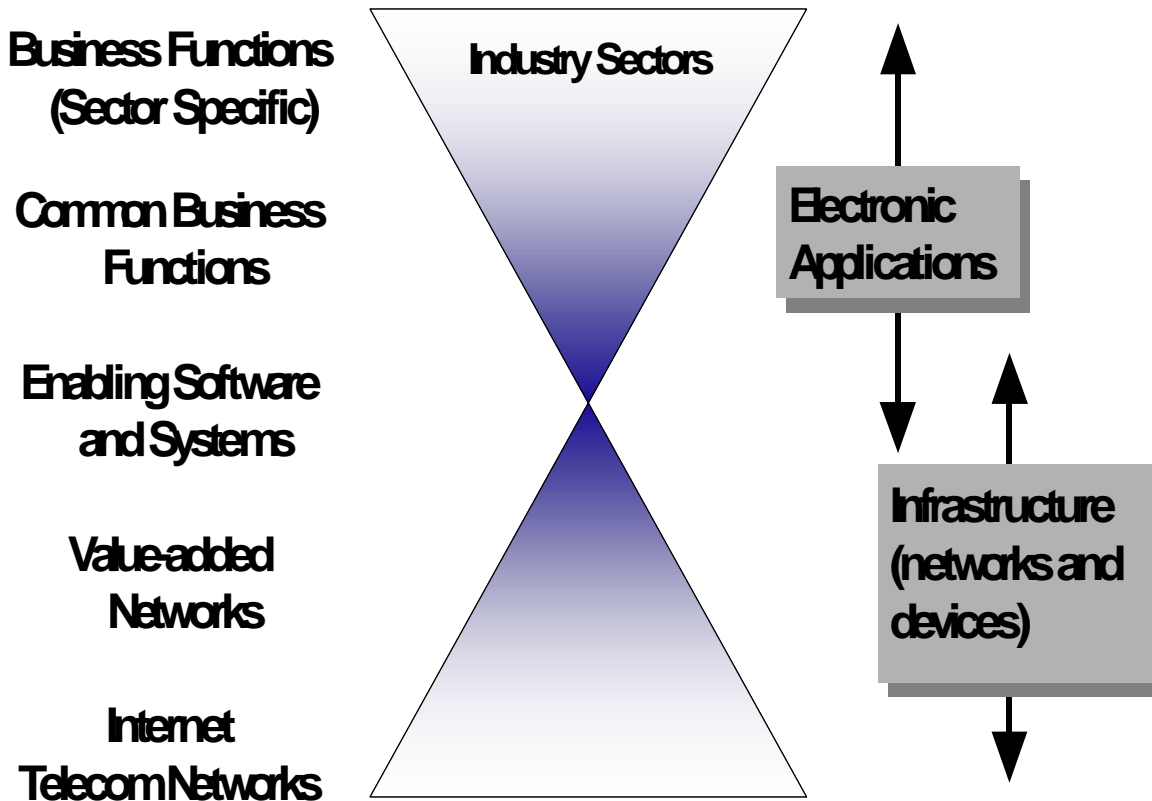
- the use of standards to facilitate and to accelerate the adaptation of business processes to computer-based systems and applications (*IT enablement*);
- standards' *adaptability* to cultural, linguistic and local requirements; and
- the *cross-sectoral application* of standards as a means of broadening the growth of electronic commerce, and widening its benefits, across the economy.

The issues of IT enablement, adaptability and cross-sectoral application are receiving continuing priority and attention at the national and international level, and remain a focus of Canadian contributions to the global standards process.

Standards Requirements for Electronic Commerce

The extensive use of electronic commerce within modern business produces a broad range of standards requirements encompassing both the need for access to physical networks and devices (infrastructure) as well as demands for the technology enablement of business functions (electronic applications). Electronic commerce thus appears at the junction of a wide array of standards activities being undertaken within a variety of different standards communities, each reflecting substantially different memberships, structures, and interests. Well established standards programmes exist in such areas as telecommunications networks and computer hardware. In recent years, substantially new standards activities have also emerged in order to accommodate new technologies and systems, such as the Internet, and the growing demands of electronic commerce. The latter has produced a proliferation of industry-wide and sector-based efforts aimed at standardizing the adaptation of business functions to electronic formats. The size and complexity of standards players, processes and products related to electronic commerce are represented in Figure 1, below.

