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ISO/TC 211 Geographic information/Geomatics

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Draft Business Plan of ISO/TC 211 - Geographic information/Geomatics

Introduction

ISO Technical Committees and Business Planning

The extension of formal business planning to ISO Technical Committees (ISO/TCs) is an important measure which forms part of a major review of business. The aim is to align the ISO work programme with expressed market needs and to allow ISO/TCs to prioritize between different projects, to identify the benefits expected from the availability of International Standards and to ensure the adequate resourcing of projects through their development stages in the ISO/TCs. Your role in the implementation of the Business Planning concept will contribute significantly to the overall effectiveness of international standardization.

We express our sincere appreciation and thanks for your time in reviewing this Business Plan.

International standardization and the role of ISO

The foremost aim of international standardization is to facilitate the exchange of goods and services through the elimination of technical barriers to trade.

Three bodies are responsible for the planning, development and adoption of International Standards: ISO (International Organization for Standardization) is responsible for all sectors excluding electrotechnical, which is the responsibility of IEC (International Electrotechnical Committee), and most of the Telecommunications Technologies, which are largely the responsibility of ITU (International Telecommunication Union).

ISO is a legal association, the members of which are the National Standards Bodies (NSBs) of some 130 countries (organizations representing social and economic interests at international level), supported by a Central Secretariat based in Geneva, Switzerland.

The principal deliverable of ISO is the International Standard.

An International Standard embodies the essential principles of global openness and transparency, consensus and technical coherence. These are safeguarded through its development in an ISO Technical Committee (ISO/TC), representative of all interested parties, supported by a public comment phase (the ISO Technical Enquiry). ISO and its Technical Committees are also able to offer the ISO Technical Specification (ISO/TS), the ISO Public Available Specification (ISO/PAS) and the ISO Technical Report (ISO/TR) as solutions to market needs. These ISO products represent lower levels of consensus and have therefore not the same status as an International Standard.

ISO offers also the Industry Technical Agreement (ITA) as a deliverable which aims to bridge the gap between the activities of consortia and the formal process of standardization represented by ISO and its national members. An important distinction is that the ITA is developed by ISO workshops and fora, comprising only participants with direct interest, and so it is not accorded the status of an International Standard.

Scope of ISO/TC 211

Standardization in the field of digital geographic information. This work aims to establish a structured set of standards for information concerning objects or phenomena that are directly or indirectly associated with a location relative to the Earth. These standards may specify, for geographic information, methods, tools and services for data management (including definition and description), acquiring, processing, analyzing, accessing, presenting and transferring such data in digital/electronic form between different users, systems and locations. The work shall link to appropriate standards for information technology and data where possible, and provide a framework for the development of sector-specific applications using geographic data.

Comments:

The overall objectives of ISO/TC 211 are:

- increase the understanding and usage of geographic information
- increase the availability, access, integration, and sharing of geographic information
- promote the efficient, effective, and economic use of digital geographic information and associated hardware and software systems
- contribute to a unified approach to addressing global ecological and humanitarian problems

Market Environment and Objectives of ISO/TC 211

This section establishes a sequential development of thoughts regarding the market for which the ISO/TC aims to fulfil the needs. Details in relation to the market analysis are given in the Guidance document on ISO Business Planning. The sequence of thoughts starts from a description of the current market situation relevant to the product or product grouping under consideration by the ISO/TC, continues on to an analysis of the different factors motivating/influencing the activities of the ISO/TC, to come to clear description of objectives and expected benefits resulting from the work of the ISO/TC, together with an accompanying strategy how to reach those objectives. Finally, a general 'risk analysis' is included highlighting issues that may delay or stop the ISO/TC achieving its set objectives.

Background

The disciplines of cartography and geography, in response to technological innovations, have individually and collectively undergone significant changes during the past half-century. The 1950's witnessed the quantification of geography followed by the introduction of computers and modelling during the 1960's. The application of computer technology to cartography during the 1970's gave rise to automated/computer-assisted cartography, along with the adaptation of the mathematics of topology to computer cartography/geography around 1975 that lead to the emergence of geographic information systems (GIS). From 1985 to 1995 saw the widespread development, use, and acceptance of GIS technology. During the period from 1995 to 2000, spatially enabled enterprise databases and the deployment of geographic information on the Internet rapidly positioned a new location-based technology as part of generic information technology. Leveraging wireless and mobile applications, location-based products, services, and solutions are now initiating the new millennium with the promise of an increasing need for locational functionality and geographic information via the Internet by not just the geographic community, but the world at large.

