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Terminology Standardization and Harmonization

ISO/TC 37 "Terminology and other language and content resources"
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Terminology Standardization and Harmonization (TSH) ist ein vierteljährlich erscheinendes informationsblatt des Sekretariats des Technischen Komitees ISO/TC 37 "Terminology and other language and content resources" der Internationalen Normungsorganisation (ISO) und des Internationalen Informationszentrums für Terminologie (Infoterm). TSH enthält Informationen und Nachrichten über Ereignisse, Tätigkeiten und Projekte aus dem Bereich der Terminologienormung auf nationaler, regionaler und internationaler Ebene und verfolgt dabei keine parteilichen oder ideologi-schen Zielsetzungen. Ziel dieser Publikation ist es, alle terminologisch tätigen und interessierten Organisationen und Personen über die laufenden Aktivitäten auf dem Gebiet der Terminologienormung zu informieren, aktuelle Informationen und Hilfestellung für ihre berufliche Tätigkeit zu liefern sowie ihre Zusammenarbeit zu fördern.
TSH is a joint publication of the Secretariat of ISO/TC 37 and Infoterm. It has been created in 1989 with the objective to foster communication and cooperation among organizations and individuals involved in terminology standardization and harmonization. It provides information on terminology standardization, especially within the framework of technical Committees, as well as on the results of their activities. TSH est publié conjointement par le Secrétariat de l'ISO/TC 37 et Infoterm. TSH fut fondé en 1989 afin de stimuler et d'encourager la communication et la coopération entre les organismes et les personnes engagés dans le domaine de la normalisation de la terminologie. Il renseigne sur les activités de normalisation de la terminologie au niveau international ainsi que sur celles au sein des comités techniques.

Standards as databases and the development of knowledge

by Reinhard Weissinger, Group Manager, Project Management and e-Services, Standards Department, ISO Central Secretariat

Over the last few years, the use of databases to store structured content from published ISO standards or ISO standards under development has significantly increased. More and more ISO committees use databases to store "structured items", which lend themselves to being managed with the help of databases. Examples of such structured items are:

- terms and definitions;
- graphical symbols;
- codes of all types;
- data dictionaries;
- product properties;
- elements of classification systems, etc.

In recognition of these developments, the ISO Technical Management Board (TMB) has established a special group to investigate these activities and to propose measures to prepare ISO to meet this new challenge. The group currently comprises representatives of 14 ISO committees from various technical fields as well as representatives from several member bodies.

A recent result of the work of the group was the procedure for the development and maintenance of standards in database format, which has been approved by the TMB and has become Annex ST to the ISO Supplement to the ISO/IEC Directives. The procedure, which is available at www.iso.org/directives, supports the four main processes of the development and maintenance of standards, i.e.

- the development of new standards;
- the maintenance of existing standards;
- the withdrawal of elements from standards;
- the systematic review of standards.

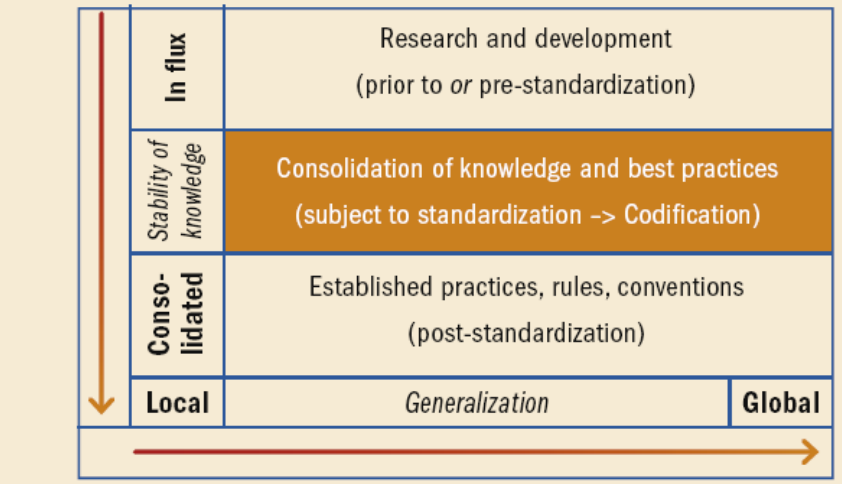
ISO is currently working towards providing an environment, called the *ISO Concept Database*, supporting this procedure, which will facilitate collecting, storing and retrieving concept-oriented items from standards. The main function of the concept database will be to provide accessibility to items that have been standardized, as well as to provide an environment for ISO committees to develop and maintain items for which they are responsible. The effort to bring together content from the different ISO committees is designed to facilitate crossstandard and cross-committee visibility and harmonization.

