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Assessment and benchmarking of terminological resources — General concepts, principles and requirements

Critères d'évaluation comparative des ressources terminologiques — Concepts, principes et exigences d'ordre général

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Foreword

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Introduction

Global society is undergoing an accelerated development towards becoming a science- and technology-driven multilingual information and knowledge society characterized by the all-pervading influence of information and communication technology (ICT). Reliable language resources (such as text and speech corpora, terminologies, computational lexicons, etc.) are essential to support the emerging knowledge and content industries. Terminology information is thus becoming a key element in all regulatory activities, as seen, for example, in technical standardization, quality management and regulation of intellectual property rights.

In the emerging semantic web, dedicated and non-dedicated browsers or web services search web-based databases and portals containing structured content (i.e. collections of content items at the level of lexical semantics). The user increasingly does not want to be overburdened with non-evaluated information, but to receive the most pertinent and reliable information for his/her purpose without missing important information. The results of automatic or semi-automatic searches, therefore, will increasingly have to be compounded and condensed by semantic analyses in order to meet user requirements.

If seemingly relevant information is found in a multitude of collections of structured content, systematic syntactic and semantic filtering, selection and evaluation processes take place. At some stage of these processes, browsers or web services have to globally distinguish between more or less pertinent and reliable terminological data as it is being collected for the sake of prioritization and optimization.

Terminological data can have many functions, the most prominent of which are

— knowledge representation (concept),

— knowledge ordering (concept classification),

— access to other kinds of structured or unstructured content, and

— means or elements of communication and knowledge transfer.

For uses and reuses such as translation, localization and content management, a systematic approach to automatic or semi-automatic assessment and benchmarking of resources or containing terminological data becomes necessary.

Assessment and benchmarking of terminological resources — General concepts, principles and requirements

1 Scope

This International Standard describes fundamental concepts related to the effective use of terminological data. It provides general principles for a model applicable to a variety of terminological resources. It clarifies the usability attributes that constitute the model and provides guidelines for the overall assessment of terminological resources by taking the user's objectives into account.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
assessment
⟨terminology⟩ process to demonstrate that a **terminological resource** (2.8) fulfils specified requirements

2.2
benchmark
⟨terminology⟩ **usability attribute** (2.11) used as a reference point or metric against which the **usability** (2.10) of a **terminological resource** (2.8) can be measured

2.3
benchmarking
⟨terminology⟩ application of **benchmarks** (2.2) to **terminological resources** (2.8)

2.4
entity
any concrete or abstract thing that exists, did exist, or might exist, including associations among these things

EXAMPLE A person, an object, an event, an idea, a process, etc.

[ISO/IEC 2382-17:1999, 17.02.05]

2.5
model for assessment
⟨terminology⟩ model that identifies the **usability attributes** (2.11) of **terminological resources** (2.8) and their interrelationships

2.6
special language
language used in a subject field and characterized by the use of specific linguistic means of expression

[ISO 1087-1:2000, definition 3.1.3]

2.7
terminological data
data related to concepts or their designations

[ISO 1087-1:2000, definition 3.8.1]

2.8
terminological resource
terminological data resource
entity (2.4) composed of collections of **terminological data** (2.7) with the **usability attributes** (2.11) that are generated by grouping/structuring the data, or incorporating the data into an application

NOTE 1 A terminological resource generally contains **terminological data** (2.7) that are structured (e.g. a terminology database), marked up with a mark-up language (e.g. an XML data file) or associated with a structured layout (e.g. a dictionary). A terminological resource can contain even plain texts (e.g. texts with distinguishable language style) from which usable terminology data can be extracted with the help of modern content-processing technology.

NOTE 2 Generally, terminological resources produced through professional terminological activities have well-organized/structured and high-quality **terminological data** (2.7) and thus have sufficient **usability attributes** (2.11). Those terminological resources created through other processes/activities often have unpredictable quality and usability.

2.9
terminology
set of designations applied to concepts belonging to one **special language** (2.6)

NOTE The definition in ISO 1087-1 is “set of designations belonging to one special language” (ISO 1087-1:2000, definition 3.5.1).

