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ISO/IEC JTC 1 INFORMATION TECHNOLOGY
Business Team on Electronic Commerce

Report to JTC 1:

Work on Electronic Commerce standardization to be initiated

Contents:

1 Executive summary

This report on " Work on Electronic Commerce standardization to be initiated " is provided to JTC 1 at the end of the lifetime of the JTC 1 Business Team on Electronic Commerce (BT-EC). It accompanies the other deliverable of the Team, the report on " Self-assessment of the JTC 1 Business Team on Electronic Commerce " (ISO/IEC JTC 1 N 5297).

This report contains the technical findings of BT-EC.

Due to time constraints, BT-EC focused mainly on Electronic Commerce of the category "Individual-to-Business", but, as broader input was available, also took a look beyond. BT-EC reviewed several sources for standardization requirements. As a conclusion, it identified the following key areas where standardization needs exist:

A) User Interfaces, including:
- Icons,
- Dialogue design principles,
- Customer profiles;

B) Basic functions, including:
- Trading protocols,
- Payment methods,
- Security mechanisms,
- Identification and authentication,
- Auditing and record keeping;

C) Definition and encoding of data and other objects, including:
- IT-enablement of existing standards,
- Techniques for defining message semantics,
- Localization,
- Registration authorities,
- Value domains needed in Electronic Commerce.

Work items needed in these areas are given. BT-EC undertook to assign priorities to these, but no full consensus could be established. However, table 1 below gives an initial orientation about those items deemed most urgent.

The Terms of Reference of BT-EC request that the Team, among others, delivers a set of formal proposals for new work in JTC 1 and other organizations, inside and outside of ISO/IEC. Due to time and resource constraints, BT-EC was not able to meet this request. Instead, only short statements are provided describing the work needed.

Therefore, BT-EC recommends that appropriate steps are taken by JTC 1 to explore such work items further. Also, BT-EC recommends to JTC 1 that steps are taken to improve cooperation with organizations inside and outside of ISO/IEC, who are active in drafting Electronic Commerce related specifications and take proper account of the multi-disciplinary nature of Electronic Commerce.

Finally, BT-EC recognizes that this report does address only a few of the many aspects of Electronic Commerce, but time and resource constraints did not permit to go furthere. It is, however, hoped that this report will help removing some of the roadblocks which prevent the implementation of global Electronic Commerce.

#	Work item	Category (as per 7.1.2)	Remark
A.1	Review existing and emerging standards regarding user interfaces, formal and de facto, to establish the status of work in this area and their interworking. Establish their relevance from a consumer/user interface perspective in a home environment, using also delivery mechanisms other than a PC.. (see 7.2.1)	I	
A.2	Develop a set of metaphors that are relevant for different domains within Electronic Commerce (e.g. shopping, traveling , ordering, searching, etc.). Existing desktop metaphors (office environment) may not be relevant for the consumer (home) environment, nor for other delivery mechanisms (smartphone, WebTV) (see 7.2.2.2.1).	I	
A.3	Develop a list of functions to be represented by each of the three (3) categories of icons; namely: (1) facilitating interaction; (2) representing certifications; and, (3) facilitating navigational aspects. Provide a functional description of these icons and provide design examples, both for visually represented icons and auditory ones (earcons). Define the grammatical rules for how these icons can be opened, closed, moved, emptied, etc. Icons to be developed in accordance with existing relevant standards. Relevant standards include not only office system standards, but also standards related to the design of information for the public (see 7.2.2.2.1).	I	
A.4	Review existing dialogue design principles for office systems (ISO 9241-10) and self-service card-based systems (prEN 1332-1). Adapt these and others to consumers in a home environment. Determine which navigational aids are needed and standardize their representation (e.g. icons) and functionality (see 7.2.2.3.1).	I	
A.5	Develop an approach to defining customer class profiles and individual customer profiles (see 7.2.3.1).	I	
A.6	Develop a starter set of customer class profiles using the approach defined in work item A.2. (see 7.2.3.1)	I	
B.1	Develop a trading protocol satisfying the above requirements. The trading protocol to be developed should try to reach the three subgoals above, wherever possible. (see 7.3.1)	I	This work should be carried out in cooperation with ISO/TC 68/SC 6 and exploit existing solutions.
B.2	Develop a limited set of standard payment methods, including standard payment objects. (see 7.3.2)	C	This work should be carried out by SO/TC 68/SC 6.
B.3	Harmonize digital signature methods.(see 7.3.3.1)	I	
B.4	Develop standards for key management infrastructure. (see 7.3.3.1)	I	
B.5	Develop standards for customer's means to sign Electronic Commerce documents including multimedia documents in an inherently untrustworthy environment. (see 7.3.3.1)	I	
B.6	Investigate which entities or items need EC- specific globally unique identification. Define different procedures for generating and attributing globally unique identifiers. For certain categories of such identifiers, the one-to-one correspondence to other identifiers (from other identification schemes) may need	I	

#	Work item	Category (as per 7.1.2)	Remark
	trustworthy certification. (see 7.3.4)		
B.7	Develop a common specification for verifying and validating the source of a data object and/or the identity of a communication partner in the Electronic Commerce context (authentication; see also Work item B.6)(see 7.3.5)	I	
C.1	Standardize an approach for the identification and mapping of encodable value domains (see 7.4.2).	I	
C.2	Develop standards for IT-enablement of existing standards using the approach defined in the standard for Work Item C.1. (see 7.4.2)	C	
C.3	Standardize the identification and mapping of the various categories of jurisdictional domains (With priority on those impacting several sectors of Electronic Commerce) (see 7.4.3).	C	
C.4	Develop a standard facility for use in defining the kinds of messages used in Electronic Commerce (see 7.4.4).	I	
C.5	Develop a set of message definition standards using the facility defined in work item C.4 (see 7.4.4).	C	
C.6	Define an approach for defining localization factors for the local use of Electronic Commerce (see 7.4.5).	I	
C.7	Define how to register and maintain various aspects of the value domains defined in the customer profile standards and in standards for localization factors (see 7.4.6).	I	

Table 1: Summary of high priority work items

2 Background

ISO/IEC JTC 1, in its effort to develop market-oriented standards, has created the concept of a Business Team as a means, in a cross-sectorial and cross-organizational manner:

- To review and analyze business needs;
- To translate these needs into standards requirements;
- To identify relevant existing or planned standards;
- To specify what new standards or changes are consequently required; and
- To encourage commitment of standards committees to create these standards.

The JTC 1 Business Team on Electronic Commerce (BT-EC) was established by JTC 1 in June 1997 with Terms of Reference as in JTC 1 N 4626, amended by N 4773.

BT-EC held its kick-off meeting on 9-11 July, 1997, in Berlin/Germany and held three additional meetings. The work of the Team was mainly conducted through e-mail and the use of a document server. In addition, BT-EC provided a WWW site with open information about its proceedings.

This report is one of two output documents of the Team: It contains technical findings of its activities. The other output document is a self-assessment report delivered to JTC 1 to assist in judging on the future use of the Business Team concept.

3 The BT-EC way of working

BT-EC recognizes that *Electronic Commerce* (EC) can be defined in many different ways. But rather than attempting to provide a satisfactory definition, the Team has chosen to take a more heuristic approach to EC and to do so from a global perspective, i.e. world-wide, cross-sectorial, multi-lingual, various categories of participants (including consumers). However, EC in the form of MOTO (mail order/telephone order) has explicitly been excluded from the scope of BT-EC.

EC has many different facets - technical, economical, political, fiscal, social, societal, cultural - of which only the technical is considered explicitly in this report. The other facets are addressed implicitly, e.g., when discussing consumer requirements for EC.

Given the resources available in the Team, the time to deliver its report and the huge complexity of the subject matter, the need arose for BT-EC to limit its scope pragmatically and to focus on a few topic areas. It is therefore important to point out that the findings in this report cannot be considered comprehensive. Rather, they are an attempt to provide additional insight into the broad area of Electronic Commerce.

Electronic Commerce can be broadly categorized into the following scenarios:

- Business to business,
- Business to public administration,
- Individual to business,
- Individual to public administration,
- Public administration to public administration,

with the understanding that each scenario holds in both directions.

Due to time constraints, BT-EC chose, at its kick-off meeting, to focus its work on "Individual to business", at the same time recognizing that some of its findings are more broadly applicable.

Electronic Commerce involving individuals (i.e. of the scenarios individual-to-business or to-administration) is unique in many respects: As a fundamental component, it brings human beings into play, with

- their requirements (see clause 5.2.2 for a full discussion) for
  - adequate man-machine interfaces,
  - privacy and data protection,
  - other societal aspects;
- the need to provide for different payment schemes, depending on the value of the goods traded;
- equal emphasis on aspects of interoperability between systems and on trust in the new technology;
- predominance of objects perceivable by humans rather than by computers (see also 6.2).

However, BT-EC also recognizes that Individual-to-Business Electronic Commerce cannot be studied in isolation as it links into the Business-to-Business category through merchant systems interconnected e.g., with financial institutions or transportation business.

Nothing illustrates the speed at which Electronic Commerce is currently evolving in the marketplace better than the fact that during the ten months of existence of BT-EC, a number of additional products were brought into the market. In addition, new private and public sector initiatives were launched, new standardization projects were started and new consortia were founded or published their results. It was against such a background that BT-EC carried out its assignment.

BT-EC intended to utilize the following methodology in its work:

1. Collect business requirements from various relevant sources;
2. Analyze such requirements,
3. Prioritize them and,
4. With the help of research results about existing specifications or those under development, translate them into requirements for new specifications or for the amendment of existing ones.

Despite the broad knowledge represented in the Team, it is to be noted that the expertise available among the Team members was unfortunately not fully adequate to cover the many facets of the multi-disciplinary nature of Electronic Commerce. The scope of the topic coupled with the time which members were able to contribute meant that several substantial individual contributions did not get the in-depth review and comment which they really required. The interests and expertise of the Team members sometimes showed an overlap and sometimes were completely divergent. Therefore, the results presented in this report are not in all instances consensus-based and fully supported findings. (For a more complete analysis of the Team's activities, see the separate Self-Assessment Report of BT-EC, ISO/IEC JTC 1 N 5297.)

Time and resource constraints did not allow for carrying out all four points in the methodology itemized above. In addition, time was insufficient for identifying and approaching organizations inside and outside JTC 1 to seek a commitment for the development of required specifications.

While the overall objective of BT-EC was to identify work items for standardization within or outside of JTC 1, it was not always possible to progress to such a stage. Therefore, this report also includes results of a different nature, e.g. fundamental decisions on technical orientations (e.g. regarding the need for anonymity).

4 Overview of other activities in Electronic Commerce standardization

4.1 Analysis of existing technical approaches to Electronic Commerce

During the course of its work, BT-EC analyzed some of the current key approaches which may serve as useful inputs in defining generic technical solutions for Electronic Commerce.

These approaches vary considerably in scope – some aim to provide a complete “architecture” (or “framework”, “reference model”), whereas others focus on particular aspects of Electronic Commerce (e.g. "trading"). However, common across these models is their attempt to address the technical requirements of Electronic Commerce in a coherent and systematic manner. This clause does not address the Electronic Commerce models as described in the various “White Papers” published by specific individual vendors recently.

Based on expertise and resources available, the approaches below were analyzed. The list does not represent any judgment of BT-EC as to the relevance of the approaches, nor does the list aim to be comprehensive.

- CommerceNet’s Architectural Framework for Internet Commerce (eCo System);
- EBES/EWOS Building Blocks for Electronic Commerce;
- Electronic Commerce Promotion Council of Japan (ECOM) common platform for Consumer-EC;
- Java Electronic Commerce Framework (JECF);
- Object Management Group Electronic Commerce Reference Model;
- Open Trading Protocol (OTP);
- Secure Electronic Market Place for Europe (SEMPER).

The details of these studies are found in 11.

A lesson can be derived from these studies:
There is not a unique approach to Electronic Commerce. Many organizations (including associations, consortia, fora and individual solution vendors) are working on Electronic Commerce. Their approaches are potentially incompatible and interoperability between any pair of approaches becomes an all-important issue for JTC 1. Given the commercial rewards for any organization whose approach may find widespread acceptance, interoperability will be difficult to achieve. JTC1 should do all in its power to work towards a harmonization of the various approaches.

4.2 Other standardization-related activities

BT-EC also noted the activities of the CEN/TC 224 - ISO/TC 68/SC 6 Group for Standardization on Electronic Commerce which are expected to provide significant proposals for future standardization work in support of Electronic Commerce. (see ISO/IEC JTC 1/BT-EC N 005).

BT-EC was aware of the activities of the JTC 1/SC 27 ad hoc Group GII Security. However, due to timing constraints, it was not possible to co-operate with this Group to the extent desirable.

5 Requirements

5.1 Synthesis from existing surveys

It is difficult to determine the scope of Electronic Commerce and the business requirements that it generates without trying to give a definition of its domain. For the purpose of this section Electronic Commerce is defined as *the use of present and future information and communication tech-*

nologies in the pursuit of business. The main issue with such a definition is that it encompasses a broad unlimited domain of applications. Many of the available surveys have the objective of identifying market needs and business constraints and using these to develop a framework which can be used in the deployment of Electronic Commerce. However, most of them do not achieve the objective because they are focused on specific segments of the business activity or influenced by the advances of some technologies.

However, two recent surveys could help in the better understanding of the foreseeable future of Electronic Commerce deployment. The first survey that we examine has been delivered by the *Committee for Information, Computer and Communications Policy* of the OECD. Its report *Measuring Electronic Commerce* [OCDE/GD(97)185] is extremely worthwhile because its *"purpose … is to begin to outline the issues associated with measuring Electronic Commerce, propose an initial framework and begin to compare some of the disparate data on the subject so as to form a mosaic which gives a clearer quantitative picture of the current status and future direction of Electronic Commerce".*

The second survey takes a completely different approach. The study *Measuring Information Society 1997*, contributed by the *Information Society Activity Centre* under the auspices of the European Commission, measures the acceptance of the NICT (*New Information and Communication Technologies*) by consumers or citizens in the different member states of the European Union. Although its domain is broader than Electronic Commerce since it covers social or societal aspects of the information society, its feedback is extremely useful in understanding the user perception of the NICT benefits.

5.1.1 Measuring Electronic commerce - OECD Survey

The first effort of the OECD survey is to propose a definition of the services which constitute the Electronic Commerce domain. As already mentioned, the difficulty encountered in this survey is that the different sources on which it has been working rarely offer such a definition and fail to specify the geographical coverage of their estimates. Figure 1 is presented in the OECD survey and is intended to indicate the various concepts in Electronic Commerce, ranging from the broadest definition, including all electronic fund transfers and credit card transactions, to the narrowest definition of business-to-consumer transactions including on-line electronic payment.

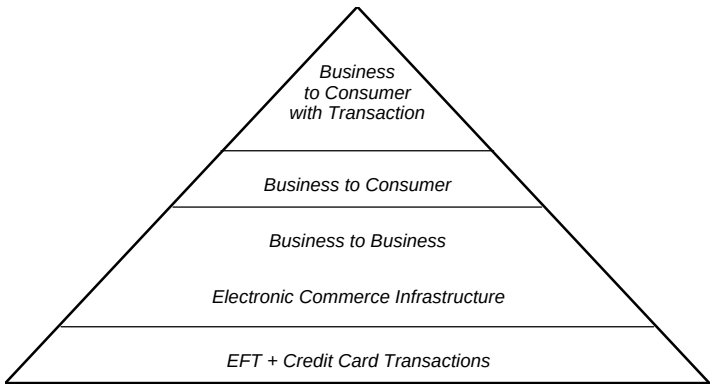

Fig 1. Typology of Electronic Commerce

The main conclusions of the survey are the following:

- Electronic Commerce is still at an embryonic stage where technology and the dynamics of the market are casting its basic shape. Policies and frameworks should be drafted with caution and in recognition of the evolving nature of Electronic Commerce.
- The volume of the business-to-business Electronic Commerce greatly exceeds the foreseeable volume of business-to-consumer Electronic Commerce. Key issues in this segment are:
    - ◊ adaptation of commercial business codes,
    - ◊ facilitation of transborder data flows between businesses,
    - ◊ agreement on new means for engaging contracts: authentication of partnership, proof of agreement (digital signature and certification).
- Within the business-to-consumer segment, the leading activity is entertainment. This calls on one side for regulation, in the sense that not all contents or services can be accepted by people or governments, and on the other side for the development of innovative services and techniques in fields such as electronic payment for small amounts, on-line certification and authentication techniques and self-regulation.
- In the business-to-consumers markets, digital products such as software, travel services and finance are and will continue to be the leading Electronic Commerce applications. This again calls on one side for regulation in the domain of consumer protection, and on the other side for the development of solutions for owner or service provider protection (enforcing copyright, fighting piracy).
- Electronic Commerce is currently relatively small compared to the overall business volume, but it is growing very quickly (over 200% annually). This trend cannot be ignored.

5.1.2 Measuring Information Society 1997 - Eurobarometer 47.0

This survey focused on consumers' and citizens' acceptance of the NICT and on their interest in new services, including broadly the many facets of Electronic Commerce. It is quite interesting both in terms of the survey sample (16 000 interviews in all European Union countries) and by comparison with the survey conducted in 1995. Three converging families of technologies are covered in the survey : information technology, digital TV and cellular phones.

Three sets of conclusions emerge as a result of a rough analysis of this very exhaustive survey:

- The importance of the individual's level of education in the acceptance of the services brought by the NICT. Clearly the interest in new technologies decreases with age, while most young people (15-24 years) have been exposed to PCs and the Internet. This phenomenon is especially noticeable in the case of information technology. The good news is that Internet awareness has grown spectacularly in two years: in 1997 less than 3% of interviewees were ignorant of the Internet as compared with 43.5% in 1995.
- Considering the results of the demographic data, there appears to be a bipolarization of the terminal set, essentially between television and computer:
    - ◊ the television set is viewed as easy, not very expensive, intended primarily to divert and very widespread both geographically and socially;
    - ◊ the computer is still viewed as a difficult and expensive technology, developed to help at work.

  The convergence of television and computer forces the audience to adapt to a new interface. This is an important field of reflection for standardization.
- In terms of sensitivity to new services and applications, the three top elected domains are healthcare, distance learning and electronic access to administrations, followed by job searching, travel services and personal finance. This represents a potential market of 10 to

20% of the overall EU population. The interviewees declare that they are ready to pay for the service in such domains.

5.1.3 Conclusions

It would not be fair to state conclusive orientations from the results of these two surveys. They nevertheless point to some interesting priorities for standardization activities:

- the need for a flexible and adaptive standardization framework, taking in account technology advances and market acceptance and reactivity;
- the recognition of the convergence phenomenon which is undoubtedly broadening the scope of Electronic Commerce standardization;
- the necessity of a dual complementary standardization approach focussing on both, technologies and applications.