This article addresses some of developments in this new field, and tries to place them into the broader context of standards development as a form of knowledge generation and consolidation. It then addresses some potential future scenarios which may evolve from these developments.

All standards organizations have procedural rules for the development of standards, for the participation of stakeholders, for prescribed time frames for the development of standards and for the structure and layout of the standards. From a more generic point of view, standards development can be seen as a process of negotiation amongst stakeholders about the codification of knowledge.

In this process knowledge may be created, its viability may be tested and verified and existing or potential knowledge alternatives may be discarded (variety reduction) in favour of others.

This process results in a consolidation of knowledge. Due to the wide participation and the extensive review processes in an organization like ISO, the resulting body of knowledge should normally be considered to be of high quality, capable of providing the basis for reliable use and application.



The **diagram above** shows a simple three-layered model of knowledge creation. The vertical arrow indicates a dynamic progression from yet unstable knowledge through a process of consolidation to stabilized and codified knowledge, whereas the horizontal arrow refers to a dynamic evolution from location- and condition-specific knowledge, through a process of generalization, towards globally applicable knowledge.

Although it is evident that not all processes of knowledge consolidation pass through formal standardization, standardization can be considered as one of the most prototypical forms of knowledge generation and of consolidation of results which become part of a globally shared knowledge pool.

Concepts, knowledge and learning

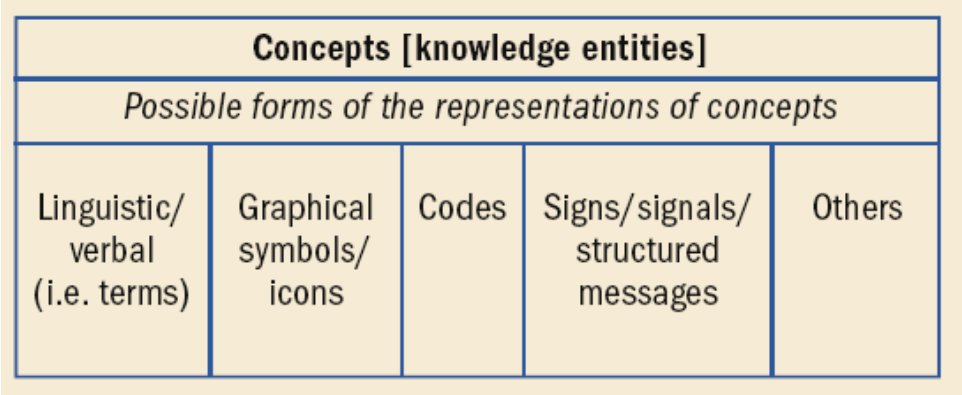
Concepts are fundamental for all higher cognitive processes. They are the means of organizing our experience and allow us to apply our existing knowledge to new situations. " This [process] entails *categorization*, because if we were unable to impose categories on the perceptual world, then every percept, object, or event that occurred would be processed as if it were unique." (Goswami, 1998, p. 25)

Concepts, as stated by ISO/TC 37, *Terminology and other language and content resources*, in ISO 704:2000, *Terminology work – Principles and methods*, are " mental constructs or units of thought which are used to categorize objects ". Concepts do not occur in isolation, but rather as elements in concept fields representing different knowledge or subject domains. Concept fields can be analysed and structured and modelled as concept systems. Concept systems help structure, organize and interrelate knowledge resources both inside a particular subject field and between multiple fields.