2.10
usability
extent to which an entity can be used to achieve goals effectively, efficiently and satisfactorily

2.11
usability attribute
⟨terminology⟩ property of **terminological data** (2.7) related to **usability** (2.10)

NOTE 1 Usability attributes can be distinguished as measurable or non-measurable. Measurable usability attributes can be measured quantitatively, whereas non-measurable usability attributes need to be described qualitatively.

NOTE 2 A usability attribute is described according to specified requirements or measured on a given basis.

3 Uses of terminological resources

Generally, a terminological resource is needed:

— to consult the knowledge content related to concepts or concept representations in a special language (e.g. looking up terms in a dictionary, querying a database, searching in a terminology portal);

— to manage domain-specific information (e.g. the management of e-business, e-government, e-learning);

— to exchange terminological data efficiently (e.g. the data exchange between activities, information systems and terminology institutes; importing terminological data to a translation memory; exporting terminological data for compiling a specialized dictionary);

— to facilitate terminological work processes (e.g. works by terminologists);

— to merge distributed paralleling terminological resources for the provision of data services (e.g. on-line services that allow customized data output, cooperative data input or management, semantic web approaches).

4 Terminological resources

4.1 General

The concept of terminological resources shall be understood from the following perspectives.

a) Terminological data are presented, recorded or stored in data media via processes of data preparation, recording and processing.

b) Using terminological data involves activities such as

   1) processing the terminological data with various technologies to provide a service to users,

   2) acquiring proper logic content, epistemological forms and linguistic expressions of specialized knowledge represented by terminological data,

   3) transporting/transforming specialized knowledge into the user's intended language context, e.g. translation or localization. However, whether or not a piece of terminological data fits to an intended language context is beyond the scope of this International Standard.

c) From user's point of view, the two main requirements for usable terminological data are that

   1) the terminological data meet the user’s need to acquire terminological information content,

   2) the terminological data are designed to allow desired access or processing.

Therefore, when terminological resources are analysed, it is generally the case that the terminological data are associated with technological means. In other words, technological means are generally required to make terminological data usable as a terminological resource.

A terminological resource shall be seen as an integrated dynamic system of terminological data. The system begins to exist, to evolve and to function once the terminological data are presented. The usability of the system is demonstrated by its usability attributes. This International Standard clarifies these attributes.

Terminological resources can be systematically assessed. If possible, they may also be automatically assessed. Terminological resources shall be assessed on the basis of analyses of their creation, their management and their potential use.

EXAMPLE 1 One thousand term entries on a digital medium are usually accompanied by a user guide explaining how the medium is accessed and what equipment or tools are required to read the data. The users can then follow the instructions and browse the data to determine if they are useful for their purpose. In this case, the terminological resource is composed of the physical data and the medium that verify the usability attributes explained in the user guide.

EXAMPLE 2 A dictionary of terminologies in mathematics, physics and chemistry is also a terminological resource. In theory, to a user who only needs to access chemical terminology, this dictionary will be little different from a dictionary that has only chemical terminology, i.e. without mathematical or physics-related terminologies. Such a terminological resource will be evaluated differently by users who need to consult mathematical or physics-related terminologies.

These two examples propose that the systematic methodological approach to an assessment focused on the terminological data be

— to take the data together with their overall associations as a terminological resource,

— to assess the usability attributes of the terminological resource through comprehensive analysis of the following elements: data recording, data storage, data format, data structure, the appropriately assigned subject field and user's practical need, etc.

4.2 Model for assessment of terminological resources

A model for assessment of terminological resources shall consist of four sets of usability attributes, each related respectively to

— terminological data,

— data management,

— data output,

— data input.

Not every set of usability attributes is necessarily pertinent to every terminological resource.

EXAMPLE 1 If a hardcopy of a specialized dictionary is considered to be a terminological resource, it will not have significant usability attributes of data input and data management; its usability attributes will only include those derived from the output (printed pages), namely the terminological data that are on those pages and the printed indexes.

Similarly, not all the individual usability attributes related to data management, data output and data input are necessarily pertinent to every terminological resource.

EXAMPLE 2 In the context of a database, an index displayed on user interfaces is not necessary. The user will generally not consider such a displayed index to be a usability attribute.

Figure 1 illustrates the general structure of the model for assessment.