5.2 Consumer requirements

5.2.1 Consumer interest in Electronic Commerce standardization

There are several reasons for consumer interest in Electronic Commerce and its standardization.

Firstly, Electronic Commerce (EC) will touch most facets of society and daily living, including fundamental services such as banking, shopping, etc. If the individual cannot cope with this, s/he will become socially disadvantaged and a two tier society will be created.

A second, closely related point, is that EC may be the only way certain products or services will be offered for sale in the future. Not being conversant with Electronic Commerce will reduce an individual's choice (choice being a fundamental consumer right).

Thirdly, it can, through economies of scale, provide better offers to the consumer than traditional city centre stores. Those conversant with Electronic Commerce will be able to enjoy lower prices, those not will pay higher prices.

Fourthly, it may be the most suitable way to shop for people living in remote areas, single parent families, people at work or for disabled consumers. Consumers who are not able to use the Electronic Commerce systems or do not trust them will be disadvantage themselves when this becomes a normal means of purchase.

Electronic commerce currently presupposes that the user has access to a computer and a modem. The costs associated with this (equipment, software, installation, not least of all training costs) will be a barrier to some. The use of other delivery techniques where the user already has invested in *existing* equipment (e.g. TV sets, screen phones) needs to be considered according to market requirements.

Following on from the point above, is the issue of Electronic Commerce delivery systems being compatible with other *emerging technologies* (e.g. Smart house control technologies). Through compatible systems, the user would be able to avoid purchasing, installing and learning several different pieces of incompatible equipment and systems.

Demographics are also changing. By 2010, twenty-five percent of the population will be elderly.

A concern that underpins several of the points above, is ease of use of Electronic Commerce systems. This concern has derived from the problem many users have when using existing low functionality self-service, or smart card systems.

One way of achieving ease of use is consistency at the user interface. Today's user interface solutions can hardly be described as consistent. If the systems are not easy to use, large sections of users will not be able to use them, or will use them inefficiently. This will in turn impact market acceptance.

On a positive note, users can achieve advantages using Electronic Commerce, provided that the systems are easy and consistent to use and accessible physically and psychologically. They should also be available via technologies other than the PC, e.g. through TVs, screenphones and mobile-phones.

5.2.2 Consumer requirements for Electronic Commerce

The following consumer requirements are not necessarily specific to Electronic Commerce, but generic for Information and Communication Technologies. Some of them are already met, partially or in full, by computerized information systems currently in use.

It should be noted that it is important to see all the requirements in relation to each other as they are interlinked. Resolving just one or two of the issues will not ensure that consumer interests are satisfactorily taken account of.

Requirements are not presented in any hierarchical order of importance. This is because the relevance and thereby importance of each and every requirement is situation-dependent. In some situations, some of the requirements may not be applicable.

5.2.2.1 Ease of use

Electronic Commerce must be easy to use for all intended user groups. Following ergonomics software principles for user interface design[1] should help achieve ease of use. Information presentation should follow a natural flow. A system should be designed taking into account the mental models of the users. The model of a systems designer should be „behind the scenes, but should not intrude on the users' perception of the system.

Electronic Commerce standards should address ergonomical aspects of hardware, software, services and support. Existing standards should be applied[2].

Metaphors and supporting icons should be standardized to help facilitate ease of use.

A usability metrics tool is needed.

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[1] e.g. ISO/IEC 9241-10 Dialogue principles and ISO/CD 13407 - 2 Human centered design processes for interactive systems

[2] e.g. IS 9241

Note: Ease of use can be measured in terms of performance (e.g. the time taken by users to complete a predetermined task, and/or number of errors, and/or satisfaction with a service: see ISO/IEC 9241 -11 Guidance of usability). Goals for ease of use (known as usability statements) should be developed.

5.2.2.2 Consistent user interface elements

A system must have consistent user interface elements. It is especially important that the method of processing, storing and accessing the systems is consistent for the user.

Note. A consistent user interface can be achieved by different means, e.g.:
1. All components of the user interface are uniform - this requires standardization.
2. The user interface adapts to the user, so that the user always meets a personalized uniform interface. This principle is the subject of the prEN 1332-4 «Identification card systems; Man Machine Interface: - Coding of User requirements on Smart Cards.»

5.2.2.3 Adaptability

A system should be adaptable to meet a user's specific requirements and abilities. For example, a system should provide output in a format and at a pace that meets the individuals' needs.

Note 1: This is a way of achieving consistency for the user.
Note 2: This principle could be applied to prevent unintended users gaining access to a system.
Note 3: This principle could be applied in the case of custom upgrading of a system.

5.2.2.4 Provision of system status information

The status of a system (e.g. waiting for input, checking, fetching, etc.) should be always available for the user (i.e. feedback). Different mechanisms should be employed to give complete feedback to the user. Messages should be positive and not place blame on the user. Equally, mechanisms for feedforward (especially of consequences of actions) should be available ("if you start down-loading the file you have selected it will take 76 minutes. Press «Cancel download» or «Down-load»"). Feedforward is an attribute that helps build trust in the system.

5.2.2.5 Error tolerance and system stability

The system should anticipate errors of operation and be forgiving. Informative error messages should lead the user forward. The system should be robust and should remain stable if users try services which cannot be delivered or make choices that are redundant.

5.2.2.6 Minimise the user's need to remember system operation

A system should display dialogue elements to the user and allow them to choose from items generated by the system or to edit them. Menus are a typical technology to achieve this goal.

5.2.2.7 Explorability

The system should encourage users to discover its functions, without the system crashing.

5.2.2.8 Design for all

Electronic Commerce standards should support the principle of "Design for all"[3]. This is a process of creating products, systems, services which are accessible and usable by people with the widest possible range of abilities operating within the widest possible range of situations.

3 in line for example with *UN Standard Rules on the Equalization of Opportunities for Persons with Disabilities*

This could be facilitated by standards on the interchange of different input/output devices needed to match the individuals requirements (e.g., a blind person wants voice output). Equally, an individual's requirements could be encoded in a standardized way (see below) so that the user interface of the system is adapted to the individuals requirements (language preference, input mode preference, etc.).

5.2.2.9 Functionality of solution

A standard supporting Electronic Commerce should take into account the requirements of different users groups and the user tasks which a system conforming to the standard is able to support. In the scope of an Electronic Commerce standard, it should be stated by which groups and for which tasks the system should be used, and in which operating environments. This statement should be open for review.

There may be occasions where a system is not intended for all users, e.g. it is intended to be childproof. In these instances, the scope of the underlying standard should state which users and tasks the system is not designed for and why these groups' requirements are not taken into account.

5.2.2.10 Multi-cultural aspects

Multi-cultural aspects (these are regarded by some as a geographical Localization issues) need to be considered when developing Electronic Commerce standards. These aspects might be affected by religion (e.g., No shopping on Sunday, national legislation, the shape and size of clothing/ footwear). (See 6.5 for more discussion on cultural adaptability)

5.2.2.11 Multi-linguistic aspects

Multi-linguistic aspects need to be considered. Existing standards should be applied and where necessary new ones developed. (See 6.3 for more discussion on multi-linguistic aspects.)

5.2.2.12 Terminology

As part of a user-centred design, the terminology used in user interfaces, (including brochures, user instructions and information presented by the system) should meet basic generic user requirements[4].

5.2.2.13 Comprehensible standards

Where consumer input is required in the standardization process, standards should be unambiguous and easy to understand, i.e. written in plain language so that non-technical people can comprehend them and contribute. ISO Guidelines on standards writing must be met.

5.2.2.14 Interoperability

Different services should be interoperable so that, in theory, any service can be accessed on any appropriate network on any relevant device, thus avoiding the acquisition of access to several different networks and terminals for similar services.

[4] or meet ISO Guide 37

5.2.2.15 Compatibility

Compatibility within a system should be ensured; for example, new versions of systems should be compatible with previous versions of the same system and components for systems originating from different manufacturers should be also be compatible. Different systems should be compatible so as to allow their joint operation.

5.2.2.16 Privacy

The system should ensure privacy of the individual.

5.2.2.17 Security of information

It should not be possible for unauthorized people to follow a user's activities on an electronic network. Electronic footprints are to be avoided. Standards should help provide methods for checking this, especially in open and decentralized networks. Necessary system-generated footprint data should be deleted after an appropriate time. The system should not allow disclosure of information about the user to unauthorized people and should indicate clearly to whom information is given.

Security of information sent, stored, received or deleted must be ensured. The level of security should be clearly stated to the user. Electronic signatures and encryption devices are clear candidates for standardization.

5.2.2.18 Cost transparency

The system must be transparent regarding all costs involved. Cost information should be presented in a standardized way. This includes both initial costs incurred by the user and subsequent costs for subscribing to and operating the system, especially when interworking on networks, or when using on-line help or other fundamental services (e.g. directory enquiries or short message service on a mobile phone). Disconnecting from a service must be free of charge or the charge must be stated in a standardized way at point of purchase.

5.2.2.19 Reliability of information

The system should indicate reliability of information (possibly by quoting sources) provided on the system. (e.g. "Balance of account is xxx ECU at 1000 hours on yyyy-mm-dd. Note: Bank clearing system has been out of action last two days.").

5.2.2.20 Quality of service and system reliability

There should be a way to determine and present quality of service and system reliability. This should include the development of performance indicators. This information should be displayed at the point of sale.

5.2.2.21 Rating and grading systems

Electronic Commerce standards should allow for the application of rating and grading systems.

Standards for evaluating and presenting ICT (Information and Communication Technologies) systems in terms of ease of use, cost, durability, system reliability and information reliability (source and content) will need to be developed.

5.2.2.22 Consumer participation throughout the system development process

Active consumer participation should be ensured throughout all phases of the standardization process in order to ensure "user friendly" systems. This includes the programming of standardization work, priority setting and participating in the technical work.

5.2.2.23 Ecological aspects

Developments should be sustainable in an ecological sense. Scientific and objective methods are needed to assess the environmental friendliness of products over their entire lifetime. This information should be indicated in a standardized way.

5.2.2.24 Ethical aspects

Scientific and objective methods are needed to assess ethically sound products (e.g. no child labour, no support of ideologies based on discrimination or violence) . This information should be indicated in a standardized way.

5.2.3 Conclusions

In section 5.2, high level consumer requirements for Electronic Commerce have been identified. It should be noted that these requirements are not exclusively the prerogative of consumers, - in fact most, if not all of the requirements could be equally applicable to other actors such as business users.

It is noted that Electronic Commerce is still in its infancy and therefore more practical work (field trials, experience transfer) is needed so that more definitive and supplementary statements on consumer requirements can be made.

5.3 Business examples

The Business Team used business examples drawn from business cases, to identify issues which, in the course of standardization, will require technical decisions to be made. The degree of detail and focus of attention of the business cases were chosen in such a way that, besides an identification of business requirements, a discussion of some potential technical solutions was supported by the material.

5.3.1 Characteristics of the business examples

The following abbreviations are used: EC - Electronic commerce, C – the customer, M – the merchant, B – the customer's bank, TTP – the trusted third party.

The smallest structuring elements of a business example are events like message exchanges between the co-operating parties (including between C and his/her PC) and the related state changes. This view reflects the understanding that a major goal of standardization in EC is a multi-party trading protocol, the backbone being the customer/merchant trading protocol.

The following assumptions are common to all examples:

- The customer C:
    - C is a person occasionally using an EC-network to participate in EC.
    - C's equipment consists of a PC or a similar computer system, one or several smart cards or similar personalized devices, e.g. as a home of his/her cryptographic keys.
    - C has a globally unique identification for his/her participation in EC.
    - C and his/her computer system are only occasionally present in the EC network.

        - C takes all important decisions regarding EC personally, i.e. he/she does not delegate such decision to his/her computer system.
    - The merchant system:
        - is typically a highly available computer system with long-term secure storage,
        - has a globally unique identifier in the context of EC, and
        - makes (most) decisions without human intervention.

Note 1: Not all Electronic Commerce is expected to require Trusted Third Parties; many business transactions will be based on extensions to business contractual relationships.

Note 2: The concept of "unique identifiers" may mean "the same identifier always points to the same identity", but "uniqueness" does not imply "singular" identifiers (same identity implies same identifier).

The examples had the following characteristics:

5.3.2 Acquiring expensive services, e.g. an airline ticket. No anonymity needed.

C runs a network-based search for a business partner. Thus the partners may very well never have done business together before.

The structure of a negotiation protocol for making a contract is discussed. The concept of a binding offer, electronically signed, is introduced and some typical elements are listed. Signed messages of acceptance, referring to a valid binding offer and possibly complementing it, and signed positive or negative acknowledgements by M, are proposed.

The normal payment/delivery deadlock is considered and the introduction of a TTP, typically a bank, especially B, is proposed. The need for certificates of the participants' qualities (as partners in EC) in order to establish mutual trust is made evident.

The role of smart cards for C receiving service (e.g. air transportation) is exemplified.

It becomes obvious that the differences in stability between the customer system and the merchant system result in strongly unsymmetric rules for the recovery procedures.

For details of this example see ISO/IEC JTC 1/BT-EC N 14.

5.3.3 Buying a book by an anonymous customer.

The book is to be delivered through the EC-network. Degrees of anonymity are explained: anonymity with and without traceability. C wants to remain anonymous towards M but not towards B, i.e. B will know for what purpose C’s money is spent.

The problem of copyright protection is touched upon. Protocol flow is outlined allowing C, by means of encryption and digital signatures, to make a contract anonymously with M; B is engaged to sign the contract on behalf of C and to guarantee payment to M.

The concept of a certified pseudonym of C, possibly issued and certified by B, is introduced.

Delivery of the encrypted book text together with an additional signed statement by M helps to remove the delivery/payment deadlock. The procedure will enable C to sue M if the decrypted material does not reveal the ordered book.

For details of this example see ISO/IEC JTC 1/BT-EC N 14

5.3.4 Purchase of a network-transportable item; very low- to medium-level price.

The usage of a bank card (a special smart card), producing, on request, prepaid crossed checks, is outlined. The intention is to allow C anonymous payment of a bill of a few US cents for a very small fee to the banking system. Will the banking system be able to handle a low-value money transfer for a fee of one cent ? How many cents would be acceptable for C ?

Anonymity, even with untraceability of C's activities, towards M and, if necessary, even towards B, can be achieved. The genuine trading protocol between C and M is very short with respect to the number of message exchanges.

Admittedly, the bank card is a very critical device since it contains a mechanism for signing checks, specified and requested by C, with the bank's signature.

Double spending can be detected and the double spender tracked down.

Finally, some selected topics concerning payment/delivery sequencing are presented. They include the concept of certified texts; they allow a TTP, based on computer action only, to check whether a delivered text it has received on behalf of C is really the text ordered by C.

For details of this example see ISO/IEC JTC 1/BT-EC N 31.

5.3.5 Issues

During the study of these examples, some fundamental issues were identified which, due to differing views and a lack of resources, could only partly be resolved by the Team:
Issue 1. What is signed as a contract?
Issue 2. How to produce digital signatures when mainly using untrustworthy equipment?
Issue 3. Questions on anonymity.

For details of these issues see 12.1 and ISO/IEC JTC 1/BT-EC N 39, N 40, and N 43.

5.3.6 Conclusions

From the business examples, the following was be concluded:

- A need for a trading protocol exists which embraces all phases of a transaction, from offer to delivery, and not only the payment phase. This trading protocol should support several electronic payment schemes, depending on the volume to be paid and preferences of the parties involved.
- Management of trust: As a result of a network-wide search for a business partner, a customer may have found a partner to whom no business contact existed before. Therefore, the need exists to have sufficient trust in the merchant's ability and/or willingness to fulfil the contract and to deliver the ordered goods. Mechanisms, technical and organizational, are required to establish this trust.
- The fact that a person, not a computer, takes the ultimate decision on the customer side, leads to the requirement that an object which is to be digitally signed as a contract, is human-interceptible, rather than computer-encoded (for further details, see 12.1.1).
- Devices which are used for Electronic Commerce, such as PCs, are potentially not trustworthy. Hence, if a digital signature is to be produced, provisions must be taken that the contract to be signed is not unknowingly manipulated within such device (for further details, see 12.1.2).
- Like in conventional shopping, the desire for a customer to remain anonymous vis-à-vis the merchant may exist. The need for potential anonymity of the customer vis-à-vis a financial institution depends on the degree of personal data protection which the financial institution of-

fers out of legal or other reasons. BT-EC, however, did not see a requirement for a merchant to remain anonymous vis-à-vis any of the trading partners (cf. also 12.1.3).

6 Horizontal aspects

6.1 Overview

BT-EC identified four horizontal issues as being of general relevance for all scenarios involving Electronic Commerce and gave these horizontal issues some prominent attention in its work. These issues are:

- information technology (IT) -enablement,
- localization including multi-lingualism,
- cross-sectorial aspects,
- cultural adaptability.

These horizontal issues are ordered here on the basis of

1. the need to go from the simpler to more complex challenges,
2. placing priority on the "do-able" and immediately most useful in the context of increasing resource constraints in standardization work; and,
3. promotion and visibility of ISO/IEC JTC 1 work within the ISO, IEC and ITU and especially outside of these standardization communities.

From a user perspective, these four horizontal issues need to be addressed in a harmonized manner.

A key characteristic of commerce world-wide, in particular in the business-to-business and business-to-administration domains, is that it consists of business transactions which:

1. are rule-based, i.e., mutually understood and accepted sets of business conventions, practices, procedures, etc.; and,
2. make extensive use of "codes", often table-based, representing predefined possible choices for common aspects of business transactions. Examples include countries, currencies, languages, manufactures and their products.

Many of these sets of agreed-upon rules used in business world-wide and their associated lists of tables/codes are "de jure" and "de facto" standards. BT-EC noted that numerous international standards are already in use in support of commerce world-wide. The problem is that most are paper-based and lack a computer-processable version. Even if distributed in electronic form, these standards including those of ISO, used in commerce world-wide consist of tens of printed pages. They cannot be "plugged-in" for use in Electronic Commerce. Much of the intelligence in these international standards is humanly understandable explicitly or implicitly. They have not been described formally using Formal Description Techniques (FDTs), i.e., in their present form they do not support "computational integrity". Consequently, each enterprise using these code sets has to spend considerable time and effort to (1) determine their meaning and interpret them; (2) build applications; and, (3) hope that they interoperate with other networks or enterprises.

Human beings like to name "objects". But the approach of using "names" is not very IT friendly, cost-efficient or time-efficient.

Depending on the interplay of multi-lingual and localization requirements, in Electronic Commerce, a singular product or service being offered for sale will have multiple names and differing names even in the "same" language. Thus, if we wish to ensure rapid and widespread use of

Electronic Commerce globally, we must on the one hand identify "objects", i.e., products or services being offered for sale, in an unambiguous, linguistically neutral, and IT-processable and EC-facilitated manner, and, on the other hand, present the same via a range of linguistic names (and associated character sets) from a point-of-sale perspective, i.e., human-readable user interface, as required by the "local" marketplace.