Concepts are shared in society in general and/or in expert groups. They ensure consistency of understanding and communication by assimilating new experiences to existing conceptual structures. Learning takes place when new experiences, perceptions or insights cannot be assimilated within the framework of existing conceptual structures. Under such conditions, it is necessary to accommodate, extend or re-organize these structures and possibly generate alternative new structures (von Glasersfeld, 1995, p. 113-119 and Sodian, 2002).

Forms of concept representation

As shown in the **diagram below**, concepts can be represented in different forms. One and the same concept may even be designated by different forms of representations (e.g. by using a term as well as a symbol). Each representation is accompanied by additional elements, such as an entry number, a definition, examples, notes, a description of the specific function, of the image content of a symbol and possibly other elements (see e.g. ISO 22727:2007, which defines requirements for public information symbols).



Possible future scenarios

Standards development and standards documents

It is likely that the database-centred approach for the development and maintenance of standardized content will become much more common in the future. It is also likely that, supported by the new procedure, currently separate approaches to the development of concepts applied in different communities (e.g. terminology, graphical symbols) may further converge. The visibility of content from different standards and standards under development in the same database will very likely contribute to stronger harmonization and further consistency.

There may be an impact on the structure of standards: The existence of a standard in the form of a paper or electronic *document* could become only one form – amongst others – of rendering standardized content.

Flexible assembly of products and new services

Together with parallel developments in the field of standards authoring such as the increasing use of XML, it is possible to foresee new types of services whereby standardized content is assembled from a set of source standards and provided as a combination of relevant components from standards. References to the full texts of the source documents could be included. The customized product obtained by the customer would then only contain relevant elements from standards with the possibility of retrieving the full content of the standards, whenever needed.

Products provided to customers could be updated more frequently by incorporation of new or revised content maintained in databases. On the basis of sophisticated release and version management systems, it would also be possible to re-generate and reference earlier versions (e.g. in response to contractual and legal demands).

Other services could include the provision of standardized content for computer access with a much higher degree of granularity than available today. Customers may have many more options in defining the package of standardized content they wish to obtain in order to best fit their needs.

Emergence of a global knowledge infrastructure

Some observers predict the emergence of worldwide structures of mass collaboration based on highly segmented value-chains which span far beyond the borders of individual companies and institutions. Knowledge resources and expertise from inside of firms will be utilized and combined with many resources from outside on a global scale (Tapscott et. al., p. 240).

In such an environment, standardized concepts in their different representations, including in different languages, may function as key components of a global knowledge infrastructure through which existing and newly developed knowledge resources can be referenced, classified, inter-related and retrieved as part of a new global infrastructure of meaning (Weinberger, p. 222).

Conclusions

The review of the ongoing developments and their potential for the future has shown that standardized concepts may perform a foundational role in the emergence, structuring and operation of a global knowledge infrastructure. With its coverage of a multitude of technical and other subject fields, its wide range of stakeholders and open processes, ISO – through its national members and together with its international partners – is in a position to make a key contribution to the evolution of such a widely shared knowledge infrastructure.

"It is likely that the database-centred approach for the development and maintenance of standardized content will become much more common in the future."

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Practical business solutions for ontology data exchange

by Hiroshi Murayama, Senior Research Scientist, TOSHIBA; Guy Pierra, Professor, Computer Science, ENSMA, and Director, LISI; and Wolfgang Wilkes, Senior Researcher, Computer Science, University of Hagen

The electronic exchange of business and product information among different companies is basic for e-business and e-engineering. It requires that different software systems interpret data in the same way, independent of their roles in the business process.