The era of modern of geographic standardization spanned the decade from the early 1980's to the early 1990's. Internationally, initial standardization efforts within cartography and geography were slow and arduous. National and international organizations were busy developing standards for the transfer/exchange of geographic data between computers systems. The technical

development of such standards were limited to few national and regional user communities. There were no standards that had broad international support. By 1995, ISO/TC 211 and the Open GIS Consortium (OGC) emerged with GIS standards becoming a highly visible and prominent part of the international geographic agenda. The value of these initial international standardization efforts was to gain the international recognition and acceptance by the cartographic and geographic communities of the need and value of geographic standardization.

In general, OGC is concerned with software specifications, while ISO/TC 211 concentrates more on data standards. Unlike previous ISO technical committees, ISO/TC 211 has the unique distinction of beginning a programme of work that includes the concurrent development of an integrated set of twenty standards for geographic information. While the development of singular or stand-alone ISO standards occurs at a faster rate, the carefully developed ISO/TC 211 set of integrated standards advances the interoperability of its family of standards. Recently, the OGC & ISO/TC 211 formed a coordination group to leverage mutual development. The OGC is submitting their specifications for ISO approval via ISO/TC 211. The OGC, an industry consortium, has a conformance and testing program for the specifications they develop. There is also an OGC interoperability program for developing specifications by rapid-prototyping software in their Web Mapping Testbed (WMT). This practical bottom up approach by industry and its vendors develops specifications as a result of implementation and interoperability scenarios. De jure standardization efforts are a top down exercise that hopes that the industry will implement many of the resulting paper specifications. Mature ISO/TC 211 draft standards such as metadata and portrayal have been offered to the OGC WMT initiatives for testing and refinement before and as part of the process for final ISO approval. The OGC WMT initiative provides for multiple vendor implementations of a standard and tests the interoperability of these implementations.

Currently, the OGC Web Map server interface has been commercially implemented by over 130 of the GIS industry's 200 software vendors. Under the cooperative agreement between the OGC and ISO, the Web Map server interface (ISO 19128) is now being progressed as an International Standard within ISO/TC 211. A highly visible OGC specification recently submitted to ISO/TC 211 for ISO standardization is the Geography Markup Language (GML). A number of other successful OGC open neutral software interfaces may be forthcoming as new work item proposals from the OGC.

The increasing recognition for the value of spatial data and geographic information has spawned the entry of new players into the spatial standardization arena, both from within ISO and externally. This has resulted in the formation of a Joint Steering Group on Spatial Standardization and Related Interoperability, chaired by the ISO/TC 211 Chairman. Consequently, a new agenda is emerging for international spatial standardization that includes traditional and new innovative applications across a spectrum of disciplines. For ISO/TC 211, these developments are resulting in new strategic directions.

Achieving more interoperability requires a proactive coordination of spatial standards at both the abstract and implementation levels. Proactive cooperation among spatial standards activities should also help to use available resources more efficiently by minimizing technical overlap, wherever this occurs. Such coordination and cooperation should lead to more market-relevant spatial standards, and could serve as a useful roadmap for all interested parties.