In order to provide a focus for its work on horizontal issues, the BT-EC utilized four real world examples; namely:

- Currency Codes,
- Country Codes,
- Language Codes,
- Commodity Codes.

(For details of these examples see 12.3 and JTC 1/BT-EC N 047.)

These examples represent standards used for commerce world-wide and are presently implemented by enterprises and their information systems in wide variety of different ways. There are also no "standard" ways for the interworking among these and similar standards. This does not promote global interoperability. The recent widespread use of the Internet is exacerbating existing ambiguities.

From a BT-EC perspective, these four examples underline the fact that with respect to electronic commerce there may be less of a need for new standards. Rather the immediate challenge may well be the development of a category of information technology standards which will facilitate the development of information technology enabled versions of existing standards used in commerce and do so in a manner which also supports the interplay of localization and multi-lingual requirements, i.e., "bridging standards".

BT-EC wishes to pass on the following considerations for such standardization work in support of Electronic Commerce; namely:

1. Standards must focus on the interface (as opposed to implementation) as the best means of arriving at globally harmonized solutions for interoperability from both a business and information technology perspective.

2. Standard interfaces among information systems must be technology neutral accommodating advances in technology to the extent possible. Further, such standard interfaces must be linguistically neutral to the furthest extent possible.

3. In order to empower users and consumers, standards should be adaptable to local and multilingual requirements at national and regional levels, while ensuring full transparency of available market solutions to the consumer. Multi-lingualism must be considered. The expansion of open, multi-lingual standards could significantly increase the volume and value of world-wide Electronic Commerce.

6.2 Information Technology (IT) -enablement

"IT-enablement" is the term used to identify the need to transform currently accepted standards used in commerce world-wide from a manual to a computational perspective. Electronic commerce, in particular of the Business-to Business or Business-to-Administration categories, introduces a requirement for standards that are prepared, structured and made available for unam-

biguous usage within and among information systems. This requirement can be expressed as "computational integrity", in particular:
"the expression of standards in a form that ensures precise description of behaviour and semantics in a manner that allows for automated processing to occur, and the managed evolution of such standards in a way that enables dynamic introduction by the next generation of information systems".

The objective of IT-enablement is to capture in a computer-processable manner, and one which maximizes interoperability, the implicit rules and relations (i.e., those known to "experts") of the code sets found in standards used in commerce world-wide, i.e., capture and state from an entity relationship and/or object technology perspective, using Formal Description Techniques. Also, issues arising from change management in "code tables", i.e., synchronization, backwards compatibility, migration, etc. need to be addressed.

IT-enablement is based on the premise that a detailed and exhaustive identification of standards and "conventions", etc., used in support of existing commerce, will eliminate many barriers to Electronic Commerce.

IT-enablement recognizes that within ISO, IEC and ITU, there are committees which have the domain responsibility and expertise in areas of work, the primary purpose of which is to manage and control the content. IT-enablement also recognizes that outside of ISO/IEC/ITU, there are many other organizations which have domain responsibility and expertise in subject areas relevant to global Electronic Commerce. Their "content" and industry sector domain oriented standards require an IT-enabled version for use in Electronic Commerce.

BT-EC suggests that JTC 1 gives proper consideration to IT-enablement, initially focused on currency, country, language and commodity codes. Members of BT-EC are of the opinion that such work will serve as the necessary practical experience and expertise needed to develop a generalized approach to "IT-enablement". This should also help to support localization and multilingual requirements.
(For further information, see document ISO/IEC JTC 1/BT-EC N 46.)

6.3 Localization and multi-lingualism

IT-enablement is based on the premise that to ensure rapid and widespread use of Electronic Commerce globally, we must on the one hand identify "objects", i.e., products or services being offered for sale, in an unambiguous, linguistically neutral, and IT-processable and EC-facilitated manner, and, on the other hand, present the same via a range of linguistic names (and associated character sets) from a point-of-sale perspective, i.e., human-readable, as required by the "local" marketplace.

BT-EC reviewed existing JTC 1 terms and definitions of "locale", (see ISO/IEC JTC 1/BT-EC N 46). Those aspects normally are related to the character sets associated with a natural language, including collating/ordering, data/time formats, monetary formatting, etc., a.k.a. "cultural elements".

From an Electronic Commerce perspective, BT-EC identified four additional sets of parameters of "localization" requirements which should be addressed, namely:

1. jurisdictional requirements, i.e., various combinations of "top-down" legal and regulatory frameworks which place constraints on the global marketplace and in doing so, often define/establish a "local" market;

2. consumer requirements, i.e., combinations of "bottom-up" consumer demands and behaviour;

3. supplier requirements, i.e., combination of factors impacting on suppliers of goods and services (as well as those involved in supporting logistics chains); and,

4. human rights-related requirements, (e.g., disabled/handicapped, privacy, etc.).

BT-EC defines "localization" as:

localization: pertaining to or concerned with anything that is not global and is bound through specified sets of parameters of:

- *(a) a linguistic nature including natural and special languages and associated multi-lingual requirements;*
- *(b) jurisdictional nature, i.e., legal, regulatory, geopolitical, etc.;*
- *(c) a sectorial nature, i.e., industry sector, scientific, professional, etc.;*
- *(d) a human rights nature, i.e., privacy, disabled/handicapped persons, etc.; and/or*
- *(e) consumer behaviour requirements.*

Within and among "locales", interoperability and harmonization objectives also apply.

From an Electronic Commerce perspective, "jurisdiction", on the whole, represents a set of local market entry and/or participation requirements which may be of a general nature or product-/ service-specific.

From a legal perspective, the basic entity is the country. Two or more countries among themselves can form a common harmonized "jurisdiction" governing the marketplace, through a bilateral or multilateral agreement. Where these agreements are of a general nature, the harmonized "jurisdiction" is know as a "region". Examples here include the European Union, NAFTA, etc.. Within countries, there may be various approaches to more granular legal and regulatory frameworks, e.g., at the level of states, provinces, etc..

In addition to a jurisdiction with a geographic dimension, there are jurisdictions bounded by a goods and services dimension. Examples here include airlines, banking, oil companies, etc. Here jurisdiction is often expressed through treaties, regulations, agreements, etc., which are harmonized through an entity representing these communities (e.g., ICOA, WCO, or WTO).

Combinations of laws and regulations can be viewed as frameworks. BT-EC can thus define jurisdiction as:

"jurisdiction: a distinct legal and regulatory framework which places constraints on the global marketplace and in doing so often defines/establishes a local market".

Electronic commerce is "borderless" in its nature - it transcends jurisdictions.

From a BT-EC perspective, multi-lingual requirements comprise more than just the need to support the character sets and sort/collate sequences of the various languages used by customers

world-wide. It also means that a single natural language is utilized in different ways in various local markets.

In addition, one should add the concept of special languages, i.e., those of a scientific or technical nature, as well as those which pertain to a specific industry sector. Many of these can be considered to be global in nature and use.

Thus from an Electronic Commerce perspective, "multi-lingual" requirements embody not only:
1. multiple natural languages; but also,
2. multiple and different uses of the "same" natural language;
3. multiple source languages in any multi-lingual thesauri, database, referenceable permitted value domains (PVDs), i.e., tables, code sets, etc.; and possibly also,
4. the use of special languages.

In this context, one can define:

multi-lingualism: "the ability to support not only character sets specific to a language (or family of languages) and associated rules but also localization requirements, i.e., use of a language from jurisdictional, sectorial and consumer marketplace perspectives".

From a BT-EC perspective adding multi-lingual capabilities in Electronic Commerce can be viewed as simply mirroring the existing physical world requirements. Prime examples here are product labelling requirements and product usage instructions. Given the increasing globalization in trade in goods, single language usage instructions accompanying products are increasingly rare and multi-lingual usage instructions increasingly common place.

6.4 Cross-Sectorial issues

Cross-sectorial issues pertain to differing, at times conflicting, understandings of business practices, object identification, etc., among economic sectors. The challenge here is that of resolving two sets of issues:

1. Industry sectors, scientific fields, and professional disciplines assign their own uses or meanings to the terms of a natural language. Quite often natural languages are used in the manner of what we earlier called "special languages": the same word/term frequently has very different meanings in other industry sectors. There is a trend in various sectors towards using existing non-technical "common language" words as terms with new technical meanings. This problem of polysemy needs to be taken into account in cross-sectorial Electronic Commerce.

2. Multi-lingual equivalency needs to create an added layer of complexity and even more so for unambiguous cross-sectorial interoperability in support of Electronic Commerce (as well as world-wide "individual-to-business" Electronic Commerce via the Internet).

A case study on cross-sectorial issues (see JTC 1 /BT-EC N 045) led in respect to scientific languages to the conclusion that a scientific language can be considered a culturally neutral exchange language which, in turn, has multiple natural language and culturally dependent linguistic equivalent terms.

Technical languages and their use in particular industry sectors, however, do present particular challenges to cultural adaptability and cross-sectorial interoperability since they do not have the attributes of scientific languages. Technical languages as linguistic sub-systems are difficult

enough to handle even within their industry sector, in one natural language. To this are added the challenges of localization, multi-culturalism and cross-sectorial interactions in Electronic Commerce.

Each industry sector interacts with other sectors. A key characteristic of special languages is an associated controlled vocabulary of terms, often also in a multi-lingual manner.

In conclusion, it should be noted that within industry sectors, established standards and conventions exist for unambiguous identification and referencing of unique objects, and for naming them (often multi-lingually), along with associated rules. Although not originally designed to interoperate across and among industry sectors, many of these sectorial standards have core constructs in common which could be utilized to support cross-sectorial Electronic Commerce and in a manner which accommodates localization and multi-lingual needs.

6.5 Cultural adaptability

BT-EC viewed "cultural adaptability" as a set of requirements affecting global Electronic Commerce from a cultural perspective and noted that these can co-exist within "localization" and "multi-lingualism" requirements. In addition, there are societal aspects which often are not bounded by jurisdiction or geographic area (e.g., Jewish and Muslim cultures transcend jurisdictional boundaries).

The following definition of "cultural adaptability" is found in JTC 1 N4627:
The special characteristics of natural languages and the commonly accepted rules for their use (especially in written form) which are particular to a society or geographic area. Examples are: national characters and associated elements (such as hyphens, dashes, and punctuation marks), correct transformation of characters, dates and measures, sorting and searching rules, coding of national entities (such as country and currency codes), presentation of telephone numbers, and keyboard layouts".

This definition of the concept/term "cultural adaptability" is the same as that for "cultural elements" found in ISO/IEC JTC 1/CAW N 008. It has a focus on special characteristics of natural languages and commonly accepted rules for their use which are particular to a society or geographic area. The emphasis here appears to be on character sets, scripts, glyphs, etc., their ordering, sorting, search, etc.

However, in commerce world-wide, it is not so much the natural language but the usage of special languages (e.g., technical and scientific), which forms a significant challenge to providing interoperability in Electronic Commerce. This is true especially for "technical" uses of natural languages by different industry sectors. Differences in uses of a natural language exist also in industry sectors which represent sets of requirements other than those particular to a society or geographic area.

BT-EC made an effort to coordinate the work on this horizontal issue with the JTC 1/CAW (Cultural Adaptability Workshop). BT-EC notes Resolution 3 of JTC 1/CAW which states "that CAW did not have time to address the request of JTC 1 to elaborate or amend the definition of cultural adaptability as contained in the document JTC 1 N4627".

From an Electronic Commerce perspective, standardization work addressing the three horizontal issues associated with

- "IT-enablement",

- "Localization and Multi-lingualism", and
- "Cross-Sectorialization"

should resolve some of the requirements for "cultural adaptability". It then remains to be seen what other "cultural adaptability" requirements remain, i.e., those of a societal nature (see also 5.2.2).

7 Standards urgently needed to support Electronic Commerce

7.1 Introduction

7.1.1 Areas for standards needs, and priorities

Based on the findings in the previous sections, the following key topic areas have been identified in which requirements for standardization exist:

A) User Interfaces, including:
- Icons,
- Dialogue design principles,
- Customer profiles;

B) Basic functions, including:
- Trading protocols,
- Payment methods,
- Security mechanisms,
- Identification and authentication,
- Auditing and record keeping;

C) Definition and encoding of data and other objects, including:
- IT-enablement of existing standards,
- Techniques for defining message semantics,
- Localization,
- Registration authorities,
- Value domains needed in Electronic Commerce.

Such needs were evaluated with respect to urgency and their potential to remove roadblocks to the emergence of global Electronic Commerce. They were classified into the following priorities:

- High (H): considered essential for the global (geographical and sector-wise) implementation of Electronic Commerce;
- Medium (M): important to speed up the introduction of Electronic Commerce and to promote acceptance; therefore recommended to JTC 1;
- Low (L): items which are considered as being "nice to have".

While it was deemed necessary by the Team to provide a sharp focus to JTC 1 on the essential work items, it should also be recognized that any such prioritization may be subjective and, in some cases, was not supported by the full Team. Therefore, while this clause identifies only needs of the priority H (High) and other needs are found in 10, the latter are also strongly recommended to JTC 1 for further evaluation and consideration.

7.1.2 Categories of standards

For the purposes of this report, it is useful to identify three broad categories of standards needed to support Electronic Commerce:

a) sector-specific (S)

b) cross-sectorial (C)
c) IT infrastructure (I)

Standards already exist in each of these categories, some of which were developed with the specific aim of supporting Electronic Commerce and some of which were developed (or at least started) before Electronic Commerce became accepted as a meaningful concept.

7.1.2.1 Sector-specific standard

A sector-specific standard (for the purpose of this report) is identified as a standard which is specific to a sector such as banking, health care, libraries, travel or tourism, etc.. It is important that sectors not conventionally thought of as “commerce” are not omitted from consideration.

Each standard in this category should be assigned to the appropriate sector-specific Technical Committee. Further, BT-EC notes that outside of the ISO, IEC, and ITU, there are also recognized authorities who undertake work of a standardization nature which imparts on the widespread deployment and use of Electronic Commerce. For these and other sector-specific standards, JTC 1 should make its standards work known, particularly for those which can serve as part of a common "tool set" for IT-enablement of sector specific standards.

7.1.2.2 Cross-sectorial standard

A cross-sectorial standard is a standard which is relevant to more than one sector but which is not part of the IT infrastructure.

Each standard in this category should be assigned to an appropriate Technical Committee, if it exists, such as ISO/TC154. Otherwise, ISO needs to address the issue of cross-sectorial standardization in an appropriate way.

7.1.2.3 IT infrastructure standard

A standard in the category IT infrastructure is a standard which is relevant to information technology and potentially to any information system which may be designed and implemented to support the activities in any sector (including activities relevant to the design, implementation and operation of information systems).

For the purposes of this report, an IT infrastructure standard is a standard which may be used to support Electronic Commerce. JTC 1 should take actions as to maximize visibility and utilization of existing IT infrastructure standards.

It should be noted that certain standards are needed to define standards in the other two categories and that such standards will typically also be usable outside the broad area of Electronic Commerce.

7.2 A: User interfaces

7.2.1 Introduction

To facilitate a minimum level of human-system interaction, there is a need for standardization work in the following areas:

a) user interface elements,
b) adaptable user interfaces through encoding of user requirements,

c) usability,
d) end user participation in the design process.

It should be noted that the above areas are closely interrelated and should interwork.

BT-EC recognizes that there are standards existing or under development that may appear to cover some of the above elements. However, many of these existing standards were developed for the office environment, for trained office workers, and for the PC. These standards may not be relevant for the (untrained) consumer, in a home environment, using delivery mechanisms other than the PC (smartphone, WEB TV, mobilephone, etc.). Existing standards may not interwork.

Therefore, the following high level work item is identified:

Work item A.1: ***Review existing and emerging standards regarding user interfaces, formal and de facto, to establish the status of work in this area and their interworking. Establish their relevance from a consumer/user interface perspective in a home environment, using also delivery mechanisms other than a PC.***

Pending the results of this, new work items may be needed with respect to the categories above.

7.2.2 User interface elements

7.2.2.1 Introduction

The focus of BT-EC on the "individual to business" aspects of electronic commerce has brought to the fore the importance of addressing key components of the "Human - Information System Interface".

Evaluation of these requirements and their resolution through standards will help:

- To assist individual consumers in their interaction and use of systems utilized to deliver electronic commerce-based goods and services;
- To promote consumer confidence in systems supporting electronic commerce;
- To facilitate efficient use of IT systems in support of electronic commerce:
- To reduce significantly and minimize the probability of errors when individuals engage in Electronic Commerce;
- To improve consumer learnability and familiarity with electronic commerce.

The following sub-sections identify user interface elements required to facilitate human ↔ IT systems interaction in support of electronic commerce.

7.2.2.2 Icons and metaphors and their underlying functions.

Metaphors provide a relevant image of how the system works (e.g. desk top metaphor for office systems, filing cabinet for database, etc.) - comprising a desktop. Metaphors are often supported by underlying icons.
There are three categories of interrelated icons to be considered; one set is specifically for facilitating interaction, one set is for representing certification (e.g. copyright, Quality of Service, Usability) and the third is for facilitating navigational aspects (page forward, page back, scrolling). The functionality of the icons (opening, closing, moving, etc.) needs consideration. Icons can be presented visually (on screen) and/or auditorily (earcons) e.g. as tones, alerts, etc.

7.2.2.2.1 Work items

Work item A.2: ***Develop a set of metaphors that are relevant for different domains within Electronic Commerce (e.g. shopping, travelling , ordering, searching, etc.). Existing desktop metaphors (office environment) may not be relevant for the consumer (home) environment, nor for other delivery mechanisms (smartphone, WebTV).***

Work item A.3: ***Develop a list of functions to be represented by each of the three (3) categories of icons; namely: (1) facilitating interaction; (2) representing certifications; and, (3) facilitating navigational aspects. Provide a functional description of these icons and provide design examples, both for visually represented icons and auditory ones (earcons). Define the grammatical rules for how these icons can be opened, closed, moved, emptied, etc. Icons to be developed in accordance with existing relevant standards. Relevant standards include not only office system standards, but also standards related to the design of information for the public.***

7.2.2.2.2 Relevant standards

ISO 3461	General principles for graphical symbols for use on equipment - Creation of graphical symbols
ISO 7000	Graphical symbols for use on equipment - Index and synopsis
IEC 417	Graphical symbols for use on equipment. Index, survey and compilation of the single sheets
ISO 9186	Procedures for development and testing of public information symbols
ISO/TR 7239	Development and principles for application of public information symbols
ISO/IEC 11581	Information technology - User system interfaces - Icon symbols and functions
ISO/IEC DIS 1158-1	Icon symbols and functions Part 1- Icons - general
ISO/IEC DIS 1158-2	Icon symbols and functions Part 2 - Object Icons
ETSI ETR 070	Human factors (HF); The Multiple Index Approach (MIA) for the evaluation of pictograms
--	Standards for tones (ITU/ETSI).