Electronic Commerce Standards Hierarchy



In the area of **infrastructure**, many forms of standards are utilized to support information networking at multiple levels, beginning with the telecommunications networks that perform the transmission or basic transport function for information systems. Beyond the transport function, communications standards also support the provision of many enhanced services and value-added network applications. In addition, the growth and use of the Internet has generated an entire family of standards to support its network architecture, messaging and content functions.

Electronic commerce is also increasingly dependent on standards which support the growing number of **business applications** of information technology. Common business processes and functions, which are routinely practice and accepted in conventional forms of commerce, demand specific IT standardization when converted to their electronic equivalents. For example, provision for standardized company, location and product identifiers that are recognizable in digital format

is a pre-requisite for conducting business electronically. Bar coding for product identification through UPC's, which is the most basic example of such a standardized digital process, has become the foundation for a whole series of functions throughout the product value chain, including distribution, inventory controls and customer service and support.

While many standards requirements relate to functions which are common to all types of business and industrial sectors, others are more sector-specific. The unique economic characteristics of certain industry sectors, such as transportation and financial services, often produce unique standards activities and products at both the domestic and international levels. While sector-based standards are likely to remain a significant part of the IT enablement of industry, the growing interdependence of the modern economy dictates the need for increasingly higher levels of inter-operability of these standards.

Enabling software and systems represent the technologies and related standards which link electronic commerce applications to network infrastructure and devices. At its most basic level, these linkages involve the development of common technical languages which underlie electronic exchanges, for example the HTML text and Java programming languages. Security capabilities are a higher level enabler which has a critical role in determining the prospects for rapid deployment of electronic commerce. Standards which expedite the inter-operability of cryptography software and the roll-out of cross-certification systems for a broadly-based security infrastructure for digital transactions are vital tools for enabling secure electronic commerce across the domestic economy and internationally. Enabling software and systems are not only the basic tools for accelerating the adoption of e-com solutions by business, but they also represent an important opportunity for Canadian suppliers of these products.

Standards Players and Process - Domestic

Several Canadian organizations play important roles in electronic commerce standards formulation and implementation.

- *CSA International*, formerly the *Canadian Standards Association (CSA)*, is Canada's largest provider of integrated services for standards development, product certification and testing, and management system registration. It has played a leading role in the development of voluntary standards for the protection of personal information and in other areas related to electronic commerce. It is one of four major standards development organizations that are members of the National Standards System under SCC.
- The *Electronic Commerce Council of Canada (ECCC)* is a not-for-profit voluntary standards organization that has taken a lead role in the introduction and promotion of electronic commerce standards on an industry sectoral level.
- The *Standards Council of Canada (SCC)*, a federal Crown Corporation, promotes efficient and effective standardization and through its Advisory Committees contributes to standards work nationally and internationally. It provides the focus for the National Standards System

in Canada and is the national body representing international standards efforts in the International Organization for Standardization (ISO).

- The *Telecommunications Standards Advisory Council of Canada (TSACC)* is an industry-government partnership formed in May 1991 to develop strategic directions for standardization in information technology and telecommunications. As such it plays a central role in the design and implementation of electronic commerce standards in Canada and internationally. TSACC Working Groups have prepared two documents dealing with this area : a “Canadian Standards Roadmaps” for the telecommunications infrastructure and and the Electronic Commerce Standards Framework” focused on applications.

In addition to their domestic responsibilities, these organizations also play crucial roles as representatives of Canada in many of the key international standards fora dealing with electronic commerce.

Standards Players and Process - International

Due to the extra-territorial nature of electronic commerce and the networks and technologies on which it is based, standards work in this area is inherently international in scope. A great many international standards organizations and initiatives are now active in some aspect of electronic commerce. These include formal standards bodies operating partly or within the public sector and/or with public or governmental mandates, as well as a growing number of private sector-based activities.