ISO 13584, *Industrial automation systems and integration – Parts library* standard series (hereafter, "PLIB" for short) has been developed to identify and characterize various concepts of products and services within or across industrial domains. Its objective is to make sense to both humans and machines. These data models represent real world materials, forms, processes, functions and performance of products and services.

Ontology is the trendy term

Within PLIB, the concept of a product or service is called a class. Each class is described by a set of inherent properties, which are then passed into its sub-concepts. Thus, a group of product concepts in an industrial domain constitutes a hierarchy of classes, or a taxonomy naturally ordered by an assortment of properties. This assembly is called a "reference data dictionary", or sometimes "ontology" as in recent IT-vogue terminology.

"Multiple approaches have to be provided to fulfil the various needs of the industries."

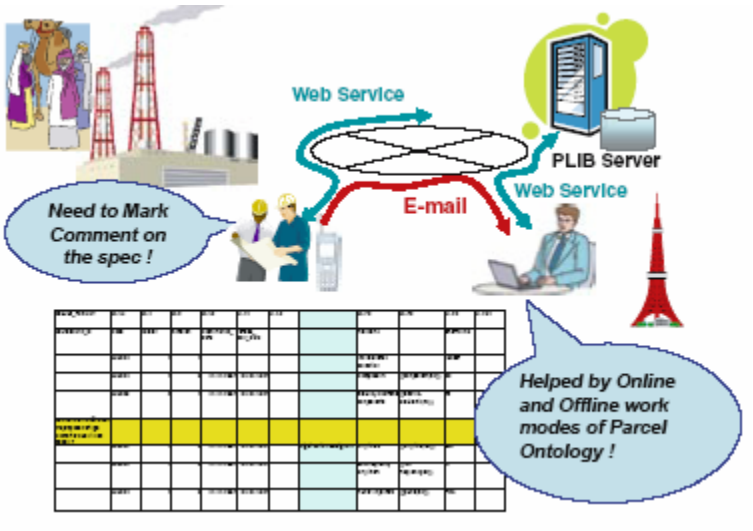
The data model of ISO 13584-42, *Industrial automation systems and integration – Parts library* – Part 42: *Description methodology: Methodology for structuring part families*, corresponds to that of the International Electrotechnical Commission's IEC 61360-2. These identical standards are referred to as the "ISO-IEC common dictionary model". The model has been widely referenced in many ISO and IEC technical committees and subcommittees, and applied in a wide spectrum of industries in Germany, France, and Japan[1)].

As industry increases its use of PLIB, it becomes clear that there is a need for other delivery forms and methods, which are more flexible, simple, and extensible than the Stepfile format (ISO 10303-21). This article introduces some of those new methods for exchanging PLIB ontologies and data.

Make an ontology in spreadsheets

The future ISO/TS 13584-35, *Industrial automation systems and integration – Parts library* – Part 35 : *Spreadsheet interface for parts library – Representation structure*, is a newcomer to the PLIB series of standards. It embodies an ontology of elements in a set of table forms – a rigorous and exhaustive organization of knowledge domains, arranged hierarchically and containing all relevant entities and their relations. More precisely, it represents data and/or metadata (instance and/or dictionary) in a few normalized spreadsheets called " parcels ". This standard is designed to serve as an interface between PLIB and real business practices and applications, as illustrated in **Figure 1** below.

1) See article in the July/August issue of *ISO Focus* 2007.



Often in business documentation, typically for engineering purposes but not limited to them, tables are an essential means of capturing, communicating, and analysing physical data and business characteristics. For example, many Finite Elements Analysis (FEA) solvers applied to thermal or structural problems are usually able to import or export data in tabular form that can be processed by commercial spreadsheet software.

Thus, the capacity of ISO/TS 13584-35 to describe an ontology in a set of normalized spreadsheets – being decomposed and assembled into parcels of information suppliers, classes, properties, and enumerated constants – literally contributes to filling the gap between the standard and its applications.