7.2.2.3 Dialogue design principles

Dialogue design principles for ensuring good human-system interaction across several delivery mechanisms (PC, TV, phone) and how to implement them are needed. This includes principles for navigation e.g. procedures and sequence for getting into the system, navigating (back, forward, return, exiting and aborting). Some of these navigational principles could be represented by icons (e.g. scrolling).

7.2.2.3.1 Work item

Work item A.4: ***Review existing dialogue design principles for office systems (ISO 9241-10) and self-service card-based systems (prEN 1332-1). Adapt these and others to consumers in a home environment.***
Determine which navigational aids are needed and standardize their representation (e.g. icons) and functionality.

7.2.2.3.2 Relevant standards

ISO CD 13407-2	Human centred design processes for interactive systems

ISO 9241-10 Ergonomic requirements for office work with visual display terminals (VDTs) - Part 10: dialogue principles

7.2.3 Encoding customer profiles

In order to achieve a user interface that is adapted to the end user, there is a need to develop a standard way of representing encoded customer profiles. The types and formatting of data to be included in such profiles needs to be standardized. It is necessary to consider customer class profiles and individual customer profiles.

These profiles would be referenced by computerized information systems used for Electronic Commerce in order to determine the way in which output from the system (and input to the system) needs to be represented for users.

Examples of the types of data to be included in such profiles are language preference, interface complexity, character size, colour preference and colours to be avoided. Examples of special needs include voice output, sound amplification, and choice of input/output devices.

When output is presented to a customer for whom no profile exists, a standardized default representation should be used. When both an individual profile and a class profile are available it would be necessary to resolve the potential conflict - typically by using the individual profile.

Consumer rights profiles will have an influence on which customer class profiles will be needed.

The consumer should be able to check the profile and make or have made required changes. The profiles should not be captured by the terminal or server.

7.2.3.1 Customer class profiles

Work item A.5: Develop an approach to defining customer class profiles and individual customer profiles.

This work item is part of the IT infrastructure which is needed to support Electronic Commerce and should be developed in an appropriate JTC 1 sub-committee. With respect to user profiles pertaining to "individuals", the BT-EC assumes that standardization work in this area will support applicable privacy and data protection requirements.

Work item A.6: Develop a starter set of customer class profiles using the approach defined in work item A.2.

Work item A.6 should be for cross-sector customer class profiles.
Relevant standards include:

- CEN TC 224 WG 6 - prEN 1332-4.
- ETSI TC HF Coding of User requirements for Telecommunications Services and Equipment

7.3 B: Basic functions

7.3.1 Trading protocol

A Customer-Merchant (CM)-Trading protocol defines the message exchanges between two partners (customer, merchant) and their respective financial institutions when they do business together, i.e. when they negotiate the contents of a planned contract, make a contract, arrange

payment and delivery. The focus is on the CM-message exchanges, but other agents (financial service providers, systems organizing delivery, trusted-third-party systems acting as mediators) may join the group of involved agents.

A continuous sequence of message exchanges which is somehow self-contained by its functional meaning and its effects is called a transaction.

The next larger dynamic business context between two specific partners, i.e. all the message flow and the build-up and maintenance of a documentation around a single contract is called here a business affair. Typically many transactions belong to a business affair the lifetime of which may span over month or even years.

Note: The above definition of the term "transaction" is attempting to grasp the meaning of this term as used (though not defined explicitly) in the OTP-documents published in January 1998. (see 11.7).

Note: Another definition of 'transaction' has also been provided to the Team:

A transaction has the following components:

- Business process. The customary steps and flow of a certain type of business. These steps are associated with information bundles and financial events.
- Information bundles. Information attached to the steps of the business process and/or to the financial events. The method of attaching this information is to be described by standards, but the format of the attachment itself might not, in all instances, be described by these standards, i.e., arbitrary information can be attached.
- Financial events. The debits and credits associated with the accounting systems of the parties of the transaction.

The trading protocol is driven by complex states of the two partners. The state sequences represent the progress of the business affair. This, in general, includes the responsibility of the partners to store securely data objects or documents describing the current state of the business affair as seen by the respective partner.

The task of developing a standardized trading protocol comprises at least three important subgoals:

1. defining appropriate EC-functionality (esp. as to be offered to the customers).
2. assuring interoperability between ad hoc partners (esp. customer/merchant pairs)
3. limiting unnecessary diversity of mechanisms

Note: Unnecessary diversity occurs if several essentially equivalent mechanisms (protocols) are present and are required to be implemented for achieving a high degree of interoperability. Unnecessary diversity drives up costs in different ways (production and operation of equipment, customer's intellectual efforts, etc.).

Technically a principal provision of interoperability may go together with a high degree of unnecessary diversity. A small universal protocol made only for agreeing on one of a set of protocols to be used next will in principle achieve interoperability, on the condition that the two partners can always find one of the "lower order" protocols they can both operate. Selecting subprotocols may go on recursively.

The list of (customer) functions of EC comprises among others:

- negotiating contents of purchase contracts (disregarding more sophisticated aspects such as language adaptation, anonymity, etc., protocols are available, e.g. WWW-techniques);
- receiving, producing and storing legally binding statements, e.g. purchase contracts, by applying certified electronic signatures;
- making payments, i.e., agreeing on and exchanging of payment objects recognizable within the electronic commerce model;
- arranging delivery;
- doing business while staying anonymous or even untraceable (esp. the customer towards the merchant);
- recovering from communication or system failure esp. in the situation of critical uncertainty (e.g. uncertainty whether a high-value contract is made or not);
- establishing provisions for dispute (sometimes called: customer care);
- managing trust (before contracts are made).

A restriction of unnecessary diversity would enhance the achievable degree of interoperability (= success rate when two ad hoc partners try to interoperate), and it would reduce all kinds of costs for EC-participants including EC-software vendors. Moreover, a joint effort of system and software vendors, of financial service providers, consumer representatives etc. to define the appropriate EC-functionality could help to solve this task and to reduce the costs going along with it. Therefore, the following work item is proposed:

Work item B.1: Develop a trading protocol satisfying the above requirements. The trading protocol to be developed should try to reach the three subgoals above, wherever possible.

The most prominent subareas of the trading protocol and its related service interfaces are the payment procedures and the security mechanisms which are further elaborated below.

7.3.1.1 Organization and timing of work

Currently, there is much activity in consortia, industry, and proprietary systems. A group of experts (GSEC) under the auspices of CEN TC224 and ISO TC68/SC6 are defining a framework around standards needed in the core parts of this business requirement to allow current or to-be-developed specifications or products to be coherent and, as far as possible, interoperable; their work is expected to be complete in early 1999. It is assumed that GSEC will give due consideration to, among others, existing work in the trading protocol domain, such as OTP. Coordination between JTC 1 and this work will be necessary to ensure harmonization between the efforts. Because of the strong interest in this work, it is hoped that standardization can be completed in 3 years.

This work should be performed in close collaboration with the financial industry (e.g., TC 68) and incorporated within existing JTC 1 SCs (e.g., SC 17, SC 32) and the JTC 1 PAS process.

7.3.1.2 Existing work

The following are known related activities in the marketplace:

- CommerceNet
- Electronic Commerce Promotion Council of Japan (ECOM)
- Java Electronic Commerce Framework
- Object Management Group (OMG)
- Open Buying on the Internet (OBI)
- Open Trading Protocol (OTP)
- Secure Electronic Market Place for Europe (SEMPER)

Many of these systems and specifications are incompatible and do not interoperate.

The following are known related standardization activities:

- ISO TC68/SC6
- CEN TC224
- ANSI X9
- EBES
- Electronic Data Interchange (EDI)

7.3.2 Payment methods

A number of payment protocols for different purposes and with different characteristics have reached or are about to reach practical applicability. They can be used as subprotocols of the trading protocol; their systematic invocability in the trading protocol will be an important part of its design. The multitude of payment methods causes consumers to have different and unique electronic purses to interface with their corresponding electronic point-of-sale equivalent on the merchant side. This results in the consumer having to supply the same payment information in multiple instances. Therefore, to promote globally Electronic Commerce of the Individual-to-Business category, it would be ideal to have a single payment protocol applicable to all forms of Electronic Commerce and globally accepted. It is noted that efforts are currently undertaken at the national body level. Whether they will be technically successful and accepted in the marketplace or not, for a transitory period the need exists to encapsulate a number of such payment schemes within a trading protocol.

Work item B.2: Develop a limited set of standard payment methods, including standard payment objects.

This work should be carried out by ISO TC 68/SC 6.

7.3.2.1 Existing work

The following are known related activities in the marketplace:

- CyberCash, CyberCoin
- DigiCash ecash
- E-check
- e-COMM
- Electronic Purse Systems (e.g., Mondex, GeldKarte, Clip, prEN 1546)
- EMV
- Home Banking Computer Interface (HBCI)

- JEPI
- Millicent
- Proton
- Secure Electronic Transactions (SET)
- Visa Cash

The following are known related standardization activities:

- ANSI X.9
- ECBS (European Committee on Banking Standards)

7.3.3 Security mechanisms

A minimum common ground must be defined for Electronic Commerce security in order to provide for reliable, interoperable operations. This includes as a minimum a set of common interoperable mechanisms for

- authentication, integrity and digital signatures,
- supporting key management infrastructure.

In addition to the above, issues such as confidentiality, data protection and privacy need to be addressed to fulfill regional and national regulation or self-regulation, or legislation (see also 8.1).

It is understood that JTC 1/SC 27 has a number of standards that are applicable to the area of Electronic Commerce, e.g. standards on various security techniques such as for authentication, guidelines on the management of security and the specification of TTP services. It is also noted that the SC 27 GII Security Report to JTC 1 identifies a list of standards topics. Some of these standards are already being developed within JTC 1 and elsewhere. However, there are also some areas of standardization which need to be worked on.

7.3.3.1 Digital signatures

The technical basis for non-repudiable agreements (reachable by producing and exchanging non-repudiable digitally represented documents) are digital signature algorithms. Digital signatures provide a method of "signing" digital media such that the "signer" can be identified and/or validated. A digital certificate relates the "signed" digital media to the well-known "signer" -- the meaning of the certificate is dependent upon the application.

Though some such algorithms are well known and some have already been standardized, their application by individuals in a potentially hostile or at least untrustworthy system environment is a technical and organizational problem that remains to be solved.

Work items are identified to make digital signatures practically available for customer-merchant oriented EC.

Many Electronic Commerce operations use digital signatures and certificates, not just payment systems, so there will be many schemes, e.g., different algorithms and key sizes. Therefore:

Work item B.3: Harmonize digital signature methods.

Methods and management techniques are necessary to support widespread, large scale deployment of digital keys. Therefore:

Work item B.4: Develop standards for key management infrastructure.

Work item B.5: Develop standards for customer's means to sign Electronic Commerce documents including multimedia documents in an inherently untrustworthy environment.

7.3.3.1.1 Related standards, specifications, and activities

- JTC 1/SC 27 existing standards and current work on:
    - Digital signature schemes;
    - TTP services for digital signatures.
- TC 68 addresses sector specific (banking and payment) issues.
- IETF PKIX: public key infrastructure
- IEEE P1363: public key cryptography (algorithm definition)

7.3.3.2 Confidentiality

To support confidentiality, a number of encryption methods (standardized or non-standardized) are already available. Whether or not Electronic Commerce leads to special and additional requirements for new methods could not be resolved in BT-EC. Therefore, it is recommended that JTC 1 invites its SC 27 to further study this item, and that any standardization work necessary be conducted by SC 27.

7.3.3.3 Anonymity

With respect to anonymity, it was not possible to produce specific requirements for standardization. However, as already stated above (see 5.3.6), the following conclusions relative to anonymity were drawn:

- Even if financial service providers offer a high degree of data protection, consumers may, in certain instances, have the desire to stay anonymous towards the financial institution, if legally possible, when doing certain forms of Electronic Commerce.
- No requirement was identified as for a merchant to stay anonymous vis-à-vis any of the trading partners.

7.3.4 Identification

Certain entities (especially participants like customers, merchants, financial service providers, trusted third parties etc.) and certain items (processes and data objects like business affairs, transaction records, payment procedures etc.) will need EC-specific globally unique and verifiable identifiers (GUIDs).

Note: The qualification "globally unique" does not exclude that an entity or an item has several such identifiers; it means that such an identifier, in a large but precisely specified context like, e.g. "EC in the Internet", is generated and attributed at most once and never again in the specified context and for all times.

When developing an identification scheme two different methods are conceivable:

- The GUIDs are formed such that they facilitate searching for them on the basis of other available knowledge about the identified entity or item.
  Example: Identify a person by his/her civil name plus the date of birth plus a (short) suffix.

- The GUIDs are in no way correlated to properties of the identified entity or item. Example: The identifier is a serial number taken from a single global counter.

7.3.4.1 Work items and recommendations

Recommendation: Wherever possible and in due consideration of privacy concerns, the identification procedures should be defined in such a way that they support searching for GUID's on the basis of typically available other information on the identified entities or items.

Work item B.6: Investigate which entities or items need EC- specific globally unique identification. Define different procedures for generating and attributing globally unique identifiers. For certain categories of such identifiers, the one-to-one correspondence to other identifiers (from other identification schemes) may need trustworthy certification.

7.3.4.2 Related standards, specifications, and activities

See 14.1 for a list of relevant standards. More work is going on in ISO/TC 68. Also, the work of both JTC 1/SC 31 and SC 32 is relevant in this domain.

7.3.5 Authentication

Editor's note: *This clause contains material on which no full consensus could be reached within the Team. It is, however, presented here as it is identified as an important item; and it is recommended that JTC 1 invites SC 27 to further investigate this field.*

Authentication is defined by JTC 1/SC 27 as the provision of assurance of the claimed identity of an entity. Authentication concerns verifying and/or validating that a user, system object, etc. are the identity that they claim they are. Many methods are possible, e.g., passwords, certified keys, biometrics.

7.3.5.1 Work items and recommendations

Work item B.7: Develop a common specification for verifying and validating the source of a data object and/or the identity of a communication partner in the Electronic Commerce context (authentication; see also Work item B.6)

7.3.5.2 Related standards, specifications, and activities

See 14.2 for a list of relevant standards.

7.4 C: Definition and encoding of data and other objects

7.4.1 Introduction

Though some of the requirements below primarily result from Electronic Commerce in the Business-to-Business or Administration domain, they are given here altogether for further consideration by JTC 1 and other Technical Committees. Standardization work is needed in the following areas:

a) identification of all value domains involved in Electronic Commerce;

b) IT-enablement of existing standards for widely used value domains (such as countries, currencies, languages) for use in Electronic Commerce;

c) widely used value domains for which no standards exist such as jurisdictional domains affecting Electronic Commerce;

d) complete semantics of data types and message types used in Electronic Commerce;

e) localization for a specific point of use (for example a mix of jurisdictions, languages,) of the terms available for referring to all information used in Electronic Commerce;

f) arrangements for registering the results of work developed in e) and f) above.

7.4.2 Identification and IT-enablement of existing standards for widely used encodable value domains

Many of the value domains needed for use in Electronic Commerce are bounded sets in the sense that the value domain and the set of permitted values in that domain are pre-defined and enumerated in the standard. Most of these are of the nature of "codes representing X". From a global Electronic Commerce perspective, standardization work is required for the identification and referencing of such objects in an unambiguous, linguistically neutral, IT-processable and EC-facilitated manner. These standards need to be re-cast in a computer processable form in order to support more fully the objective of computational integrity, a key part of IT-enablement and in a manner which supports localization and multi-lingual requirements.

Other value domains are unbounded in the sense that the set of possible values cannot be prescribed. A standard may be defined for the format of the values in such a domain.

The following work item is identified:

Work item C.1: Standardize an approach for the identification and mapping of encodable value domains.

Work item C.1 is a part of the IT infrastructure for Electronic Commerce and should be defined in JTC 1.

Work item C.2: Develop standards for IT-enablement of existing standards using the approach defined in the standard for Work Item C.1.
Examples of standards which need to be redrafted are the following:

- ISO 4217 (Currency Codes) of ISO/TC 68;
- ISO 3166 (Country Codes) of ISO/TC 46;
- ISO 639 (Language Codes) of ISO/TC 37.

Work Item C.2 represents the application and use by ISO Technical Committees of JTC 1 standard(s), i.e., tools. When the above noted examples are IT-enablement, the JTC 1 tool set of standards will be improved.

7.4.3 Identification and Mapping of Jurisdictional Domains

Electronic commerce, like present-day commerce, has to comply with the requirements of the jurisdictions which impact the way in which Electronic Commerce is carried out. In addition to

jurisdictions which have a physical, i.e., geographic, dimension, there are jurisdictions bounded by type of goods or services dimensions. Examples of jurisdictions with (1) a physical dimension are the European Union, NAFTA, California, Punjab, etc., (2) those with a goods dimension is the Multi-Fibre Textile Agreement (MFTA); and, (3) those of services dimension are found in the transportation, banking, environment, etc., sectors.

Work Item C.3: Standardize the identification and mapping of the various categories of jurisdictional domains (With priority on those impacting several sectors of Electronic Commerce).

Work Item C.3 is part of the IT infrastructure and thus should be defined by JTC 1, i.e., standard as a tool to be utilized by bodies with sectorial and cross-sectorial responsibilities as well as bodies wishing to start the process of IT-enablement for electronic commerce of their jurisdictional domain".

7.4.4 Definition techniques for defining data and message semantics

Standardized techniques are needed for defining the semantic constraints to be imposed on the data elements comprising the contents of message types used in Electronic Commerce. These techniques need to be compatible and consistent with the techniques used to define the data as used in the computer information systems which need to be able to interoperate in Electronic Commerce.

Standards exist for defining message formats but these do not enable the complete message semantics which may be quite complex and indeed open to interpretation.

Examples of the kind of semantic constraints which need to be expressed as part of message definition are the following:

a) a data element in a message must take one of the values which are prescribed in a standard for the value domain to which the data element corresponds;

b) a data element in one part of a message must take the same value as that for a matchable data element in another part of the message;

c) the values in two or more data elements in a message must collectively satisfy a potentially complex validation criterion based on a predefined Boolean condition expressed on these fields.

Work item C.4: Develop a standard facility for use in defining the kinds of messages used in Electronic Commerce.

Work item C.4 is part of the IT infrastructure which is needed to support Electronic Commerce and should be developed in an appropriate JTC 1 sub-committee.

Work item C.5: Develop a set of message definition standards using the facility defined in work item C.4.

Work item C.5 should be for cross-sectorial messages.

Though BT-EC recognizes that the work on BSR (Basic Semantic Repository) of ISO/TC 154 is not fully appropriate to address the above work items, it is suggested that BSR is also taken into consideration.