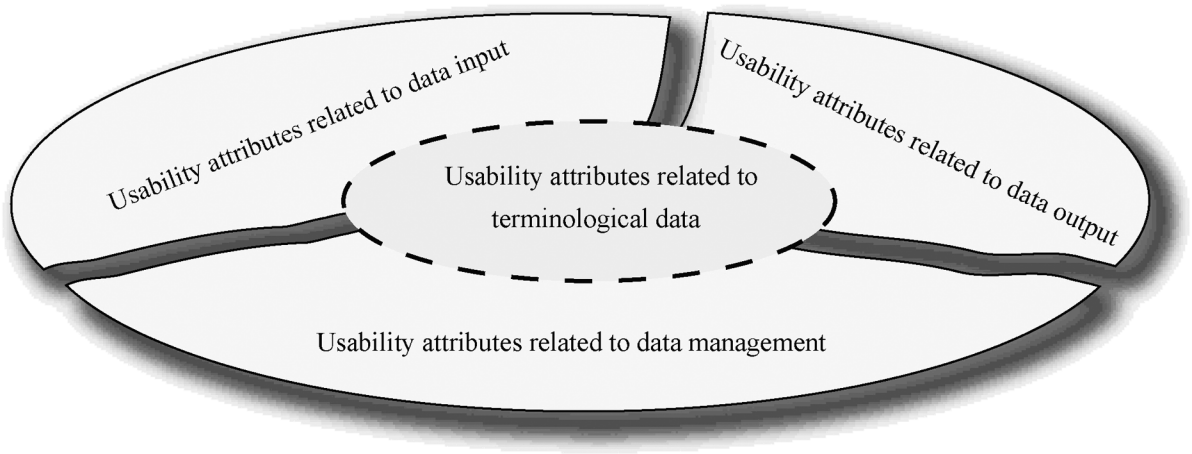

Figure 1 — Four sets of usability attributes

Although in the following clauses the attributes are described individually, it is necessary to bear in mind that the usability attributes can be interrelated with, and dependent on, each other.

4.3 General usability attributes of terminological resources

4.3.1 Usability attributes related to terminological data

A terminological resource shall have enough attributes to meet the complexity of the terminological data while at the same time meeting the requirements for specific purposes, such as

— data structure specification,

— data category coverage,

— subject field coverage,

— language coverage,

— compliance with rules of coherence,

— use of controlled external data,

— use of authoritative sources,

— intellectual property rights ownership indication,

— symmetry of the terminological data collection,

— size of the terminological data collection.

4.3.1.1 Data structure specification

Data structure specification refers to the data model of a terminological resource. With an understanding of the data model, users can employ appropriate technologies to extract terminological data from a terminological resource or to further set up services using a terminological resource, and so on. Therefore, the data structure specification shall be explicit to users. This is the rule for this usability attribute.

4.3.1.2 Data category coverage

Data category coverage refers to the set of data categories that are used in the data model of a terminological resource. The composition of the set of data categories varies depending on subject fields or applications.

EXAMPLE ISO 12616 specifies the necessary data categories for translation-oriented terminography. This provides a metric for determining whether a terminological resource is suitable for translation-oriented terminography.

ISO 12620 has specified possible data categories for recording terminological data.

Data category coverage is measurable if data categories specified in ISO 12620 are used and if a data model is implemented to comply with ISO 16642. If the data model and data categories of a terminological resource do not comply with ISO 16642 and ISO 12620, a mapping mechanism is necessary when evaluating the terminological resource.

4.3.1.3 Subject field coverage

Subject field coverage refers to the set of subject fields in which the knowledge information is represented by the terminological data of a terminological resource.

A terminology deals with special language in a particular field of knowledge. This particular field of knowledge shall be indicated by one or more subject field indicators belonging to

— a discipline in an established classification scheme or controlled language, or

— an application-specific or domain-specific community.

If not, it shall be indicated by explicit subject field indicators. A subject field indicator, either a representation in a controlled language or a commonly used explicit indicator, can refer to a collection of terminological data as a whole, apply to each individual entry, or both.

Subject field coverage is measurable when the controlled languages or explicit subject field indicators employed to indicate subject fields are comparable. Consequently, users can match the subject fields covered by a terminological resource against their expectations.