Market Environment

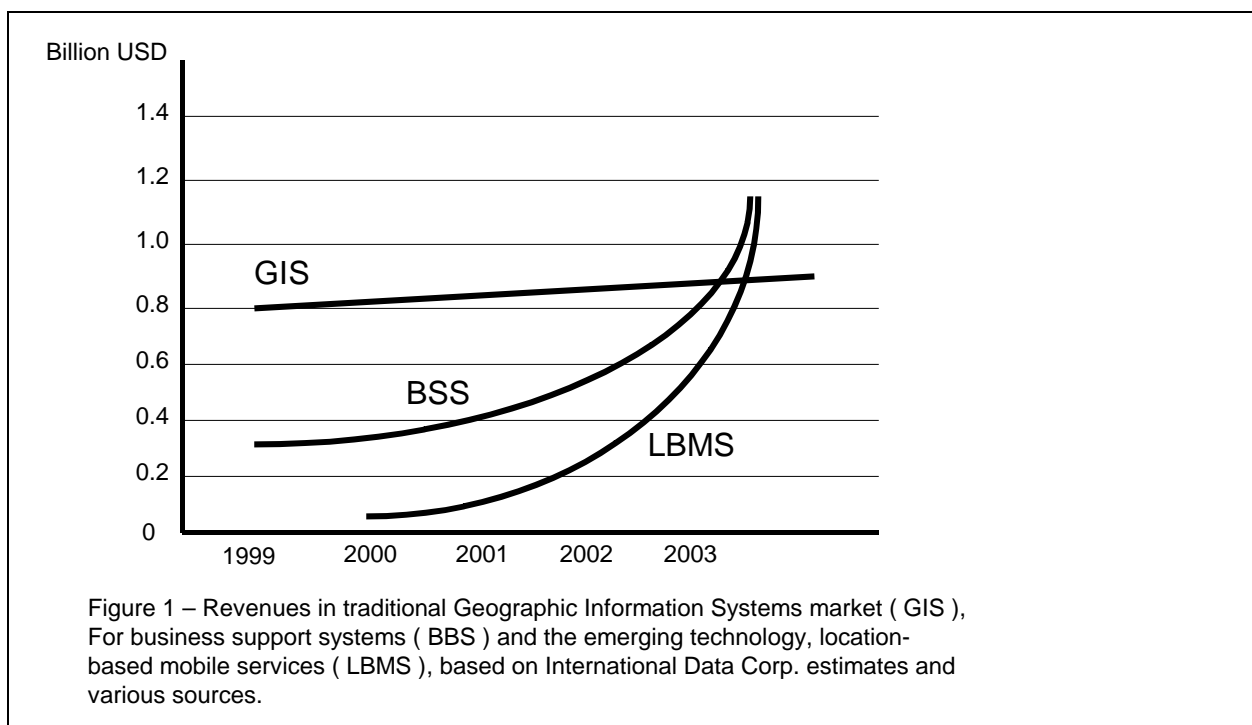
Political, economical, social, technical, legal and international factors that either directly require some or all of the standardization activities proposed by the ISO/TC, or significantly influence the way these activities are carried out are the following:

1. General description of the market (*descriptive*)

A common way to describe the market is by dividing it into three segments: the traditional geographic information systems (GIS) market, business support systems (BSS), and personal productivity (PP). A description can be given as:

- GIS:
 - Spatial information contributes the most value
 - Traditional market for spatial technology
- BSS:
 - Spatial information does **not** contribute the most value
 - Spatial technology embedded in business applications
- LBMS:
 - Location – based mobile services (LBMS)

2. Description of the total market (*descriptive and quantitative*)



A new emerging market is location-based mobile services (LBMS). Many industry sectors within the market-place will benefit significantly from interoperable access to spatial information and services, including such areas as the travel and tourist industries, the mapping and routing industries, communications, utilities, transportation, national defense, agriculture, disaster management and public safety, inventory management, real and synthetic environmental modelling and gaming, and the emerging needs of electronic commerce for spatial information.

Location-based services, or location-based mobile services (LBMS), are perhaps the most “high profile” of the emerging technologies to utilize geographic information. Many analysts foresee an enormous market in this field, one of them predicting, for example, that the market for tracking, route-finding and guiding, notification and alert services in North America and Western Europe will reach USD 15 billion by 2005. A whole string of partners is involved in a complex value –chain providing such services. The need for standards is such that we could say that our ability to

provide rules for the game through standards is a prerequisite to trigger off development of the market. Thus, we do, indeed, face a huge challenge!

“Location-based services” are services (through a combination of hardware devices, communication networks – often wireless – and software applications) that access, provide or otherwise act upon location information. We distinguish between *mobile position determination systems* that determine the location of a mobile terminal and *application-oriented location services*, which exploit device location in some application service sought by a client. Examples of this include:

- Traffic Information, e.g. “You are about to join a ten-kilometer traffic queue, turn right on the A3 ahead”
- Emergency Services, e.g. “Help, I’m having a heart attack!”
- Roadside Emergency, e.g. “Help, my car has broken down!”

A special advisory group on location-based services has been set up to define requirements for new work in this field, and the new tasks ahead have already been identified:

- ISO 19132 Geographic information – Location based services possible standards
- ISO 19133 Geographic information – Location based services tracking and navigation
- ISO 19134 Geographic information – Multimodal location based services for routing and navigation

Global Spatial Data Infrastructure (GSDI)

The Global Spatial Data Infrastructure (GSDI) was defined at the 5th GSDI Conference in May 2001 as: “The Global Spatial Data Infrastructure is coordinated actions of nations and organizations that promotes awareness and implementation of complementary policies, common standards and effective mechanisms for the development and availability of interoperable digital geographic data and technologies to support decision making at all scales for multiple purposes.” Put more simply, the purpose of the GSDI is to encourage the growth of compatible Spatial Data Infrastructures capable of supporting collaboration on regional and global issues of importance.