7.4.5 Localization

Terms and names found in standards (as discussed in Section 6.1 and 6.2 above) are not linguistically neutral, nor are they IT-processable. In Electronic Commerce, there are specific local requirements which need to be identified. Collectively these requirements and other aspects are referenced here as localization factors.

There is a need to be able to cast international standards in a manner which on the one hand supports unique, unambiguous and linguistically neutral identification and referencing of objects; and, on the other hand, supports the development of designation of such objects by terms and names in support of localization and multi-lingual requirements, i.e., in addition to the ISO official languages.

Work item C.6: Define an approach for defining localization factors for the local use of Electronic Commerce.

Work item C.6 is part of the IT infrastructure which is needed to support Electronic Commerce and should be developed in an appropriate JTC 1 committee.

Specific individual standards can only be developed locally and when a specific need is identified. The approach developed in C.6 should be used.

7.4.6 Registration authorities

Both customer profile standards and localization factor standards are likely to proliferate and it is necessary to define a process of registering such standards so that they may be available to other users.

Work item C.7: Define how to register and maintain various aspects of the value domains defined in the customer profile standards and in standards for localization factors.

8 Recommendations to JTC 1

8.1 General recommendations

This section contains general recommendations to JTC1 in the sense that they either

- are not specific to EC, or
- do address matters which are beyond the remit or expertise of BT-EC.

1. Because of the multi-sectorial nature of EC, improvement of co-operation with other standardization bodies, formal and others, in the domain is strongly advised. Such potential partners include:
   - ISO/TC 68
   - ISO/TC 154

   In particular, the work in ISO/TC 68/SC 6, together with CEN/TC 224, requires close attention by JTC 1 and its SCs, in particular SC 17, SC 27 and SC 32.

2. BT-EC recognizes that EC also addresses issues which potentially fall into the legal or regulatory domain. BT-EC understands that fundamentally different views exist as to the degree to which legal or regulatory measures are needed. Therefore, self-regulation is often considered an appropriate instrument to address such issues, e.g. regarding:
    - harmful content,
    - protection of privacy,
    - cost transparency.

    It should be noted that the Team does not take a position regarding the appropriateness of self-regulation or regulation in any of these and other domains. To support self-regulation, standards, in principle, may be useful tools. But it is also strongly recommended that any related standardization work is initiated only on the basis of a sound a priori agreement of the parties involved in such self-regulation.

3. Consumer participation in relevant standardization activities should be encouraged and member bodies are strongly invited to take appropriate steps. Such participation should be eased by JTC 1 re-enforcing, as a general objective, the request to its technical bodies that the intended functionality of a standard is clearly stated and that standards are written in a comprehensible way.

8.2 Specific recommendations

This section gives Electronic Commerce-related recommendations to JTC 1. It will not include recommendations to JTC 1 related to the functioning of a Business Team, in general. These will, instead, be incorporated in a separate report to JTC 1 (see ISO/IEC JTC 1 N 5297).

1. JTC 1 is invited to recognize that Electronic Commerce, in particular in the domain with consumer involvement, needs to take account of a range of devices, including PCs, TV sets, smart phones.

2. It is recommended that the work items identified both in clauses 7 and 10 are submitted to JTC 1 member and liaison bodies for review and comment. Reviewers should be invited to submit proposals for new work items, following the JTC 1 Directives.

3. In particular, the following JTC 1 Technical Directions are affected by Electronic Commerce requirements:
    - Data Capture and Identification Systems;
    - Distributed Application Services;
    - Information Interchange Media;
    - Multimedia and Representation;
    - Programming Languages & Software Interfaces;
    - Security;
    - User Interfaces;
    - Document Description Languages;
    - Coded Character Sets.

    They should be invited by JTC 1 to study this report with a view of identifying areas where they can support the requested work items, also, if appropriate, in co-operation with other organizations.

4. As, in particular in the area of Electronic Commerce frameworks and payment methods, a number of organizations outside of JTC 1 are active, it is recommended that JTC 1 pro-actively encourages such organizations to seek closer co-operation with JTC 1 and other relevant ISO Technical Committees, based on already existing mechanisms for co-operation, including the JTC 1 PAS process.

5. It is recommended that JTC 1 appoints a rapporteur to act as a focal point in JTC 1 for Electronic Commerce related topics (see also ISO/IEC JTC 1 N 5297).

9 Abbreviations

Abbreviation	Meaning	URL of organization, if applicable and available
ANEC	European Association for the Co-ordination of Consumer Representation in Standardization	http://www.anec.org/
BT-EC	(JTC 1) Business Team on Electronic Commerce	http://www.din.de/ni/aktuell/j1btechtml/index.html
CAW	(JTC 1) Cultural Adaptability Workshop	-
EBES / EWOS	European Board on EDI Standardization / European Workshop for Open Systems	http://www.cenorm.be/isss
EC	Electronic Commerce	-
ECOM (of Japan)	Electronic Commerce Promotion Council (of Japan)	http://www.ecom.or.jp/eng/index.htm
e-COMM		http://www.e-comm.fr/anglais/sommaire.html
EMV	The Europay International, MasterCard International and Visa International Consortium	http://www.visa.com/cgi-bin/vee/nt/chip/download.html?2+0
HBCI	Home Banking Computer Interface	
JECF	Java Electronic Commerce Framework	http:/java.sun.com
JEPI	Joint Electronic Payment Initiative (from CommerceNet and W3C)	
OBI	Open Buying on the Internet	http://www.supplyworks.com/obi/
OECD	Organisation for Economic Co-operation and Development	http://www.oecd.org
OMG	Object Management Group	http://www.omg.org
ORB	Object Request Broker	see OMG
OTP	Open Trading Protocol	http://www.otp.org
SEMPER	Secure Electronic Market Place for Europe	http://www.semper.org.
SET	Secure Electronic Transactions	http://www.setco.org/
TTP	Trusted Third Party	-
WCO	World Customs Organization	

10 Additional standardization work needed in support of Electronic Commerce

This clause contains additional proposals for standardization work which were identified by the Team. Though they were not regarded as of high priority (see also 7.1.1) they are strongly recommended to JTC 1 for further consideration and action.

#	Work item	Priority	Remark
A.7	Develop a standard for the unique, unambiguous and linguistically neutral identification and referencing of all icons, navigational aids and product labeling in an IT-enablement manner including the ability to support computational integrity. Such a standard or standards must also include the ability/facility to support the assignment of multi-lingual language equivalents appropriate to localization requirements. (see 10.1.1)	L	
A.8	Standardize plug compatibility for different input/output devices (from keyboards, joysticks to braille readers/printers, speakers) and different delivery mechanisms (TV, PC, telephone). Develop appropriate software standards to facilitate plug compatibility. (see 10.1.2)	L	
A.9	Review existing standards and industry practice regarding usability. Identify the right measures for objective measurement of usability (error rate, failure of transaction, time etc.). Adapt and/or develop tools for the objective and subjective measurement of usability for Electronic Commerce. (see 10.1.4)	L	
B.8	Develop encryption algorithms that satisfy cross-sectorial and sector-specific needs (see 10.2.1.1).	M	
B.9	Develop recovery methods necessary for recovering from errors, cnetwork outage, etc., for encrypted blocks and streams (see 10.2.1.1).	L	
B.10	Develop a common specification for validating which operations can be performed by and on components, e.g., users, systems, events, transactions (see 10.2.2).	M	
B.11	Develop a standardized method for selecting the security algorithm and security attributes, e.g., key size (security quality of service) (see 10.2.3).	L	
B.12	Develop standards for digital media that may be written only once that meets the security requirements of EC, such as tamper-proof, tamper-evident media (see 10.2.4.1).	L	
B.13	Develop common auditing and tracing standards that support common analysis of EC components in the past (e.g., forensic analysis), present (e.g., monitoring and alarms), and future (e.g., thresholds and problem anticipation) (see 10.2.4.2).	L	
C.8	Standardize an approach to defining sets of values for unbounded domains and for defining the format of the sets of values for unbounded value domains (see 10.3.1).	L	
C.9	Define bounded value domains used in two or more sectors of Electronic Commerce (see 10.3.1).	L	
C.10	Identify requirements for the handling of unbounded value domains used in two or more sectors of Electronic Commerce (see 10.3.1).	L	
C.11	Define bounded value domains for use in a specific sector of Electronic Commerce (see 10.3.1).	L	
C.12	Identify requirements for the handling of unbounded domains for use in a specific sector of Electronic Commerce (see 10.3.1).	L	

Table 2: Additional work items for standardization

10.1 Consumer related requirements

The table below shows how consumer requirements are mapped onto recommended standardization activities in this clause and 7.2. The requirements that have no standardization activity or are not taken into account in this document, are recorded as «Not covered» in the right hand column.

Consumer requirement	Work item
1. Ease of use	A. 4; A.2
2. Consistent user interface elements	A.1; A.2; A.5; A.6
3. Adaptability	A.1; A.5; A.6
4. Provision of system status information	A.4
5. Error tolerance and system stability	A.4
6. Minimize the consumer's need to remember system operation	A.1
7. Explorability	A.1
8. Design for all	A.5; A.6
9. Functionality of solution	see clause 8.1
10.Multi-cultural aspects	A.5; A.6
11.Multi-linguistic aspects	A.5; A.6; A.7
12.Terminology	Not covered
13.Comprehensible standards	see clause 8.1
14.Interoperability	not explicitly covered
15.Compatibility	not explicitly covered
16.Privacy	see clause 7.3.3
17.Security of information	see clause 7.3.3
18.Cost transparency	Not covered
19.Reliability of information	Not covered
20. Quality of service and system reliability	Not covered
21. Rating and grading systems	A.9
22. Consumer participation throughout the system development process	see clause 8.1
23. Ecological aspects	Not covered
24 Ethical aspects	Not covered

Table 3: Mapping of consumer requirements onto suggested work items

10.1.1 Multi-lingual equivalency with localization.

This generally applies to textual information pertaining to icons, navigational aids and product labelling.

Work item A.7: ***Develop a standard for the unique, unambiguous and linguistically neutral identification and referencing of all icons, navigational aids and product labelling in an IT-enabled manner including the ability to support computational integrity. Such a standard or standards must also include the abili-***

ty/facility to support the assignment of multi-lingual language equivalents appropriate to localization requirements.

10.1.2 Easy connectivity for input/output devices

Easy connectivity for input/output devices will enhance accessibility for all users, including disabled and elderly people.

Work item A.8: Standardize plug compatibility for different input/output devices (from keyboards, joysticks to braille readers/printers, speakers) and different delivery mechanisms (TV, PC, telephone).
Develop appropriate software standards to facilitate plug compatibility.

10.1.3 Other Elements of a multi-cultural nature

These are elements of a multi-cultural nature not covered above, e.g. societal. These include, but are not limited to date/time formats, numeric and non-monetary formatting, monetary formatting, sorting and searching rules, local legal requirements, local consumer /supplier requirements religion, (ref section 6.1Horizontal issues, 6.5 Cultural adaptability).

10.1.4 Testing and conformance of user interfaces (Usability)

Human-system interfaces need to be tested for usability. Usability is defined as the extent to which a product/system can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use. (ISO 9241-11). Ease of use is measured by usability metrics. Usability metrics objectively measure features associated with usability, such as time taken to perform a task, number of errors, task completion as well as subjective measures. The metrics (and existing usability standards) do not set levels of usability.

Existing standards were developed for trained office workers, in an office environment performing office related tasks.

Work item A.9: Review existing standards and industry practice regarding usability. Identify the right measures for objective measurement of usability (error rate, failure of transaction, time etc.). Adapt and/or develop tools for the objective and subjective measurement of usability for Electronic Commerce.

Relevant standards include

- ISO 9241-11
- ISO CD 13407-2.

10.2 Basic functions

10.2.1 Security

Editor's note: The material in this clause does not represent full consensus of the Team. It is, however, presented to JTC 1 with the recommendation to forward it to SC 27 with an invitation to explore the topics further.

10.2.1.1 Encryption

Encryption is a coding technique that obscures the content. Typically, encryption is used to implement confidentiality.

Work item B.8: Develop encryption algorithms that satisfy cross-sectorial and sector-specific needs.

Work item B.9: Develop recovery methods necessary for recovering from errors, cnetwork outage, etc., for encrypted blocks and streams.

As SC 27 is integrating new algorithm definitions, no additional work is needed in this area.

10.2.1.2 Other issues

There are significant legal problems that impede or inhibit wide-spread deployment of common encryption techniques, e.g., usage control and export control. This issue will not and should not be addressed by standardization.

10.2.2 Authorization and capabilities

Authorization concerns the valid operations that can be performed by a user, system, object, etc.. Capabilities concern the valid operations that can be performed on an object.

Work item B.10: Develop a common specification for validating which operations can be performed by and on components, e.g., users, systems, events, transactions.

10.2.3 Security algorithm and attribute selection

Electronic commerce systems will use various security methods, and support various security levels and qualities. Both users and systems will need to select from, say, different algorithms and key lengths, depending on the needs of the user, system, or transaction.

Work item B.11: Develop a standardized method for selecting the security algorithm and security attributes, e.g., key size (security quality of service).

10.2.4 Auditing, record keeping

10.2.4.1 Write-Once Media

Editor's note: The material in this clause was challenged in the Team. It is, however, presented here with a recommendation to JTC 1 to invite its subcommittees of the Technical Direction on Information Interchange Media to further explore the subject matter.

Many regulatory agencies require financial institutions to maintain permanent records that cannot be changed, i.e., tamper-proof or tamper-evident. Currently, many records are stored in non-digital form, such as microfilm. While there exist write-once media standards (e.g., CD-ROM), these standards might not be appropriate for EC because additional security features are required.

Work item B.12: ***Develop standards for digital media that may be written only once that meets the security requirements of EC, such as tamper-proof, tamper-evident media.***

See 14.3 for a list of relevant standards.

10.2.4.2 Auditing and traceability

Editor's note: The material in this clause was challenged in the Team. It is, however, presented here with a recommendation to JTC 1 to invite its SC 27 to explore the subject matter further.

Successful financial systems require common methods, techniques, and practices for validating all components of the data processing system to ensure financial integrity of the electronic commerce system. The components include: users, systems, objects, transactions, communications networks, currency (and other objects of value) several auditing techniques. Common techniques and methods are required for consistent auditing of EC components. Common system tracing methods enable analysis of the past (e.g., forensic analysis), present (e.g., monitoring and alarms), and future (e.g., thresholds and problem anticipation).

Work item B.13: ***Develop common auditing and tracing standards that support common analysis of EC components in the past (e.g., forensic analysis), present (e.g., monitoring and alarms), and future (e.g., thresholds and problem anticipation).***

See 14.4 for a list of relevant standards.

10.3 Definition and encoding of data and other objects

10.3.1 Identification of value domains needed for use in Electronic Commerce

The following additional work items have been identified in addition to those of 7.4.2:

Work item C.8: ***Standardize an approach to defining sets of values for unbounded domains and for defining the format of the sets of values for unbounded value domains.***

Work item C.8 is a part of the IT infrastructure for Electronic Commerce and should be defined in JTC 1.

Work item C.9: ***Define bounded value domains used in two or more sectors of Electronic Commerce.***

Work item C.10: ***Identify requirements for the handling of unbounded value domains used in two or more sectors of Electronic Commerce.***

Work item C.11: ***Define bounded value domains for use in a specific sector of Electronic Commerce.***

Work item C.12: ***Identify requirements for the handling of unbounded domains for use in a specific sector of Electronic Commerce.***

Work items C.9 and C.11 are cross-sectorial standards (i.e. usable in several sectors). These should make use of the approach standardized in work item C.8.

11 Existing technical approaches to Electronic Commerce

11.1 Introduction

During the course of its work, BT-EC analyzed some of the current key approaches which may serve as useful inputs in defining generic technical solutions for Electronic Commerce.

Based on expertise and resources available, the approaches below were analyzed. The choice does not represent any judgment of BT-EC as to the relevance of these approaches, nor does it aim to be comprehensive.

11.2 CommerceNet's eCo System

CommerceNet described eCo System as its "flagship project" for 1997. The White Paper on eCo System is available at the CommerceNet Website at http://www.commerce.net.
The objective of the eCo project is to:

- Develop an object-oriented architectural framework for Internet commerce that promotes the interoperation and reuse of applications and services
- Establish an ongoing process for achieving broad industry consensus on issues of interoperability and reuse critical to open digital markets.

The eCo System is intended to be "a framework of frameworks" which model key business processes and services for building Internet Markets ("*iMarkets*"). According to CommerceNet, there is "a unique opportunity" to create a truly open architectural framework for Internet commerce that will be fully compatible with leading proprietary platforms and synthesize their "unique strengths".

The focus of the eCo project is on de facto interoperation, rather than on de facto standards ("the IT industry is moving so fast that there's seldom time even for de facto standards to emerge"). This means getting incompatible products that are already in the marketplace "somehow" to communicate. This may be accomplished through negotiation protocols ("I don't care what standard you use, just tell me what it is and I'll speak it"), bridging gateways, and mediators (smart gateways).

The eCo System framework is conceived to consist of:

- Applications and services that model real markets and business processes;
- A Common Business Language so that applications can communicate using messages and objects analogous to those used in real commerce;
- An extensible set of interface specifications, class libraries and network services so that applications can be quickly assembled from existing components and subsequently reused themselves;
- A layer of middleware that insulates applications from each other and from platform dependencies.

Each eCo System framework can be categorized according to: Vertical Market, Business Process & Applications, Commerce Services, and Network Services. In the eCo System, each framework specifies:

- The core services that all application objects belonging to that class (e.g., payments, catalogues) must provide;
- A network services interface (NSI) - a set of messages for requesting the core services;
- The business objects on which the services operate, e.g. invoices, contracts, products, companies;
- The APIs for any software modules (or cartridges) involved in delivering services.

It should be noted that the NSI messages, business objects and product taxonomies constitute the Common Business Language (CBL) in the eCo System. CBL is intended to be an alternative to the "ad hoc" text strings currently used in EDI systems.

The eCo System White Paper provides preliminary documentation of how various existing Electronic Commerce frameworks could be implemented within the overall eCo framework. According to the White Paper, the framework will leverage commercial Internet platforms. It will also use emerging standards such as CORBA 2.0 ORB, IIOP, Java and HTTP/HTML.

11.3 EBES/EWOS Building Blocks for Electronic Commerce

In this EBES/EWOS report, available at http://www.ebes.cenclcbel.be/ structur/ebes/project/prb/prbinfo.htm, the concept of Electronic Commerce building blocks is developed as an analytical tool to identify the key technical components for Electronic Commerce and to position the example products and services currently on offer or planned. The building blocks approach is then applied for assessing the likely impact of specific legal and regulatory measures on the technical infrastructure of Electronic Commerce and for identifying the critical components and/or interfaces for interoperability. The objective is to identify and categorize the key issues which are of public interest through a comprehensive and systematic examination of the relationships and interactions between the technical, legal/regulatory, and standardization dimensions of Electronic Commerce.