4.3.1.4 Language coverage

Language coverage refers to language indication, i.e. a set of names or symbols that designate human languages or their variants. It shows the language or languages used to record terminological data and reveals how many languages the information in a terminological resource covers.

The language indication of a terminological resource shall be studied under four aspects:

— language sections;

— metadata language;

— geographic indication;

— writing systems and character encoding systems.

The ISO 639 series provides standardized codes representing the names of languages. ISO 15924 provides a standardized code for representing scripts. In addition, language indications may have to be further specified with codes representing geographical entities according to the ISO 3166 series.

If the language indication used in a terminological resource conforms to these standards, this usability attribute is measurable, i.e. it can be matched easily against practical needs without additional translation.

4.3.1.5 Compliance with rules of coherence

Compliance with rules of coherence refers to the proper observation of the rules defined for recorded terminological data. These rules usually control relationships between terminological data, i.e.

— *cross-references between terms and the entry where they are defined*

  — The cross-reference relations can be validated/tracked/checked manually or automatically.

  — Whether or not cross-reference relations are well established can be measured quantitatively.

— *use of unified spelling, unified phraseology, etc. to represent knowledge information*

  — This attribute is non-measurable.

— *organization of data according to a system of concepts*

  — Some computer programmes can generate a system of concepts based on the existing data. Such programmes can help to show if a terminological resource contains systematic terminological data. Therefore, this attribute is “computable” for qualitative judgment instead of being simply “measurable”.

Whether or not these rules are well observed in a terminological resource shall thus be measured through studying these aspects.

4.3.1.6 Use of controlled external data

Use of controlled external data refers to complementary information[1)] comprising external resources such as independently maintained standards, thesauri, ontologies and bibliographies. This is an attribute that can show the quality of the data. The better the links are established, the higher the expectations are of data quality. In a computer application context, the links to external resources can be calculated quantitatively.

1) In ISO 16642:2003, 3.1, complementary information is defined as “information supplementary to that described in terminological entries and shared across the terminological data collection”.

4.3.1.7 Use of authoritative sources

Use of authorative sources refers to the authoritative nature of documents or other sources from which the terminological data are taken. The more authoritative the sources used, the higher the data quality is likely to be. The criteria for “authoritative” sources are qualitative issues.

4.3.1.8 Intellectual property rights ownership indication

Intellectual property rights ownership indication refers to the indication of the ownership of certain data by individuals or organizations/institutions. Ownership is often linked to the source of the information. Indirectly, this indication signals to the user that the owner has set certain conditions that must be met to use or reuse the terminological data in the resource. This is a non-measurable usability attribute.

With more deliberate approaches to IT technology, such indications could be made for the whole terminological resource as well as for each entry or even for information elements. If the ownership (or permission) is detailed enough and entered in a controlled way, the copyright status of the terminological resource can be indicated as a quantitative statistic, which makes it a measurable usability attribute.

4.3.1.9 Symmetry of the terminological data collection

Symmetry of the terminological data collection refers to the equal comprehensiveness of information in different languages. This attribute can be measured by “complete”, “incomplete” or the number of the complete information sections, etc.

EXAMPLE It is essential that definitions in each language in a bilingual or multi-lingual terminological resource be complete and available. If information on only one language is complete and available in a “bilingual terminological resource”, the resource is not to be valued as a bilingual resource.

4.3.1.10 Size of the terminological data collection

The size refers to the total amount of information available in a terminological resource. Size can be measured in numbers of entries or bytes, megabytes, etc. The size of a single terminological resource can be different in assessments that serve different uses, subject fields or applications. It is a benchmark for comparing the comprehensive coverage of different terminological resources.

EXAMPLE The number of designations (by language if applicable), or definitions, etc. can be such attributes.

4.3.2 Usability attributes related to data management

Usability attributes related to data management concern methods and mechanisms that shall be employed in a terminological resource for the purpose of:

- data validation
  - completeness
  - linguistic correctness
  - conformity to presentation conventions
- control of redundancy/control of concept level duplication
- regular maintenance of data
- regular maintenance of metadata (i.e. Metadata Registry, see ISO 11179)

Many of the usability attributes described in this clause are linked to those related to data input or data output.

4.3.2.1 Data validation

Data validation refers to the controls for the systematic correctness of terminological data. If the user learns the validation rules for the data provided, this is helpful for determining the status of the data, even automatically.