Starting from an initiative of a few far-sighted individuals, the GSDI has blossomed into a major and important organization in developing a global consciousness as concerns geospatial policies. In addition, it provides practical guidelines on how to establish spatial infrastructures. Currently, there are more than 50 nations developing national spatial data infrastructures. These guidelines highlight the importance of global standards, and point to the work of ISO as the basis upon which to build. The GSDI is now recognized as a Class A Liaison of ISO/TC 211.

GSDI is also working closely with the United Nations. The UN interest in geographic information is broad, and obviously runs the gamut of UN sectors. The UN recently formed a UN Geographic Information Working Group (UNGIWG), that was established for the needs of peacekeeping actions, sustainable development and the eradication of poverty. This working group wants to collaborate with ISO/TC 211 and use standards it has developed and has become a Class A Liaison of ISO/TC 211. Even more recently, both the GSDI and UNGIWG have indicated a willingness to work even closer with ISO/TC 211 under cooperative agreements that would enable capacity building in standards through education, training and technology transfer.

Recently, the European Commission has established an initiative known as Infrastructure for Spatial Information in Europe (INSPIRE). The INSPIRE initiative aims to make harmonised and high quality geographic data and information readily available for formulating, implementing, monitoring and evaluating Community policy and for the citizen to access information about the environment, whether local, regional, national or international. INSPIRE recognizes ISO standards as a foundation for its work.

These and other global geographic organizations constitute the traditional user community for ISO/TC 211 standards. Currently, work items are reaching publication as International Standards; ISO/TC 211 has initiated an outreach activity to user communities to enable them to take advantage of the considerable international investment in the development of these standards.

Awareness of ISO/TC 211 standards is known within many but not all global geographic communities, however, awareness is absent among most potential user communities. The full realization of the benefits of ISO/TC 211 standards will only occur when they are adopted for all forms of human endeavor when using geographic information.

As a strategic investment to ensure the long-term viability of ISO/TC 211 standards, there is a need for advocacy – to establish agreements between ISO/TC 211 and global organizations that will recognize ISO/TC 211 standards as the foundation for the standardization of their geographic information.

Consequently, the ISO/TC 211 Advisory Group on Outreach seeks to promote the awareness, adoption, and advocacy of ISO/TC 211 standards.

Objectives of ISO/TC 211 and Strategies for their Achievement

Based on the considerations above, ISO/TC 211 proposes the following objectives and strategic directions for its future work:

The ultimate benefits of standardization are based on the use of widely recognized and accepted international voluntary standards developed to the highest technical level by an open consensus process that includes all those affected. Beyond standardization of traditional geographic functionality: innovative, new, and unknown technology and application domains present challenges transcending the established process of geographic standardization. Previously, standardization was a process for recognizing and codifying the status quo of technology. Standardization is now beginning to define the requirements and implementation of new technology.

The implied mandate for ISO/TC 211 is to develop an integrated set of standards for geographic information. Equally important, if not more so, is the unstated strategic direction for the international deployment of such standards. Accordingly, the strategic directions for ISO/TC 211 can be viewed in terms of development, deployment, and the underlying coordination/consensus process that integrates both these phases for successful standardization.

For development, the major issues include: standards technical development, organizations developing geographic or related standards, priorities of standards, standards and interoperability testing, and speed of developing technical specifications. For deployment, the key issues are: implementation of standards, standards education / training, and user communities supporting ISO/TC 211 standards.

Inherent and pervasive through standards development, deployment, and their coordination/consensus process are considerations for the implementors and users of geographic standards. Such as data transfer standards that are implemented by vendors or data cataloguing standards implemented by data producers, or metadata standards implemented by vendors, data producers, and general users of geographic information. Implementors and user requirements need to be considered in conjunction with the standards development, deployment, the process of integrating such requirements.