The primary audiences of this report are Electronic Commerce policy makers and standardizers.
Building blocks are derived from the sub-processes which comprise the commercial activities of Electronic Commerce. They are defined as (Electronic Commerce-specific) functions which may be implemented into a discrete Electronic Commerce product or service. Three categories of building blocks have been identified in relation to where each "belongs" (buyer, seller or the commercial/third party service) and its relationship with other building blocks. Using the building blocks technology, two further basic concepts are defined – solutions, defined as the implementation of a building block, and solution sets, defined as a set of integrated products or services in which a number of implemented building blocks are being used together to provide a complete Electronic Commerce functionality.
The following local building blocks are identified. A local building block is defined as a building block that belongs to the seller or buyer and interfaces with another local building block which typically belongs to a trading partner.

Processes	Building Blocks
Marketing	Consult/build up product catalogue. Publish/extract/analyze information. Request/give quotation Collect/save goods in shopping basket
Contracting	Order/confirm order. Register confirmation/replenish stock Cancel order/accept order cancellation
Logistics	Receive goods/request forwarding of goods
Settlement	Select payment methods Credit card payment wallet Ecash payment wallet Reconcile payment
Interfacing with Administration	VAT reporting Notify Customs on export transaction

A service building block is defined as a building block which belongs to a commercial service. This service is provided by a third party. It is accessed by an access building block.
The following services building blocks are identified:

- Payment services offered by acquirers/issuers, e.g., credit card acquiring, ecash acquiring
- Trusted third parties, e.g., registration, certification, data archiving, directory services.

Based on the building blocks analysis, the report provides recommendations on policy setting and specific technical areas for action in Electronic Commerce standardization.

11.4 ECOM of Japan common platform for consumer-EC

The Electronic Commerce Promotion Council of Japan (ECOM), a non-profit organization, is constructing a common platform through 19 test-bed projects. Over 350 companies and 500,000 consumers are participating in these projects. In the course of coordinating these test-bed projects, ECOM intends to identify common technological and institutional issues, conduct the survey and research, determine the directions that hold solutions for those issues, and present proposals to the global community.

ECOM WGs are very active and issued the interim report of guidelines, reference models, measures, etc. others for constructing and implementing EC in 1997. Some of them are:

- Model contracts for Cybermalls (Consumer - Mall, Merchant - Mall, Mall -Mall, Consumer - Merchant),
- Consumer Transaction Guidelines,
- Standard Agreement of Credit Card-Type Electronic Settlement,
- Security Guideline on Smart Card-Type Electronic Settlement System,
- Reference Model for Personal Authentication,
- Standardization of Product-Attribute Information.

These guidelines and protocols are being incorporated and reviewed in the testbed projects.

One of them is "Development of a Common Platform that Implements a Secure Commerce Protocol: SECE". The protocol is in compliance with SET, while applied to domestic Japanese commercial practices such as using the Japanese character set and bonus-attached automatic payment.

Final versions of ECOM WGs' studies of Phase I, Jan 1996- Mar1998, are being drawn up now. They will be made public in the spring of 1998. ECOM enters into Phase II for another 2-year activity in April 1998.

11.5 Java Electronic Commerce Framework (JECF)

JECF is a structured architecture for the development of Electronic Commerce applications in Java. It aims to provide functionality that reduces the time and effort developers require to build Electronic Commerce applications. JECF is intended to be the foundation for electronic wallets, point of sales terminals, electronic merchant servers and other financial software.

JECF defines application responsibilities for merchants and financial institutions. JECF provides services, such as database services, to merchant and financial institution applications. The layers of the framework are described below.

The Merchant Applet Layer uses Java applets as an appropriate way to implement short term customer relationships such as shopping experience. Examples of consumer applets are shopping cart applets and content charging applets. Examples of bank applets include loan questionnaire applets. Applets are downloaded from servers to client computers

The Cassette Layer implements long term customer relationships such as credit cards, home banking and brokerages. Cassettes are downloaded from servers to client computers. Unlike applets, which disappear when users quit the browser, cassettes are retained on the customer's system. Cassettes may safely store valuable information such as public key certificates and transaction records. Examples of cassettes include SET certificates and protocols, home banking, etc.

The Java Commerce Package Layer implements the infrastructure needed by the merchant and the cassette layers. Features at this layer include a user interface, an application model, a data base, and access to strong cryptography.

The Java Environment Layer is the underlying browser or operating system.

The Merchant Applet and Cassette Layers are downloaded from the merchant or financial institution into the consumer computer in order to enable the security protocol between the two partners. They can be described as "customized" Electronic Commerce building blocks for a specific consumer.

The Java Commerce Package Layer includes common or basic functions allowing commerce relationships. These can be described as generic building blocks which are needed in every consumer's computer.

The Java environment layer is the platform running the above layers and is not Electronic Commerce-specific.

11.6 Object Management Group Electronic Commerce Reference Model

This architecture is developed by the Object Management Group Electronic Commerce Domain Task Force. The goal of this task force is to define and promote the specification of OMG-distributed object technologies for the development and use of Electronic Commerce applications. The architecture is available at http://www.osm.net/ec-dtf/index.html.

The rationale for the development of an Electronic Commerce Reference Model is based on the basic assumption that there is a need for:

- Defining a framework for establishing inter-relationships between domains;
- Identifying Electronic Commerce Domain Facilities;
- Developing a Roadmap for technology adoption. Objects representing the most significant needs by the broadest range of user communities are the top priority of the Electronic Commerce Task Force.

The Electronic Commerce Reference Model is currently under development. The model takes into account currently adopted and emerging OMG Standards.

Specifically, the Reference Model is based on OMG's Object Management Architecture, which identifies and characterizes a generic set of components, interfaces, and protocols. These include the Object Request Broker (ORB) component that enables client and objects to communicate in a distributed environment, and four categories of object interfaces:

- *Object Services* are interfaces for general services that are likely to be used in any program based on distributed objects;
- *Common Facilities* are interfaces for horizontal end-user-oriented facilities applicable to most application domains;
- *Domain Interfaces* are domain-specific interfaces for application domains such as Finance, Healthcare, Manufacturing, Telecom, Electronic Commerce, and transportation;
- *Application Interfaces* are non-standardized application-specific interfaces.

The Electronic Commerce Reference Model references a set of OMG Common Facilities and Service Objects – the "building blocks" for the Electronic Commerce Application Frameworks. It should, however, be noted that unlike the EBES/EWOS approach (which defines building blocks in terms of commerce processes and sub-processes), each Common Facility is handled as a real object offering interfaces to other objects.

These Common Facilities are divided into three principal groups:

- Low level Electronic Commerce services including payment, profile and selection services;
- Commerce facilities supporting contract, service management and related desktop facilities;
- Market infrastructure facilities covering catalogue, brokerage and agency facility.

Each facility is described in the following table.

Common Facilities	Description
Selection	A selection service supports the selection and configuration of supporting facilities across a set of independent domains involved in an Electronic Commerce trans-

Common Facilities	Description
	action. It allows compliance with generalized federation requirements introduced under inter-domain commerce (ex: disclosure of information).
Payment	Interactions between a buyer and a seller and any necessary third parties for the successful electronic exchange of value for goods or services provided.
Profile	A profile is a data object that is provided by a service provider or consumer and describes the service offered or requested. It is a portable, persistent container for arbitrary data objects. It comprises standardized information and information specific to distinct applications.
Contract	An object framework encompassing both the static contractual perspective of a real-world contract and the dynamic perspective of a common and potentially dynamically changing policy.
Service	An object framework which supports the separation of declared interfaces between the consumer, the provider and any third party involved in an EC transaction.
Intellectual Property Rights	It provides the support for the management and administration of Intellectual Property Rights including copyright and ownership.
Catalogue	A structured object that can be inspected, browsed and transferred through the network.
Brokerage	Facility to allow users (information consumers and providers) to be more focused in dealing with information about commercial services in the global electronic market. It allows information consumers to focus requests for information upon the pertinent sources of information.
Agency	A facility to allow the establishment of a formal access point and public query interface for a player in an electronic marketplace. This access point returns information about the agency such as: protocol of the interface, name, resources (certificates), ability, policy.
Browser	The object browser and navigator facility introduces an extendible framework for the inspection, presentation and execution of Electronic Commerce entities.

11.7 Open Trading Protocol (OTP)

OTP is the result of an industry standardization initiative, the OTP consortium, which seeks to provide a unifying framework for trading (defined as "the process of doing business") over the Internet or similar mechanisms in an "open extensible way". Specifically, unlike existing electronic payment solutions, OTP is intended to provide a single method of encapsulating different - present and future - payment protocols. It is also intended to be independent of the transport mechanism for transmitting the messages within the protocol, as well as the software and hardware products being used.

Version 0.9 of the OTP specification was published in January 1998 as a Draft for Public Comment. Version 1.0 is scheduled to be published by the end of the first quarter of 1998. Any products built from Version 0.9 and/or Version 1.0 are expected to prove function and live interoperability.

It is OTP's stated intention to hand over the specification to an appropriate internationally recognized standards authority (e.g. ANSI, ISO) in due course.

The objectives of OTP are to:

- Enable development of interoperable products to support Electronic Commerce (any OTP-enabled consumer can "trade" with any OTP-enabled merchant).
- Replicate consumer's real world experiences in the virtual world (e.g. provide invoices and receipts, linking delivery to the offer and the payment).
- Provide a "universal shopping experience" (a consistent interface for all trading steps, irrespective of the identity of the trading parties).
- Encapsulate any Internet payment method ("complements" but does not replace available and emerging payment methods).
- Respond to market demand (start with simple baseline protocols and evolve additional protocols based on what the market wants).

OTP is based on a two party operation (the low cost trade model). Its architecture describes the various roles of the parties that are involved in trade on the Internet - consumer, merchant, value acquirer, deliverer, customer care provider - and the different types of transactions that can occur between these parties. The OTP specification, which is based on XML, sets out the content, format and sequence of messages that pass among the trading parties. Collectively, these provide a set of rules that covers:

- Offer for sale
- Agreements to purchase
- Payment (using existing payment methods)
- Transfer of goods and services
- Delivery
- Receipts for purchases
- Multiple methods of payment
- Support for problem resolution
- Payment brand and protocol selection.

The rules are embodied in a number of basic steps ("trading blocks"), which could be used in different sequences. OTP provides a consistent framework for different Trading Protocol Options to be defined. The individual options cover the steps for inclusion in a specific purchase protocol, the sequence in which the steps occur, which options apply to which steps (e.g. payment method, structure and version of data, use of digital signatures, etc). It should be noted that:

- Payment method is but one of the various steps (a trading block) which constitute the OTP cycle of trade.
- Usage of digital signatures is optional.
- No consumer certificates are needed.
- Standard XML parsers are used for the processing of the message flow.

The optional features enable differentiation between OTP implementations by the trading parties. Specific user defined data may also be communicated as part of the standard OTP message flow, for which additional software will be needed.

How OTP works with specific payment methods (i.e. message flows which are specific to a payment scheme), as well as how the messages within the OTP protocol map to specific transport mechanisms, are included in the OTP specification as supplements.

Extensions to OTP in future versions of the specification will be based on stable XML documents and new user-defined values for existing codes.

11.8 Secure Electronic Market Place for Europe (SEMPER)

SEMPER is a European Commission funded R&D project in the area of secure Electronic Commerce over open networks, especially the Internet.

The SEMPER consortium comprises some twenty partners from multiple disciplines, including finance, retail, publishing, IT, telecommunications, publishing and academia.

The objectives of SEMPER are to provide:

- A detailed description of commercial, legal, social and technical requirements and options for an electronic market place
- A coherent model and a generic, open architecture of an electronic market place, independent of specific hardware, software and network architectures
- Specifications, designs, prototype implementations and evaluations for services enabling Electronic Commerce
- Information to the technical, scientific and standards communities and the general public.

The project falls into two main parts - a non-technical requirement part which is based on the existing expertise within the consortium, as well as expert surveys performed in different European countries; and a development and trial part which is organized into three phases, each phase corresponding to an enhanced set of services and trials:

- The first phase concentrates on two topics: the development of a framework and architecture for secure Electronic Commerce, and the provision of fundamental Electronic Commerce services within this framework (i.e. offering, ordering, payment and delivery for information services)
- The subsequent phases concentrate on extending the architecture and developing more advanced services (e.g., notary services, attribute certificates or credentials with specific privacy features, multimedia-specific security services such as protection of intellectual property).

SEMPER has published draft specifications on *Basic Services: Architecture and Design* and *Architecture of Payment Gateway*, as well as other results from the project (Survey Findings, Trial Requirements, Legal Framework, etc).

SEMPER is probably the most ambitious example of architectural concepts and definitions for an Electronic Commerce framework which has been developed with European Union funding. The SEMPER architecture specifies a number of layers:

- Commerce Layers
- Exchange Layers
- Transfer Layer
- Supporting Services Layer.

For the Supporting Services and Transfer Services Layers, generic service blocks have been defined:

For Transfer Layer services

- Payment
- Certification
- Statement

For Supporting Services Layer

- TINGUIN
- Archive
- Comms
- Crypto
- Preferences
- Access control.

In addition, the actual implementation also contains a utility block with various utility services for, e.g., converting objects into streams of bytes, logging and debugging.

The SEMPER service blocks are intended to offer considerable flexibility by hiding complexity or variation behind the block definition. For instance, a variety of payment protocols are envisaged to be supported by the payment service block.

The key properties of the SEMPER architecture in relation to possible standardization activities are:

- SEMPER does not attempt to impose solutions in other areas. Such solutions may therefore be realized either completely independently of the existing architecture, or by extension of the SEMPER approach.
- The architecture has been specified independently of any particular distributed systems architecture, although the implementations and pilot applications are expected to be based on the use of Java.
- The service blocks which comprise the architecture are intended to meet the requirements of existing and emerging protocols in so far as they are known. While the architecture is intended to be "frozen" later in 1997, it may need to be extended in the future; alternatively, new protocols may need to be retrofit into the SEMPER architecture. On this analysis, the standardization activity should focus not so much on the service blocks themselves, but the interfaces between them.
- The SEMPER architecture is based on certain assumptions about the actors in Electronic Commerce and their roles. In view of the proliferation of Electronic Commerce architectures and solution sets, a common definition of these actors and roles is considered to be desirable.

12 Additional information

This section takes additional information which was submitted to the Team during the preparation of this report. It is regarded as useful technical or other background material which may be used during the further activities of JTC 1 or any other pertinent body.

12.1 Issues identified in the business examples

12.1.1 What is signed as a contract?

In a negotiation, C is typically looking at catalog pages sent by the merchant system and presented to C by an applet, downloaded from the merchant system (short designation: the M-applet). Later or somehow in combination with the descriptions of offered goods and services, order forms will be presented to C. On the screen, all this consists of pieces of text, lines, shaded areas, icons, other graphical elements, pictures etc.
As input actions C will write at certain places sequences of digits and letters, i.e. words of a known vocabulary; but C may also mark certain positions, e.g. indicating a colour in a colour range.

The following fundamental rule for EC (for EC centred on the customer/merchant relationship) is put forward for consideration:

> "The exclusive base for understanding the meaning of a contract is the two-dimensional graphical object (even if there is often written text which, in fact, is a graphical object, too) seen by C when he/she decides to make and sign a contract."

This rule might be called the rule of the absolute predominance of the directly visible.

Computer processable encodings of C's input signals which must be produced by the M-applet in order to send them to the merchant system are certainly indispensable for making merchant systems work routinely without human intervention. Standardization efforts may be justified to harmonize these encodings. But these encoded messages from the M-applet to its merchant system are judicially irrelevant, at least for the interpretation of the contract from C's perspective.

As a consequence of the rule of the absolute predominance of the directly visible, the participants of a business affair have to ensure the incontestable "facsimile reproduction" of what C saw when he/she signed the contract, especially in case of a dispute e.g. in court.

12.1.2 How to produce digital signatures when mainly using untrustworthy equipment?

The basic observation is that 'PC-type' computing equipment a customer can really trust cannot be bought in a computer shop and cannot even be ordered from a recognized computer manufacturer. The traditional PC is not trustworthy and will not become trustworthy in the foreseeable future. The main reason is that its interfaces to its surroundings are too broad and too manifold and are hence ultimately uncontrollable.

This observation undoubtedly applies to the PC of a mobile customer being away from home, but it also applies to the well-protected 'private' PC in the customer's home. C cannot ask the M-applet (cf.Issue 1.) to sign the negotiated contract for him/her since he/she cannot allow access to his/her private signature key to any unknown program.

Probably the PC could, technically and in principle, contain trustworthy components with which C could securely cooperate (via the normal user interface) despite the presence of untrusted programs also using this interface. But the frequency with which new versions of widespread operating systems are created and distributed and the frequency with which these operating systems have proven to contain security defects would suggest that these systems should not be used as the immediate crypto and signature base for C.

So C's need for producing digital signatures in a mainly untrustworthy environment probably has an answer only in the direction of personalized mobile system components. One proposal is outlined here and recommended for further study.

Trusted personalized computers (TPC)

For regular and secure participation in EC, a customer needs a trustworthy personalized computing and storage base; it will typically consist of a mobile TPC. Some important properties of a TPC are:

* ***(TPC.1)*** a TPC must be produced and distributed under permanent official (or at least trusted) control.
* ***(TPC.2)*** a TPC, before it begins its working life, becomes a strictly personalized device, i.e. constrained to cooperate with only one particular person.
* ***(TPC.3)*** the functions of a TPC cannot be spoiled or corrupted and cannot be changed unless such a change is part of its specified operation (cf. TPC.1!). Ideally, the failure behavior of a TPC is fail-stop.
* ***(TPC.4)*** a TPC must be portable and capable of cooperating with different types of marketable computer systems; this follows from the unquestioned requirement to have customer mobility.
* ***(TPC.5)*** a TPC must include a user interface that allows it and its owner, without using any other equipment,
  - to agree on potentially large aggregates of texts, graphics, sound to be electronically signed
  - to evaluate jointly and thoroughly received electronically signed material.
* ***(TPC.6A)*** a TPC must be capable of directly cooperating with a (temporarily connected) IC-card-type, "second-order" TPC of the same owner.

  Remark: A second-order TPC fulfills (TPC.1) through (TPC.4) where (TPC.4) normally holds only for some specific types of partner systems. A customer may dispose of several second-order TPCs.
* ***(TPC.6B)*** a TPC must be capable of directly working with a (temporarily connected) IC-card being an element of a secure, card-based archive for the owner of the TPC.