Moreover, a user may insert additional rows and columns as local extensions of classes, properties and attributes to the standardized ontology in order to reflect local needs for extension or specialization, as well as for making comments and annotations. This capacity is greatly appreciated by end users who need to communicate with their clients using their own terminology and vocabulary in their day-to-day business.

"ISO 29002-20 makes communication across different standard communities much easier."

ISO 13584-35 enables the translation of tabular forms (a display of several items or records in rows and columns), exemplified by Comma Separated Values (CSV), into various engineering and desktop publishing formats, because many leading commercial spreadsheet software tools are equipped with various built-in read/write translators. Thus, via those tools and their functionalities, the ontology within the parcels can be translated into many other formats.

In addition, basic graphical user interface operations such as cut-and-paste will be available to edit parcels. Thus the standard is expected to become a primary means for editing and creating ontology for users who are not necessarily IT-specialists. We believe that it will open a new avenue for application of ontology standards in many business domains.

Giving the public what they need

Another new way of exchanging PLIB compliant product data and reference dictionaries is the future ISO 13584-32, *Industrial automation systems and integration – Parts library* – Part 32 : *Implementation resources – OntoML*: Ontology markup language, expected to be published in 2008/2009. This part of the PLIB standard series defines an XML schema for PLIB for both the dictionary and instance levels.

The XML schema of OntoML has near one-to-one mapping to the formal EXPRESS[2)] model of the ISO 13584/IEC 61360 common data model, which provided the fundamentals of the PLIB based ontology description. Moreover, it covers most of the ranges of product and service ontology modelling and exchange by other popular ontology languages, such as RDF/S[3)] or OWL-Lite[4)].

Providing the PLIB data model in XML format has a number of significant advantages :

First, since XML is one of the current favourites among IT engineers, there are many available public domain or commercial tools. Thus, IT engineers are willing to transform the data into applications with a combination of tools and services. This is becoming even more important in light of various e-business standards and protocols in XML being developed by other ISO/IEC committees, as well as by consortia, mainly for product and service inquiry and trading purposes.

One of the remarkable and influential moves is ebXML (Electronic Business eXtensible Markup Language) submitted by the Organization for the Advancement of Structured Information Standards (OASIS) and published by ISO as a technical specification, ISO/TS 15000.

Thus, the availability of PLIB in XML is expected to facilitate the conjoint use of PLIB and ebXML in e-commerce and/or e-procurement business scenes. Many organizations in Europe are considering the simultaneous use of both standards in their business activities.

Second, since the data model is expressed in XML schema, the ontology files conforming with OntoML may be subject to rigorous type checking by XML schema compilers, which are both publicly or commercially available.

Due to the rigid mapping of the OntoML XML schema to the EXPRESS schema, global rules and functional checks may be applied to entity definitions beyond the microscopic type checking available within XML schema, once the dictionary or instance data is converted from an XMI (XML schema instance) file format into a Stepfile format.

Needless to say, OntoML will retain high transparency with respect to ISO 29002, Industrial automation systems and integration – Exchange of master data characteristics, whose base structure is supported by both the PLIB standard group and other library/catalogue standard groups.

Web service fills the gaps

Whereas the XML exchange format and the spreadsheet format describe in which “syntax” reference dictionaries can be exchanged, ISO 29002-20, Industrial automation systems and integration – Exchange of master data characteristics – Part 20: Concept dictionary resolution services, supports direct communication of application software with reference dictionary servers. Basically, it allows the resolution of a unique concept identifier (e.g. of a class or a property) to its specification. The specification comprises terminological information about a concept (e.g. its name, its definition) and ontological information (e.g. relationships to other concepts).

The Concept Dictionary Resolution Service (CDRS) is primarily used by tools that process catalogues received from suppliers. Classes and properties are paired – i.e. a property is always denoted by both an identifier and a value. In other words, the tool can only process values if it understands their meaning : what kind of value is it ? a price ? length ? which unit ? what is the property’s name ?