Traditionally, geographic information was produced and used by the geographic community. Increasingly, geographic information is being created and used by everyone else, especially, in the business community. Hence, the once all important technical issues for experts are now being

subordinated to the business issues confronting government and commercial organizations. Previously, the cost of standardization was minimal because of the number of users and requirements. Because geographic information has transitioned, in many countries, from being the essence of national mapping organizations to being the common commodity of consumers in the electronic/Internet/wireless communities – the diverse requirements, costs, and complexity for geographic standardization has increased dramatically.

Risk analysis

The greatest challenges for geographic standardization are internal and external. Internally, the geographic community must overcome the prevailing perception, by both the geographic and non-geographic communities, of the usual applications of geographic information. When in reality, geographic information has outgrown its traditional uses and has assumed an integral part of the latest and forthcoming technological innovations. Externally, modern businesses and companies are recognizing the value of incorporating location-based information as part of their products, services, and solutions to differentiate themselves within existing and new markets. The location-based market is expected to be a multi-billion dollar industry in just a few years. The strategic directions for geographic standardization need to be responsive to these challenges in a timely manner, else, the geographic community will again be guilty of relinquishing its mandate to outsiders that have only a superficial knowledge of the value and extent of geographic information.

Critical success factors for the industry in general:

- Increase the velocity of information
- Dynamic support of business processes
- Move right information close to the point of work
- Treat spatial data as any other data type
- Appropriate spatial data quality

Barriers and constraints to the development

- The rate of change in spatial technology is too slow
- Spatially-enabled data and applications are highly specific to each vertical industry and business process.
- Spatial solutions are not a well-known part of mainstream information systems.
- Departmental business units are responsible for most spatial applications.
- Spatial data quality is a significant constraining factor

The market will be fundamentally different by 2002. Velocity of change is a critical gating factor for spatial technology. The standards community will have to adapt to new customer requirements, risks and rate of change. This will strongly challenge our approach to developing standards in term of rules and directives. It will be necessary to strengthen the liaison with industry and industry representing organization, rapidly approving industry accepted specifications, potentially using new types of ISO deliverables. The formal standardization process will only survive when demonstrating ability to deliver timely and in response to the new requirements.

ISO/TC 211 has a Class A Liaison with the Open GIS Consortium (OGC) and a Cooperative Agreement in place. It also has a joint technical working group to complement and eliminate technical overlap. This relationship is resulting in the market acceptance of ISO/TC 211 standards as well as the processing of OGC specifications as International Standards.

The most formidable threats that may negatively impact the standards of ISO/TC 211 are within the rapidly emerging location-based mobile services (LBMS) industry. Specifically within the telecommunications industry, which recently has not fared as well as expected. The LBMS

industry is in large part predicated on the widespread and low cost usage of mobile phones and devices. Until LBMS are offered en mass by wireless telecommunications companies, the LBMS industry will remain a “designer” option. Fortunately, however, the delayed take off is providing the necessary time to develop many of the standards that will be needed when it does take off.

Initial position determination was computed through cellular triangulation, most telephone companies assumed that they could control the basic location positioning technology. But, since this type of positioning determination varied, depending on related techniques – there are many incompatible protocols which now the Location Interoperability Forum (LIF) is trying to interface – because users are mobile and bring their phones into areas servicing different protocols.

Another solution is the embedded GPS chip in the handset or mobile device – which makes the determination of location totally independent of cellular triangulation and such applications just use the mobile phones as infrastructure for the transmission of content.

For geographic information standards, the current value is in the interoperability of geographic databases and applications. This is the current programme of work for ISO/TC 211. Its future work will be to enable access to these databases and applications from a multitude of mobile devices – and to a large extent, independent of much of the impacts from the telecommunications industry.

Currently and for the foreseeable future, geographic information is rapidly being recognized as being important beyond the traditional domain of geography.

**Draft Business Plan of
ISO/TC 211**

Date: 19.06.02

Version: Draft

Page: 9

Work Programme

This part is no longer included in the Business plan. Please see the ISO/TC 211 home page for the programme of work: <http://www.isotc211.org/pow.htm>

**Draft Business Plan of
ISO/TC 211**

Date: 19.06.02

Version: Draft

Page: 10

Annex: Glossary of terms and abbreviations for the ISO/TC Business Plan

NB: This glossary gives the full name and status of terms used, in abbreviated form or in full, in the above "Business Plan for ISO/TCs". The glossary also gives the source of the information provided. Glossary intends to help with the understanding of the terms used. Whenever any of these terms are used by contributors to this Business Plan, they are requested to use them coherently as foreseen in the glossary.