Communications Standards Bodies. Significant work in electronic commerce takes place within international organizations traditionally involved in communications standards. The ITU, which was formed as an inter-governmental body in 1865, has had a long standing role in the development of communications standards and continues to play a lead role in producing standards sets ensuring the interconnection and inter-operability of telecommunications networks, both at the level of basic transport and messaging. Two other international organizations, the International Organisation for Standardization (ISO) and the International Electrotechnical Commission (IEC), through their Joint Technical Committee (JTC-1) have played a important role in the formulation of information technology in such areas as character sets, including issues pertaining to linguistic and cultural adaptation, multimedia (computer graphics and imaging) and in information network interconnection. The JTC-1 has also just initiated a new standards project in the area of Electronic Commerce. Another inter-governmental organization, the UN/EDIFACT has been active for several years in establishing standards for Electronic Data Interchange (EDI) and has now begun the migration of these standards to an Internet-based and electronic commerce-ready form of standard, along with the American National Standards Institute Committee X-12.

The Internet. In addition to the established communications arena, a series of standards initiatives have grown up surrounding the development and use of the Internet and World Wide Web. Generally, these are voluntary associations, representative of private industry, the academic and

research community and governments, who operate on a consensus basis. The Internet Engineering Task Force (IETF) is a major focus for Internet standards work and is increasingly linked to ongoing activities at the ITU and JTC-1. The World Wide Web Consortium (W3C), formed by major firms involved in the development of the Web, has been prominent in both technical standards and guidelines pertaining to content-intensive Internet services. The newly established Internet Corporation for Assigned Names and Numbers (ICANN) is another example of a voluntary group mandated to perform a vital standards related function applicable to the Internet - in this instance to govern the numbering scheme used for Internet addressing and allocate the use of domain names.

Business and Professional Associations. Several private sector organizations representing business and professional groups play prominent roles in the standards process for information technology and increasingly for electronic commerce. The International Electrical and Electro-Chemical Engineering Association (IEEE), with more than 330,000 individual members in 150 countries, remains one of the primary professional associations engaged in the development and mandating of information technology standards. The IEEE has more than 800 active standards and 700 under development, a large number of which relate directly to the deployment of information networks, computer devices and software for electronic commerce. A large number of business associations are active in standards development on an industry or sector-specific basis. The International Air Traffic Association (IATA) is one example of the many groups which have furthered standards development and application across their memberships. These and other such efforts are increasingly information technology based and oriented toward electronic commerce applications.

Standards Alliances. The accelerating pace of information technology development and its widespread adoption in the world economy have reinforced a trend toward more private sector driven and informal standards arrangements at the international level. Such activities are typically based on a broad corporate membership with general mandates to share standards information and work toward consensus-based standards. The ATM Forum was an early example of a corporate alliance designed to ensure the inter-operability of an advanced network transmission platform (Asymmetric Transfer Mode). RosettaNet, established in 1998 by major IT suppliers and users, has a specific goal of driving the development of electronic commerce standards across the range of business processes that form the product value chain.

A Standards Framework for Canada

The effectiveness of national standards efforts - at the firm level, in domestic standards bodies and within organizations at the international level - can make an important contribution to the development and use of electronic commerce in Canada. In support of such efforts, this paper and its attachments highlight the importance of standards work, clarify policy issues and interests from the Canadian perspective, and provide a practical guide to the standards players, processes and products that relate to electronic commerce. The attached documentation incorporates two "Standards Roadmaps" which were prepared for private sector organizations engaged in electronic standards development. Each of the two reports covers a major area of electronic commerce standards : the Information Highway "Roadmap" deals with telecommunications

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Information Highway Standards Roadmap

In 1995, the Telecommunications Standards Advisory Council of Canada (TSACC), in conjunction with the Information Highway Advisory Council, began work on developing a strategic framework for standards for the telecommunications infrastructure. This "Standards Roadmap" was developed through the TSACC Working Group on the Information Highway, a multi-disciplinary stakeholder group made up of Canadian telecommunications industry, service providers, manufacturers, associations and business users of telecom services.