2) ISO 10303 specifies a language (EXPRESS) to unambiguously define aspects of product data (definitions and specifications of constraints).

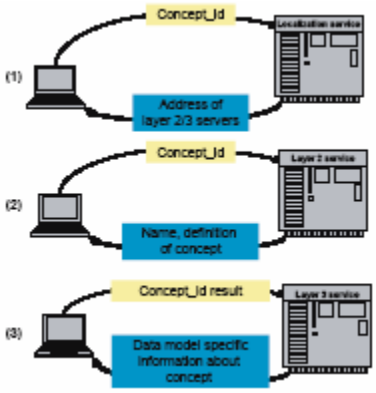
3) The Resource Description Framework Schema (RDF/S) is an extensible knowledge representation language providing basic elements for the description of ontology used to model information.

4) OWL-Lite is one of three sub-languages of the Web Ontology Language (OWL), designed to support those users primarily needing a classification hierarchy and simple constraints.

ISO 29002-20 specifies Web services that allow the tool to directly obtain the missing information and proceed with its processing. One remarkable aspect of ISO 29002-20 is its independence from dictionary model standards. As a joint effort among different groups, it covers, in addition to PLIB, the dictionary models of ISO 22745, Industrial automation systems and integration – Open technical dictionaries and their application to catalogues, and ISO 15926, which consists of several parts under the general title, Industrial automation systems and integration – Integration of life-cycle data for process plants including oil and gas production facilities. As such, it makes communication across different standard communities much easier.

Three distinct layers of service

As illustrated in **Figure 2**, ISO 29002-20 is organized in three layers. A tool, for instance, would first use layer 1 – the localization service – to find addresses of Web servers which can resolve the identifier. Afterwards, if its objective is only to search for terminology information like a name, definition, or synonym, it invokes a layer 2 service.



ISO 29002-20 contains a terminology model which covers terminological information found in many reference dictionary models. Thus the response is always the same, independent of the type of reference dictionary. If the tool needs more information, e.g. on class hierarchy, then it will invoke a layer 3 service to get data model specific results. In the case of a PLIB reference dictionary, this might be transferred in OntoML or the spreadsheet format.

ISO 29002-20 is expected to be published in 2008. It is an important step towards making reference dictionaries directly accessible for application programs. It will allow users to obtain similar information from different types of reference dictionaries. This is a big step towards interoperability and support of intercommunity data exchange.

Collaboration for the future

Through the process of developing ontology standards, the experts of ISO/TC 184/SC 4 have recognized that standards development is not enough, these should be feasibly applied in a real business and appreciated by users. Therefore, it is important to accept the variety of requirements from different users for data exchange. Consequently, multiple approaches have to be provided to fulfil the various needs of the industries. Collaboration with other standards developing organizations, in addition to ISO/ IEC technical committees, will bring us closer to this end.

About the authors

Hiroshi Murayama is Senior Research Scientist at the Corporate R&D Centre of TOSHIBA Corporation. He started as a nuclear engineer and has migrated into data engineering. He leads the ISO 13584 and IEC 61360 related database and tools development in the company while serving as project leader for some of the parts of PLIB standard.

Guy Pierra is Professor of Computer Science at Ecole nationale supérieure de méchanique et d'aerotéchnique (ENSMA), Poitiers, and Director of the Laboratory of Applied Computer Science (LISI). His main interests are data engineering, ontologies, software engineering and human – computer interaction. He has been deputy Convenor of ISO/TC 184/SC 4/WG 2 since 1991, and he has served as Project Leader for a number of PLIB standardization and research projects.

Wolfgang Wilkes is Senior Researcher for Computer Science at the University of Hagen, Germany, and co-founder of the company Semaino Technologies. He is interested in data modelling and ontologies, e-business and e-engineering, and collaborative engineering. He was Convenor of ISO/TC 184/SC 4/WG 2 from 2001 to 2007.