Term	Abbrev.	Definition
standardization	---	<p>Activity of establishing, with regard to actual or potential problems, provisions for common and repeated use, aimed at the achievement of the optimum degree of order in a given context.</p> <p>NOTES 1 In particular, the activity consists of the processes of formulating, issuing and implementing standards. 2 Important benefits of standardization are improvement of the suitability of products, processes and services for their intended purposes, prevention of barriers to trade and facilitation of technological cooperation.</p>
standard	---	<p>Document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context.</p> <p>NOTE Standards should be based on the consolidated results of science, technology and experience, and aimed at the promotion of optimum community benefits.</p>
package of standards	---	<p>A group, as small as possible, of inter-related standards in the scope of one or more ISO/TCs which are usually developed simultaneously to one another as parts of one standard, or standards that must be developed simultaneously.</p>
consensus	---	<p>General agreement, characterized by the absence of sustained opposition to substantial issues by any important part of the concerned interests and by a process that involves seeking to take into account the views of all parties concerned and to reconcile any conflicting arguments.</p> <p>NOTE - Consensus need not imply unanimity</p>
ISO/TC International Standardization Deliverables:		
International Standard	IS	<p>A normative document, developed according to consensus procedures, which has been approved by the ISO membership and P-members of the responsible committee in accordance with Part 1 of the ISO/IEC Directives as a draft International Standard and/or as a final draft International Standard and which has been published by the ISO Central Secretariat.</p>

**Draft Business Plan of
ISO/TC 211**

Date: 19.06.02

Version: Draft

Page: 12

Term	Abbrev.	Definition
ISO Technical Specification	ISO/TS	A normative document representing the technical consensus within an ISO committee, approved by 2/3 of the P-members of the ISO/TC or SC.
ISO Public Available Specification	ISO/PAS	A normative document representing the consensus within a working group, approved by a simple majority of the P-members of the TC/SC under which the working group operates.
ISO Technical Report	ISO/TR	An informative document containing information of a different form from that of normally published in a normative document.
Amendment	Amd	An amendment alters and/or adds to previously agreed technical provisions in an existing standard.
Technical Committee	ISO/TC	A technical body responsible for the programming and planning of technical work and the monitoring and execution of this technical work. The ISO/TC is also responsible for the consensus building process among its members for individual work items.
Subcommittee	SC	A technical body reporting to an ISO/TC which, within its scope which is covered by the scope of its parent ISO/TC, is responsible for the monitoring and execution of the technical work. The SC is also responsible for the approval and consensus building process among its members for individual work items.
ISO/TC Working group and ISO/SC Working group	WG	A technical body, appointed by the ISO/TC or ISO/SC and composed of experts, responsible for the drafting of standards, in accordance to the ISO rules and the clear specifications set by the ISO/TC or ISO/SC.
Editing Committee	---	A committee set up by a technical body (ISO/TC or SC) at the beginning of its work, which represents the three official languages of ISO. It is responsible for the correct formulation and presentation of the standard(s) prepared by the technical body (ISO/TC or SC) and the equivalence of the texts in the three official languages.
Participating member	P-member	A member body participating actively in the work of a TC or SC, with an obligation to vote on all questions formally submitted for voting within the TC or SC on enquiry drafts and final draft international standards and, wherever possible, to participate in meetings.
Work Item number	WI	The identification number given to a standards project in a standards work programme. It is intended that the standards project leads to the issue of a new, amended or revised standard, an ISO/PAS, ISO/TS or other ISO product.
Vienna Agreement	VA	Agreement on technical cooperation between ISO and CEN.
VA ISO lead (5.1)	---	Technical cooperation between ISO and CEN under the VA, where the work is done by the ISO/TC, where a formal notification of interest was received by ISO from CEN, and where parallel synchronized procedures are applied in ISO and CEN for the approval processes.
VA CEN lead (5.2)	---	Technical cooperation between ISO and CEN under the VA, where the work is done by the CEN/TC or SC, where

**Draft Business Plan of
ISO/TC 211**

Date: 19.06.02

Version: Draft

Page: 13

Term	Abbrev.	Definition
		a formal notification of interest was received by CEN from ISO, and where parallel synchronized procedures are applied in ISO and CEN for the approval processes.
ISO stakeholders	---	Individuals, institutions, organizations or enterprises who have a direct or indirect interest in the ISO System, its activities and products and who have a specific interest in the effective programming of ISO work items and their adequate resourcing.