Note: It would be a complete misunderstanding of the listed features of the TPC to conclude that traditional stationary computing equipment should be replaced by TPCs. A customer when doing EC will have to accept extensive support from powerful but untrustworthy equipment (PCs, browsers, ...); but in certain phases he/she must inevitably fall back on his/her TPC or TPCs.

12.1.3 Questions on anomynity

Definitions:

anonymity (towards x) = the payer's (acting person's) identity is not known (to x).

revealable a. = anonymity with someone in the background who is able and under certain severe conditions (e.g. order of court) willing to reveal the payer's/customer's identity.

unrevealable a. = (meaning evident)

untraceability = *anonymity plus the impossibility of linking two different payments by the* same payer (or of linking two different purchases by the same customer.)

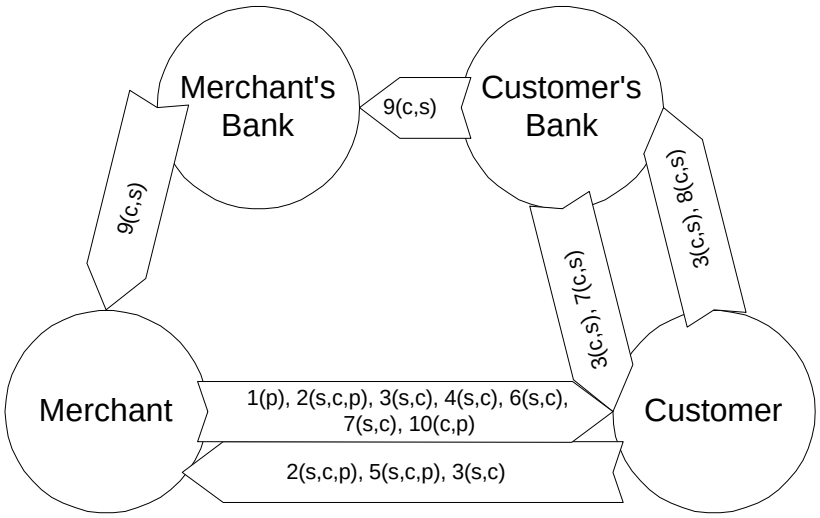
With these definitions, the following questions were raised:

Question 1. Is there a need for a customer to remain anonymous towards his/her bank with respect to certain activities in EC?

Regarding this question, it was pointed out that the answer could depend on the question whether the banks generally guaranteed secrecy of their knowledge about their customers or not.

Question 2. Is there a need for a merchant to remain anonymous (or even untraceable) vis-à-vis the trading partners (customers, banks, other merchants)?

12.2 Example: A business process including ordering and payment



logical model of a business scenario

Legend
(1) Display of goods and prices
(2) Negotiation on price, means of payment, shipment etc. (Data elements may be proprietary, cryptography requires standards)
(3) Identification
(4) Offer by merchant
(5) Order by customer
(6) Order acceptance
(7) Payment request - merchant to customer
(8) Instruction to pay - customer to bank
(9) Payment - bank to merchant
(10) Shipment of goods (Part of protocol if applicable)
Note: Authorization of Payment Object and settlement (merchant to customer's bank) may use existing infrastructures; these are not shown in the model

(c) Cryptography applied (identification, authentication, signature and signature verification, verification of the certificate)
(p) Proprietary data elements applicable
(s) Standardized data elements (partially) required

12.3 Examples of encoded value domains

For more details on the subject matter, see also JTC 1/BT-EC N 046.

12.3.1 Currency codes

A key attribute of electronic commerce is that it involves business transaction where payment must be made in a mutually acceptable currency. ISO 4217 is the standard for codes representing currencies and funds. This standard and its contents are the responsibility of ISO TC 68 Banking. The principles for inclusion in the code lists of ISO 4217 is that (1) they must be/represent currencies and funds used within the entities described by ISO 3166 (Country Codes); and, (2) the codes listed are intended to reflect current status, at the date of publication.

ISO 4217 has a number of features and anomalies which although human understandable need to be identified and explicitly captured in an IT-enabled manner. In short, ISO 4217 includes objects which are not currencies (or funds). In ISO 4217, there are countries, i.e., as ISO 3166 entities, where:

- the three digit country code is not the same as the three digit ISO 4217 3-digit code, (e.g., due to the creation/utilization in ISO 4217 of ISO 3166 "User Extensions"). For example, one can readily identify in ISO 4217 twenty-five (25) instances for ISO 3166 entries where the ISO 3166 Country Codes 3-digit numeric differs from the ISO 4217 "Code Name" 3-digit numeric. Nor is there any relation between the ISO 3166 and ISO 4217 alpha codes for many countries.
- a country (or dependency) has no currency of its own and utilizes the currency of another country;
- a country has more than one currency, i.e., its own and that of another country;
- countries having both a currency code and a funds code;
- a set of countries collectively sharing and using a currency which has no "issuing country", (e.g., SDR, XDR, XOF, and XAF). Here one notes the need to add the "euro" as currency (in addition to the "ecu", i.e., XEU);
- special fund types;
- "currency" not linked to any country or organization, (e.g., precious metals such as gold - 959, alpha = XAU, special settlement currencies, etc.); and,
- "currencies" having no numeric code but only a 3-alpha code, (e.g., XFO = Gold Franc).

Some of the above noted rules and relationships are stated in ISO 4217, others are implicit (and known by "experts"). An IT-enabled version of ISO 4217 is required especially now that in electronic commerce, and particularly that which is Internet-based, many especially those outside the financial community, are not aware of the "peculiarities" of ISO 4217.

Experiences in the financial services/banking sector indicate that on the Internet those engaged in electronic commerce as well as in general applications, need to be made aware of standard notation for currencies. For example, in actual Electronic Commerce practices, the Canadian dollar is being represented as "CDN", "CAN", "CA",, etc. Further, the 3 alpha codes of ISO 3166-1 for countries often are confused with the ISO 4217 currency code.

12.3.2 Country codes and localization with multi-lingualism

Several standards are used internationally for codes representing countries. The better known ones are ISO 3611-1, the USMARC Code List for Countries as maintained by the Library of Congress (LC), and the Universal Decimal Classification (UDC) auxiliary table for countries. Of these the ISO 3166-1 is the most widely known. (On the LC and UDC, see further 12.3.3)

This clause focuses on ISO 3166-1. This standard and its contents is the responsibility of TC 46 - Information and documentation. The purpose is to highlight the need for an IT-enabled version of this standard, and also bring to the fore related localization and multi-lingual aspects. The title of ISO 3166 is "Codes for the representation of names of countries and their subdivisions". Within ISO 3166 standard, there are now three parts; namely:

- Part 1: Country Codes;
- Part 2: Country Subdivision codes; and,
- Part 3: Code for formerly used names of countries.

Here ISO 3166-1 "established codes that represent the names of countries, dependencies, and other areas of particular geopolitical interest, on the basis of lists of country names obtained from the United Nations". Currently, each entry (or "record" of a permitted instance) contains:

(1) a three-digit numeric code
(2) a two letter alpha code
(3) a three letter alpha code
(4) a short name - English
(5) a long, i.e., formal name - English
(6) a short name - French
(7) a long, i.e., formal - French

ISO 3166-1 thus has seven (7) "standardized" representations for each unique entity or object, three (3) of which are codes. ISO 3166-1 allows any one of the seven to be utilized although in practice and especially in IT systems one usually utilizes one of the three codes.

Of these, the three digit numeric code is the most stable and tends to change only when the physical boundaries change. Names short and long do change and at times the accompanying two and three-letter alpha codes as well. ISO 3166 also has a note field.

For this ISO 3166 standard, we currently do not have a common default "standard" for the interface among applications/information systems engaged in support of electronic commerce. The 3-digit numeric code, the 2-alpha code and the 3-alpha code are all used in interchanges. However, while name changes do occur, the 3-digit numeric code remains the same for a country unless the physical entity changes, (e.g., Burma to Myanmar, Zaire to the Democratic Republic of the Congo, etc.).

The use of Alpha-3 code tags for ISO 3166 country name causes overlap confusion with ISO 4217 currency and funds codes which are represented as Alpha-3 codes (upper case).

As noted, ISO 3166 Alpha-2 and Alpha-3 codes are not that stable, i.e., whenever a country changes its name it often also changes, its alpha-2 and alpha-3 codes. The 3-digit numeric code is much more stable. It changes only when the actual physical boundaries of the countries change, i.e., the entity being identified and referenced is no longer the same.

The 3-digit numeric code is linguistically neutral and unambiguous. Each of the 3-digit numeric codes has in ISO 3166 associated with it six (6) alphabetic linguistic expressions, two of which also serve as "human understandable" (and computer-processable codes).

From an interoperability perspective, i.e., both that of commerce and IT, the "3166" identifying rule set and the 3-digit numeric code together form an unambiguous global identifier for the entity being referenced. The alpha codes and names should simply be considered linguistic equivalent expressions, i.e., form an information systems perspective all that one may need to standardize at the interface is "3166:246", "3166:056", "3166:792", etc.

Further, it should be noted that ISO 3166-1 contains many instances and associated codes for entities which are not "countries", i.e., they are dependencies of other entities, (e.g., France, Great Britain, USA, etc.). Human beings "filter" and easily make these distinctions. To make things even worse many of these 3166-1 "sub-entities" have one code in 3166-1 and a different code in 3166-2.

In addition, we should note the fact that in their own locale and language, countries have their own short and long (or formal) name. For example: 528 Netherlands = "Nederland" and "Koninkrijk der Nederlanden".. There are also multi-lingual countries, (e.g., Switzerland).

Further, there is the fact that many countries use non Latin Alphabet-based character sets. This means that one also has the original country language character script as "alphas" plus their "latinized" equivalents.

To this is added the fact that from the perspective of each country and language, the "other" countries have (are known by) their "own names". For example, a person in France uses "Allemagne" not "Germany" or "Deutschland" as the linguistic equivalent for "3166:280". All this is common, non-competitive information.

It suffices to state that all the rules and intelligence implicit in ISO 3166-1 (as well as 3166-2 and 3166-3) have not yet been captured explicitly in an IT-enabled and EC-facilitated manner, (e.g., as a "normalized" (callable) database).

12.3.3 Language codes and concordance among international standards

At times several different standards are used internationally for the same domain. One such domain is that of codes representing languages. With respect to sets of codes representing "languages" (and "countries"), these provide examples where the ISO is not the only organization to issue and maintain standards used world-wide. The most widespread used and known standard is ISO 639 "codes representing the names of languages". This standard and its contents is the responsibility of ISO TC37 - Terminology (principles and coordination).

One coding schema for country codes and language codes is that of the US Library of Congress. Its primary application is in the bibliographic/information sciences domain. It should be noted that these coding schemes pre-date those of the ISO. For country codes the Library of Congress uses two or three character lower case alphabetic codes. These represent existing national entities, provinces and territories of Canada, states of the United States, divisions of the United Kingdom, and internationally recognized dependencies. It is known as the USMARC[5] Code List for Countries and is maintained by the Library of Congress. Similarly the Library of Congress maintains a USMARC Code List for Languages. This code list consists of three letter mnemonic representing only written languages of the modern and ancient world. "*Where one spoken language is written in two different sets of characters, each set of characters is assigned a specific code. For example, Serbian and Croatian are the same spoken language but the former is written in the Cyrillic alphabet and the latter in the Roman alphabet"* ("Roman" known within ISO as "Latin" character set).

Further, the Universal Decimal Classification (UDC) scheme, used in the bibliographic/information science work (primarily in Europe), as well as increasingly for classifying documents on the Internet, also has language codes.

Human beings can recognize and filter these differences, computers cannot unless explicitly instructed. Keeping in mind that the scope and definitions of these different coding schemes also differ for what are generally the same business needs, one can bridge such differences through construction of concordance tables. This allows one to maximize insofar possible, interoperability across sectorial perspective as well as identifying "non-interoperability" instances.

With respect to ISO 639 each entry (or permitted instance) in ISO 639 consists of:

- a language symbol, in the form of a two-letter code;
- the language name - English
- the language name - French
- the original language name (as written in the Latin-1 alphabet).

Here two, initial observations must be made. First is that Canada (and the United States) has not adopted ISO 639 as a "national standard" due primarily to its current lack of inclusion of North American aboriginal and native languages. Secondly, the LANG attribute is important in SGML (ISO/IEC 8879) in the recently proposed New Work Item (ISO/IEC JTC1 N4742) for "Standard HTML". Here the LANG attribute:

- *"identifies a natural language spoken, sung, written or otherwise used by human beings for communication between people. Computer languages are explicitly excluded. The value of the LANG attribute is referred to as the "language tag"... The name space of language tags is administered by IANA. Example tags include: en, en-US, en-cockney, i-cherokee and x-pig-latin.*

[5]The acronym "MARC" stands for "Machine Readable Cataloguing". The preceding characters represent the country who utilize the "MARC" format, have amended it for their specific cataloguing needs, and have an infrastructure at the national level for addressing these national needs. There are primarily 3 countries namely the US, Canada, and the UK Hence the designation of, USMARC, CANMARC, UKMARC.

- *Two letter primary tags are reserved for ISO 639 language abbreviations. This Committee Draft does not specify three-letter primary tags, however their description may be found in the "Ethnologue". Any two-letter initial sub-tag is an ISO 3166 country name..."*

Serious reflection and more systematic thinking is required here especially if one wishes to use SGML → HTML → XML in general and in electronic commerce specifically as well as ensuring interoperability not only with the use of other syntaxes but among various consumer markets, industry sectors, etc.

First of all, "i" and "x" are single characters; and they do not exist in ISO 639. Secondly, "cherokee" and "pig-latin" are not ISO 639 languages. Thirdly, for "en-us", it is not clear at all, given the other examples whether this represents English language as used in the United States or something else.

Fourthly, use of Alpha-2 code tags for ISO 3166 country name is confusing vis-à-vis ISO 639 language codes. They overlap and are not mutually exclusive. This at times is confusing for humans (and even more so for "dumb" computers). Fifthly, in many sort algorithms and search/retrieval engines, upper and lower case letters are treated the same. This causes even more confusion in IT-enabled processing of these code sets if two letter alphas are used as codes for both countries and languages.

There is an urgent need to update ISO 639 to include North American aboriginal and native languages as well as providing for a systematic means for handling and registering user extensions, (e.g., "cockney", "pig latin", "klingon", etc.). Alternatively, one could consider developing an "ISO 639 Level 2" standard for codes representing user extensions of the nature noted above, as well as "historical languages", , i.e., as is being developed for ISO 3166-3.

Even more important is the need to develop a systematic and unambiguous interworking in an IT-enabled manner among language code (ISO 639), currency and fund codes (ISO 4217) and country codes (ISO 3166-1).

One should also develop mechanisms for the interchange of the "same" data content but using different code sets in the same domain.

12.3.4 Commodity codes: IT-enabled localization and multi-lingualism

In combining multi-lingualism and localization requirements, one must recognize the fact that associated with use of a language, (e.g., English, French German, Spanish, Portuguese, etc.), there are various "local" uses of the same natural language. The same object may well be and is often used and known by different terms in the same language in different local usage conventions. The Universal Product Code (UPC) and European Article Numbers (EAN) systems recognize this as they have multi-lingual terms associated with each code for "local" packages/labelling purposes. This has implications for Electronic Commerce and particularly that via the Internet. For example English as a language is in use in many countries or "locales", (e.g., Australia, Britain, Canada, India, Ireland, Jamaica, New Zealand, USA, etc.). Similar examples exist for other languages.

In this context, the BT-EC took the example of an enterprise wishing to sell potatoes world-wide. This is a simple example yet representative of the interplay of the four horizontal issues. This means that these goods have to pass through customs for export/import into various countries. The custom authorities world-wide have an organization that sets common rules and procedures, i.e., the World Customs Organization (WCO), formerly the Cooperative Customs Council (CCC)[6]. The WCO has established a classification scheme for goods traded called the Harmonized System (HS). It was formerly known as the Brussels Tariff Nomenclature (BTN). As such the HS for "commodity codes" is an internationally recognized standard although of a non-ISO/IEC/ITU origin.

Within the Harmonized System (HS) of the WCO, the general code for potato (fresh or chilled) is "0701". This linguistically neutral code "0701" is a data item or data element instance in the HS permitted value domain. Here the German German equivalent name of "potato" is "Kartoffel", but the Austrian German equivalent is "Erdapfel". Similarly, the Spanish equivalent name is "patata" while the Mexican Spanish equivalent name is "papa", and the Dutch equivalent is "aardappel", etc. In French, the dictionary term is "pomme de terre", with "patate" as a "local" specific, i.e., Canada/ Quebec term (and one which is not slang). The equivalent names noted above are thus culturally adapted equivalent linguistic expressions associated with "0701". Depending on the "locale," the appropriate human oriented names or linguistic expressions can be systematically/automatically generated from the linguistically neutral numeric code for human understanding, product labelling, reporting, filing, etc., and, where required, in multiple languages.

From a more detailed analysis, one can conclude two key aspects of the interworking of "localization", "cultural", and "multi-lingual" requirements; namely:

1. that within a jurisdiction, (e.g., a country, a province, canton, etc.), there can be more than one natural language of use; and,

2. that localization needs can result in a product, i.e., entity or object, having more than one equivalent "name" within a particular natural language.

[6] The WCO is but one example of "coordinated autonomy" among autonomous organizations. The degree to which autonomous organizations achieve interoperability from a business operational perspective sets the limit to the extent of interoperability of supporting IT-based functional services.