NEW STANDARD PUBLISHED: ISO 1951:2007

Presentation/representation of entries in dictionaries -- Requirements, recommendations and information

ISO 1951:2007, which is a revision of ISO 1951:1997, deals with monolingual and multilingual, general and specialized dictionaries. It specifies a formal generic structure independent of the publishing media and it proposes means of presenting entries in print and electronic dictionaries. The relationship between the formal structure and the presentation of entries used by publishers and read by users is explained in examples provided in the informative annexes.

The objective of ISO 1951:2007 is to facilitate the production, merging, comparison, extraction, exchange, dissemination and retrieval of lexicographical data in dictionaries. Following a lexicographical lemma-oriented approach, it does not deal with concept-oriented works as defined in ISO 704.

The standard exists in English and French and can be ordered from:
http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=36609

ICT Competency Standards for Teachers

Within a sound education setting, teachers can enable students to use technology to become better information seekers, analysers, problem solvers and communicators.

Governments, experts and practitioners in the education sector increasingly recognize that information and communication technology (ICT) can play an important role in supporting educational improvement and reform.

UNESCO teamed up with Cisco, Intel and Microsoft, as well as the International Society for Technology in Education (ISTE) and the Virginia Polytechnic Institute and State University (Virginia Tech), to set up the 'ICT Competency Standards for Teachers' (CST) project. The goal of the CST project is to provide guidance on how to improve teachers' practice through ICT.

The first phase of the project was completed in late 2007 and a set of three booklets 'Competency Standards for Teachers' launched in London on 8 January 2008 at the Moving Young Minds conference, an international seminar hosted by the UK government for education ministers and policy makers. This set of booklets includes:

Policy Framework

explaining the rationale, structure and approach of the CST project;

Competency Standards Modules

which crosses the components of educational reform with various policy approaches;

Implementation Guidelines

providing a detailed syllabus of the specific skills to be acquired by teachers within each skill set/module.

POSITIVE PROGNOSIS FOR e-HEALTH STANDARDIZATION

European Standards Organizations launch joint project on interoperability of eHealth standards

Brussels (7 February 2008) CEN, CENELEC, and ETSI, the three European Standards Organizations (ESOs) are pleased to announce the launch on 6 February of the joint project 'eHEALTH-INTEROP', which will address the requirements of the European Commission mandate on standardization in the field of e-health. This mandate (M/403) aims to provide a consistent set of standards to address the needs of this rapidly-evolving field for the benefit of future healthcare provision.

The project will have two phases. In phase 1, a team of appointed experts reporting to the ESOs will examine the portfolios of existing standards from the many different organizations in the sector, including international formal bodies and industry standards consortia.

Analysis of sector needs and recommendations for specific standards development will subsequently be carried out in full consultation with other international partners and a work programme will be produced that reflects the need for coherent, cost-effective, and secure provision of electronic healthcare services.

Phase 2, in 2009 and 2010, will see the execution of that work programme.

Detailed work on the project is due to start early in March 2008 with the completion of phase 1 foreseen for September 2008. This will be followed by public consultation on the draft work programme and final reporting to the European Commission: a conference will fully discuss possible solutions.

CEN, CENELEC and ETSI are now looking for experts to participate in phase 1 of 'eHEALTH-INTEROP'. Experts with substantial experience in e-health and/or relevant standardization activities are requested to apply asap:

- Call for experts

For more information, please contact Ms Shirin Golyardi, NEN.

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- Environmental standards
- History and future of standards
- Education on standardization

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Authors of accepted papers are expected to serve as discussants upon request. All papers will be reviewed (double blind) by members of the Programme Committee. Particularly good and relevant papers will be fast-tracked to the review process of either the EURAS-Yearbook or the Int. Journal of IT Standards and Standardization Research (JITSR). For more detailed information, please consult the EURAS website (http://www.EURAS.org).

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Final paper due: 15 May 2008

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