The initial framework model was published in 1996. This model outlined the methodology to be used to analyse telecommunications scenarios. Each scenario was to be a study of a particular telecommunications system, indicating the logical structure of the system, common interconnection points, interconnection standards which apply to these points and the state or lack of standards development for them. The first scenario developed was a mapping of a typical public switched telephone network, followed quickly by a mapping of an integrated services digital network (ISDN) system. Version 1.0 of the Standards Roadmap was released in late 1997 at the G-7 Global Standards Conference on the Information Society held in Brussels. A revision of this 1997 “Roadmap” (Version 2.0), which will incorporate components to deal with Internet telecommunications standards and a scenario to cover telephony over IP, appears as Annex A to this paper.

The models and scenarios associated with the “Roadmap” have made a significant contribution to standards work undertaken at the international level, in North America at the American National Standards Institute (ANSI) Committee T1 Telecommunications and at both the ISO and ITU through their respective joint committees on the Global Information Infrastructure. The first version of the model was published and presented in 1996 at the Third Global Standards Collaboration meeting, and has been selected as the basic framework for standards identification.

Electronic Applications Standards Roadmap

In June 1998, TSACC began work on the development of a standards framework for electronic commerce applications, in cooperation with Industry Canada’s Task Force on Electronic Commerce. The objective was to prepare a conceptual framework of electronic commerce which would be used to identify standards requirements, assess the status of standards in reference to the requirements, provide strategic direction for new work in standards, and notify the appropriate standards development bodies of these new work requirements.

The initial work involved developing a model of electronic commerce based on an analysis of business needs and viewed from a business application perspective. It identifies three components

to business relationships in electronic commerce : persons, processes and data, and provides a three-dimensional mapping of e-com components in generic and sector-specific frameworks. The model points out the necessity to reference business entities consistently and in an unambiguous manner in a manner which facilitates the conduct of commerce electronically. The framework includes as well an inventory of standards currently under development or in place, and identifies which business applications related standards have been enabled electronically and those which have not. Internationally, this framework has been introduced in ISO. It is currently being promoted through the OAS CITELE to assist in harmonizing e-commerce activities in the Americas.

Development of the Framework

The Standards Roadmaps appended to this document are a product of work commissioned by TSACC, and reflect the view of members of the two TSACC working groups involved. The Standards Framework, both this covering document and the two Roadmaps were reviewed at a joint meeting of the Electronic Commerce Working Groups of the Information Technology Association of Canada (ITAC) and TSACC in Toronto in February 1999, prior to its submission for the approval of TSACC on March 24, 1999. TSACC intends to report the results of this work to the Standards Council of Canada in April, 1999.

Priorities for Future Work

The purpose of this paper and the attached "Roadmaps" is to provide a framework which can assist in establishing directions for future standards work by governments and the private sector. Although the precise strategies to be followed by individual firms and organizations and by Canada as a whole must be formulated within the standards processes described above, some priorities for private and public sector action are already evident.

Both governments and industry have a joint responsibility to further the process of open standards development by:

- encouraging the exchange of information on standards issues, requirements, and priorities;
- promoting standards at the industry and sectoral level; and
- providing adequate resources in support of standards development, especially to strengthen Canada's presence at the international level.

Governments have a particularly critical role - first, through its ongoing standards programs, as a source of support for standards activity related to electronic commerce; and secondly, as a model user of electronic commerce to become a catalyst for standards development and testing. Finally, Industry Canada's current initiatives aimed at the market development of electronic commerce throughout the Canadian economy can be a focal point for promoting the adoption of standards on a sectoral and cross-sectoral basis.

Ultimately, however, the success of Canada's standards efforts, both in terms of the rapid adoption of standards for electronic commerce at the national level as well as Canada's capacity to influence the evolution of international standards, relies heavily on the abilities and commitments of Canadian industry. In this regard, national standards bodies can be instrumental in identifying priorities for action, mobilizing industry support for priority initiatives, and rationalizing the use of available private and public sector resources.

Electronic Commerce Task Force
Industry Canada
March 1999.

NOTES

(1) In the U.S., studies have shown “IT industries alone have been responsible for more than one-quarter of real economic growth” in recent years - *The Emerging Digital Economy*, (U.S. Department of Commerce, April 1998). A recent report of the OECD, *The Economic and Social Impact of Electronic Commerce* (OECD, Paris, 1999), indicates that the use of information technologies for electronic commerce applications can produce impressive economy-wide gains in efficiency and competitiveness.

(2) *The Canadian Electronic Commerce Strategy*, September 1998.