13 List of registered BT-EC documents

N 001	Calling Notice and Draft Agenda - Kick-off Meeting of JTC 1 Business Team on Electronic Commerce
N 002	NTT´s Electronic Money System Contribution from Mr. Senda
N 003	ANEC Consumer requirements in relation to ICT Interim Report
N 004	EBES-Building Blocks for Electronic Commerce Interim Report
N 005	Programme of work of the CEN/TC 224-ISO/TC 68/SC 6 Group for Standardization on Electronic Commerce
N 006	HLSG Report No. 2 Barriers to Electronic Commerce in support of SMEs
N 007	Organizations and sectors, which should be represented in the Business Team
N 008	Mode of Operation of Business Team Electronic Commerce
N 009	Decisions and actions from kick-off meeting
N 010	EBES/EWOS Document Contribution: Lite EDI - Framework for SME EC Solutions
N 011	Draft letter for membership recruitment
N 012	Calling notice and agenda Brussels meeting, 29/30 September
N 013	Interim Report of Business Team on Electronic Commerce
N 014	Two initial scenarions
N 015	Scenario methodology for User Requirements: "A rationale for the use of scenarios when eliciting user requirements for electronic commerce"
N 016	Canadian Contribution-Linkage to ISO/IEC JTC 1 Standards
N 017	Canadian Contribution-JTC 1 Cultural Adaptability Workshop
N 018	Canadian Contribution-BT-EC Self-Imposed Limitation of Scope to "Individual to Business"
N 019	Revision 10 of Reference Guide "The Next Generation of UN/EDIFACT" - An Open-edi Approach using IDEF Models and OOT
N 020	GII/Global Standards Conference - Workshop #1 - Electronic Commerce
N 021	Report on the JTC 1/BE-EC meeting in Brussels, September 29-30, 1997
N 022	JTC 1/BT-EC: E-Mail-Reflector - Instruction for use
N 023	JTC 1/BT-EC Open Meeting in Atlanta: Announcement and Invitation
N 024	Extract ISO/IEC 14662 - Open-edi reference model
N 025	Revised Agenda for the JTC 1/BT-EC Open Meeting in Atlanta
N 026	CEFACT - UN contribution to the growth of global commerce; Jari Salo
N 027	ISO/IEC JTC 1 Workshop on Cultural Adaptability - Logistics Information, Dr. J. Knoppers
N 028	Report on the Global Standards Conference
N 029	Business Requirements: Localization and Cultural Adaptability
N 030	IT-enablement of existing standards used in commerce (plus Localization and Multi-lingualism)
N 031	A third business example - R. Wiehle
N 032	Functional model for electronic commerce applications
N 033	Building Blocks for Electronic Commerce - Final Report
N 034	Draft Report of the JTC 1 BT-EC Open Meeting in Atlanta, November 13-14, 1997
N 035	Report to JTC 1: Work on Electronic Commerce standardization to be initiated - Strawman
N 036	Request for comments and contributions: Horizontal Issues - Key concepts and definitions

N 037	CEFACT - UN contribution to the growth of global commerce (new version, supercedes document N 026)
N 038	Request for comments and contributions: IT-enablement (plus localization and multi-lingualism)
N 039	E-mail reflector for Forum on Anonymity
N 040	E-mail reflector for Forum on Trusted Personalized Computers
N 041	E-mail reflector for Forum on Adaption Techniques
N 042	Draft Agenda and Call for Contributions for the JTC 1 Cultural Adaptability Workshop (CAW) to be held in Ottawa, Canada, 1998-01-20/22
N 043	E-mail reflector for Forum on Eveything-on-Screen-counts
N 044	Logistical Information concerning the JTC 1/BT-EC meeting in Brussels, 26/29 January, 1998
N 045	Cultural Adaptability and "Dog", "Doghouse", "Chip", etc.: A case study in cross-sectorial challenges
N 046	Announced document from Dr.J. Knoppers on IT-enablement
N 047	Announced document from Dr. J. Knoppers on cross-sectorial issues
N 048R	Revised Draft Agenda for the JTC 1/BT-EC Meeting in Brussels, 26-29 January 1998
N 049	The need for a multiple-interface TPC (user interface; IC-card interface)
N 050	Standards Needs for Electronic Commerce - Revised Report of the A-Team at the Atlanta Meeting
N 051	Observations on Cultural Adaptability Requirements
N 052	Correction to JTC 1/BT-EC N 046 Exhibit #2 "Sample Country and language Codes Concordance: ISO, LC and UDC"
N 053	Consumer Requirements for Electronic Commerce derived from a Scenario Workshop
N 054	The needs of Standards development relative to Electronic Commerce
N 055	Analysis of Existing Solutions for Electronic Commerce
N 057	Strawman section 4.3 of BT-EC N 035
N 058	Internet OTP Overview
N 059	Internet Open Trading Protocol - Part 1: Business Description
N 060	OTP Press Release
N 061	Inventory of Existing Standards
N 062	Analysis of Existing Surveys
N 063	Account-Based Secure Payment Messages
N 064	ECOM Overview
N 065	Report of the ISO/IEC JTC 1/BT-EC Meeting in Brussels, 26-29 January 1998
N 066	ISO/IEC JTC 1/SC 27 "Security Techniques"
N 067	Version 0.3 Draft Report to JTC 1
N 068	Version 0.9 of Draft Report to JTC 1
N 069	Version 0.9: Draft Report to JTC 1: Self-assessment of JTC 1 Business Team on Electronic Commerce
N 070	Contribution from SC 27: Electronic Commerce Security
N 071	Report to JTC 1: Work on Electronic Commerce standardization to be initiated
N 072	Report to JTC 1: Self-assessment of JTC 1 Business Team on Electronic Commerce

14 Relevant standards

In addition to standards identified in particular clauses of this report, for some areas further input was provided by Team members as to existing or forthcoming standards. The material in this clause can, however, not be regarded as comprehensive, but it is offered to JTC 1 as a basis for further technical review.

14.1 Identification

- ISO/IEC 7501-1:1997 Identification cards -- Machine readable travel documents -- Part 1: Machine readable passport
- ISO/IEC 7501-2:1997 Identification cards -- Machine readable travel documents -- Part 2: Machine readable visa
- ISO/IEC 7501-3:1997 Identification cards -- Machine readable travel documents -- Part 3: Machine readable official travel documents
- ISO/IEC 7810:1995 Identification cards -- Physical characteristics
- ISO/IEC 7811-1:1995 Identification cards -- Recording technique -- Part 1: Embossing
- ISO/IEC 7811-2:1995 Identification cards -- Recording technique -- Part 2: Magnetic stripe
- ISO/IEC 7811-3:1995 Identification cards -- Recording technique -- Part 3: Location of embossed characters on ID-1 cards
- ISO/IEC 7811-4:1995 Identification cards -- Recording technique -- Part 4: Location of read-only magnetic tracks -- Tracks 1 and 2
- ISO/IEC 7811-5:1995 Identification cards -- Recording technique -- Part 5: Location of read-write magnetic track -- Track 3
- ISO/IEC 7811-6:1996 Identification cards -- Recording technique -- Part 6: Magnetic stripe -- High coercivity
- ISO/IEC 7812-1:1993 Identification cards -- Identification of issuers -- Part 1: Numbering system
- ISO/IEC 7812-2:1993 Identification cards -- Identification of issuers -- Part 2: Application and registration procedures
- ISO/IEC 7813:1995 Identification cards -- Financial transaction cards
- ISO 7816-1:1987 Identification cards -- Integrated circuit(s) cards with contacts -- Part 1: Physical characteristics
- ISO/IEC DIS 7816-1 Identification cards -- Integrated circuit(s) cards with contacts -- Part 1: Physical characteristics (Revision of ISO 7816-1:1987)
- ISO 7816-2:1988 Identification cards -- Integrated circuit(s) cards with contacts -- Part 2: Dimensions and location of the contacts
- ISO/IEC DIS 7816-2 Information technology -- Identification cards -- Integrated circuit(s) cards with contacts -- Part 2: Dimensions and location of the contacts (Revision of ISO 7816-2:1988)
- ISO/IEC 7816-3:1997 Information technology -- Identification cards -- Integrated circuit(s) cards with contacts -- Part 3: Electronic signals and transmission protocols
- ISO/IEC 7816-4:1995 Information technology -- Identification cards -- Integrated circuit(s) cards with contacts -- Part 4: Interindustry commands for interchange
- ISO/IEC 7816-5:1994 Identification cards -- Integrated circuit(s) cards with contacts -- Part 5: Numbering system and registration procedure for application identifiers
- ISO/IEC 7816-6:1996 Identification cards -- Integrated circuit(s) cards with contacts -- Part 6: Interindustry data elements

- ISO/IEC DIS 7816-7 Information technology -- Identification cards -- Integrated circuit(s) cards with contacts -- Part 7: Interindustry commands for Structured Card Query Language (SCQL)
- ISO/IEC DIS 7816-8 Identification cards -- Integrated circuit(s) cards with contacts -- Part 8: Security related interindustry commands
- ISO/IEC 7826-1:1994 Information technology -- General structure for the interchange of code values -- Part 1: Identification of coding schemes
- ISO/IEC 7826-2:1994 Information technology -- General structure for the interchange of code values -- Part 2: Registration of coding schemes
- ISO 8583:1993 Financial transaction card originated messages -- Interchange message specifications
- ISO/DIS 8583-2 Financial transaction card originated messages -- Interchange message specifications -- Part 2: Application and registration procedures for Institution Identification Codes (IIC)
- ISO/DIS 8583-3 Financial transaction card originated messages -- Interchange message specifications -- Part 3: Maintenance procedures for codes
- ISO 9564-1:1991 Banking -- Personal Identification Number management and security -- Part 1: PIN protection principles and techniques
- ISO/DIS 9564-1 Banking -- Personal Identification Number management and security -- Part 1: PIN protection principles and techniques (Revision of ISO 9564-1:1991)
- ISO 9564-2:1991 Banking -- Personal Identification Number management and security -- Part 2: Approved algorithm(s) for PIN encipherment
- ISO 9992-1:1990 Financial transaction cards -- Messages between the integrated circuit card and the card accepting device -- Part 1: Concepts and structures
- ISO/FDIS 9992-2 Financial transaction cards -- Messages between the integrated circuit card and the card accepting Device -- Part 2: Functions, messages (commands and responses), data elements and structures
- ISO 10202-1:1991 Financial transaction cards -- Security architecture of financial transaction systems using integrated circuit cards -- Part 1: Card life cycle
- ISO 10202-2:1996 Financial transaction cards -- Security architecture of financial transaction systems using integrated circuit cards -- Part 2: Transaction process
- ISO/DIS 10202-3 Financial transaction cards -- Security architecture of financial transaction systems using integrated circuit cards -- Part 3: Cryptographic key relationships
- ISO 10202-4:1996 Financial transaction cards -- Security architecture of financial transaction systems using integrated circuit cards -- Part 4: Secure application modules
- ISO/DIS 10202-5 Financial transaction cards -- Security architecture of financial transaction systems using integrated circuit cards -- Part 5: Use of algorithms
- ISO 10202-6:1994 Financial transaction cards -- Security architecture of financial transaction systems using integrated circuit cards -- Part 6: Cardholder verification
- ISO/DIS 10202-7 Financial transaction cards -- Security architecture of financial transaction systems using integrated circuit cards -- Part 7: Key management
- ISO/DIS 10202-8 Financial transaction cards -- Security architecture of financial transaction systems using integrated circuit cards -- Part 8: General principles and overview
- ISO/IEC 10373:1993 Identification cards -- Test methods
- ISO/IEC DIS 10373-1 Identification cards -- Test methods -- Part 1: General characteristics tests
- ISO/IEC DIS 10373-2 Identification cards -- Test methods -- Part 2: Cards with magnetic stripes

- ISO/IEC DIS 10373-5 Identification cards -- Test methods -- Part 5: Optical memory cards
- ISO 10374:1991 Freight containers -- Automatic identification
- ISO/IEC 10536-1:1992 Identification cards -- Contactless integrated circuit(s) cards -- Part 1: Physical characteristics
- ISO/IEC 10536-2:1995 Identification cards -- Contactless integrated circuit(s) cards -- Part 2: Dimensions and location of coupling areas
- ISO/IEC 10536-3:1996 Identification cards -- Contactless integrated circuit(s) cards -- Part 3: Electronic signals and reset procedures
- ISO/IEC 11693:1994 Identification cards -- Optical memory cards -- General characteristics
  ISO/IEC 11694-1:1994 Identification cards -- Optical memory cards -- Linear recording method -- Part 1: Physical characteristics
- ISO/IEC 11694-2:1995 Identification cards -- Optical memory cards -- Linear recording method -- Part 2: Dimensions and location of the accessible optical area
- ISO/IEC 11694-3:1995 Identification cards -- Optical memory cards -- Linear recording method -- Part 3: Optical properties and characteristics
- ISO/IEC 11694-4:1996 Identification cards -- Optical memory cards -- Linear recording method -- Part 4: Logical data structures
- ISO/DIS 15668 Banking -- Financial transaction cards -- Secure file transfer (retail)
- ISO/IEC DIS 16388 Automatic identification and end capture - Bar code symbology and specification -- Code 39
- ISO/IEC DIS 16390 Automatic identification and data capture techniques - Bar code symbology specifications - Interleaved 2 of 5

14.2 Authentication

- ISO/IEC 7816-4:1995 Information technology -- Identification cards -- Integrated circuit(s) cards with contacts -- Part 4: Interindustry commands for interchange
- ISO 8730:1990 Banking -- Requirements for message authentication (wholesale)
- ISO 8731-1:1987 Banking -- Approved algorithms for message authentication -- Part 1: DEA
- ISO 8731-2:1992 Banking -- Approved algorithms for message authentication -- Part 2: Message authenticator algorithm
- ISO/DIS 9735-6 Electronic data interchange for administration, commerce and transport (EDIFACT) -- Application level syntax rules -- Part 6: Secure authentication and acknowledgement message (message type - AUTACK)
- ISO/IEC 9797:1994 Information technology -- Security techniques -- Data integrity mechanism using a cryptographic check function employing a block cipher algorithm
- ISO/IEC 9798-1:1997 Information technology -- Security techniques -- Entity authentication -- Part 1: General
- ISO/IEC 9798-2:1994 Information technology -- Security techniques -- Entity authentication -- Part 2: Mechanisms using symmetric encipherment algorithms
- ISO/IEC 9798-3:1993 Information technology -- Security techniques -- Entity authentication mechanisms -- Part 3: Entity authentication using a public key algorithm
- ISO/IEC DIS 9798-3 Information technology -- Security techniques -- Entity authentication -- Part 3: Mechanisms using digital signature techniques
- ISO/IEC 9798-4:1995 Information technology -- Security techniques -- Entity authentication -- Part 4: Mechanisms using a cryptographic check function

- ISO/IEC DIS 9798-5 Information technology -- Security techniques -- Entity authentication -- Part 5: Mechanisms using zero knowledge techniques
- ISO 9807:1991 Banking and related financial services -- Requirements for message authentication (retail)
- ISO/FDIS 9992-2 Financial transaction cards -- Messages between the integrated circuit card and the card accepting Device -- Part 2: Functions, messages (commands and responses), data elements and structures
- ISO/IEC 10181-2:1996 Information technology -- Open Systems Interconnection -- Security frameworks for open systems: Authentication framework
- ISO 11131:1992 Banking and related financial services -- Sign-on authentication
- ISO 11166-1:1994 Banking -- Key management by means of asymmetric algorithms -- Part 1: Principles, procedures and formats
- ISO 11166-2:1994 Banking -- Key management by means of asymmetric algorithms -- Part 2: Approved algorithms using the RSA cryptosystem
- ISO/IEC DISP 15125-7 Information technology -- International Standardized Profiles ADInn -- OSI Directory -- Part 7: DSA to DSA Authentication (ADY43)
- ISO/DIS 15668 Banking -- Financial transaction cards -- Secure file transfer (retail)

14.3 Write-Once media

- ISO/IEC 9171-1:1990 Information technology -- 130 mm optical disk cartridge, write once, for information interchange -- Part 1: Unrecorded optical disk cartridge
- ISO/IEC 9171-2:1990 Information technology -- 130 mm optical disk cartridge, write once, for information interchange -- Part 2: Recording format
- ISO 9660:1988 Information processing -- Volume and file structure of CD-ROM for information interchange
- ISO/IEC TR 10091:1995 Information technology -- Technical aspects of 130 mm optical disk cartridge write-once recording format
- ISO/IEC 10149:1995 Information technology -- Data interchange on read-only 120 mm optical data disks (CD-ROM)
- ISO/IEC 11560:1992 Information technology -- Information interchange on 130 mm optical disk cartridges using the magneto-optical effect, for write once, read multiple functionality
- ISO/DIS 12024 Electronic imaging -- Verification of the information stored on CD media
- ISO/TR 12654:1997 Electronic imaging -- Recommendations for the management of electronic recording systems for the recording of documents that may be required as evidence, on WORM optical disk
- ISO/IEC 13403:1995 Information technology -- Information interchange on 300 mm optical disk cartridges of the write once, read multiple (WORM) type using the CCS method
- ISO/IEC 13490-1:1995 Information technology -- Volume and file structure of read-only and write-once compact disk media for information interchange -- Part 1: General
- ISO/IEC 13490-2:1995 Information technology -- Volume and file structure of read-only and write-once compact disk media for information interchange -- Part 2: Volume and file structure
- ISO/IEC 13614:1995 Information technology -- Interchange on 300 mm optical disk cartridges of the write once, read multiple (WORM) type using the SSF method

- ISO/IEC DIS 15486 Information technology -- Data interchange on 130 mm optical disk cartridges of type WORM (Write Once Read Many) using irreversible effects -- Capacity: 2,6 Gbytes per cartridge
- ISO/IEC DIS 15898 Information technology -- Data interchange on 356 mm optical disk cartridges -- WORM, using phase change technology -- Capacity: 14,8 and 25 Gbytes per cartridge

14.4 Auditing and tracing

- ISO/DIS 9735-5 Electronic data interchange for administration, commerce and transport (EDIFACT) -- Application level syntax rules -- Part 5: Security rules for batch EDI (authenticity, integrity and non-repudiation of origin)
- ISO/IEC 10181-4:1997 Information technology -- Open Systems Interconnection -- Security frameworks for open systems: Non-repudiation framework -- Part 4:
- ISO/IEC 13888-1:1997 Information technology -- Security techniques -- Non-repudiation -- Part 1: General
- ISO/IEC DIS 13888-2 Information technology -- Security techniques -- Non-repudiation -- Part 2: Mechanisms using symmetric techniques
- ISO/IEC 13888-3:1997 Information technology -- Security techniques -- Non-repudiation -- Part 3: Mechanisms using asymmetric techniques
- ISO/IEC 10164-4:1992 Information technology -- Open Systems Interconnection -- Systems management: Alarm reporting function
- ISO/IEC 10164-7:1992 Information technology -- Open Systems Interconnection -- Systems Management: Security alarm reporting function
- ISO/IEC ISP 12059-4:1995 Information technology -- International Standardized Profiles -- OSI Management -- Common information for management functions -- Part 4: Alarm reporting
- ISO/IEC DISP 12059-7 Information technology -- International Standardized Profiles -- OSI Management -- Common information for management functions -- Part 7: Security alarm reporting
- ISO/IEC ISP 12060-2:1995 Information technology -- International Standardized Profiles -- OSI Management -- Management functions -- Part 2: AOM212 -- Alarm reporting and state management capabilities
  ISO/IEC ISP 12060-3:1995 Information technology -- International Standardized Profiles -- OSI Management -- Management functions -- Part 3: AOM213 -- Alarm reporting capabilities

14.5 Additional IT infrastructure standards

- Character sets: (IS 10646) (SC2)
- Data types (such as numeric, alphanumeric, date and time, free text, audio, video)
- Data Base Languages: (IS 9075 and IS13429) (SC32)
- Standard Graphic Mark-up Language: (IS 8879)
- Export/Import facilities: IS13238 (SC32)
- Remote Database Access: IS 9579 (SC32)
- Data identification cards: (SC17)
- Security (SC27): see also JTC 1/BT-EC N 066 and http://www.iso.ch:8080/jtc1/sc27