Due to the complexity of terminological data, this usability attribute shall be analysed from different aspects: completeness, linguistic correctness and conformity to presentation conventions.

4.3.2.1.1 Completeness

Completeness refers to ensuring that recorded terminological data are composed of elements that match the required data categories, as defined in the data model. This attribute is measurable especially in a computerized environment.

EXAMPLE ISO 10241:1992, 6.1 stipulates that “For standardization purposes, the entry shall contain at least a) the entry number; b) the preferred term representing the concept; c) the definition of the concept …” If a term entry does not meet this minimal requirement, it will not be a qualified ISO standardized terminology entry. A statistic can be used to show the degree of conformity to ISO 10241:1992, 6.1.

4.3.2.1.2 Linguistic correctness

This attribute refers to the control of linguistic correctness of terminological data. To assess linguistic correctness, it is necessary to check the general linguistic conventions and domain-specific conventions applied to the terminological data. This attribute is measurable especially in a computerized environment.

EXAMPLE Spell-checkers exist for many human languages. For the purposes of assessment, a statistic for mistakes, in terms of either a percentage or an absolute number, will help the user evaluate linguistic correctness.

4.3.2.1.3 Conformity to presentation conventions

This attribute refers to the standardized presentation of content in a terminological resource. It is especially measurable in a computerized environment.

EXAMPLE 1 Codes for the presentation of language names, geographical names, etc. are standardized as in ISO 639, ISO 3166 and ISO 15924. The conformity to these International Standards can be measured statistically.

EXAMPLE 2 Presentation of terminological data in ISO printed standards of terminologies conforms to specifications in ISO 10241.

4.3.2.2 Control of redundancy

Control of redundancy refers to the control of duplication of identical data content in a terminological resource. It is not simple to access absolute duplication of information in terminology because terminological information is always bound to specialized concepts in a given subject field.

The issue of redundancy relates to the specifications of ISO 860. Different classification schemes for subject fields will impose constraints on the judgment of redundancy. The management structure of a terminological resource can also be a factor to assess redundancy.

In general, users do not want to have to deal with identical data content as it has a negative impact on their efficiency when they use the terminological resource. The usability attribute “Control of concept level duplication” shall be meaningful under certain conditions.

Control of concept level duplication refers to unnecessary occurrence of identical or similar data related to one specialized concept in one terminological resource.

EXAMPLE In a tree-structured subject field system, identical concepts cannot exist within one subject field located at the end of a branch in the structure.

In practice, the criteria to judge occurrence of concept duplication are predicated on the overall content and design of a terminological resource.

For a terminological resource, the rule used to assess this attribute is data economy, i.e. using the least amount of data to best meet practical needs.

4.3.2.3 Regular maintenance of data

Regular maintenance of data refers to updating the terminological data in a terminological resource according to the latest developments in the specialized field of knowledge. This attribute can be measurable by processing date information available in a terminological resource. However, the judgment of the knowledge content is often a necessary complement to the assessment of this attribute. For example, out-of-date knowledge can be the newly recorded data.

4.3.2.4 Regular maintenance of metadata

Regular maintenance of metadata refers to keeping the data structure and the data category specification consistent to standardized registries of metadata in order to support the easy data exchange between terminological resources and the value-added reuse of data. The key to assess this attribute is to support easy exchange or reuse of data. (See also B.2.3.)

4.3.3 Usability attributes related to data output

Usability attributes related to data output concern the accessibility of terminological data. They refer to the direct needs of users with regard to:

— readability of output data

— access to data

— customized selection of data

4.3.3.1 Readability of output data

Readability of output data refers to the format used to present terminological data to users.

EXAMPLE Examples include the layout of computer display windows (user interfaces), layout of entries in a dictionary, etc.

ISO/IEC 9126 (all parts) and ISO 9241-11 provide the technical usability attributes for computerized interfaces; ISO 10241 stipulates layout specifications for developing ISO terminology standards.

Readability of output data is non-measurable. The most important factors for the description of this attribute are

— the user's preference,

— efficient data category distinction, and

— convenience for technical implementation.

4.3.3.2 Access to data

Access to data refers to the technological possibility that a terminological resource enables users to find, read and use the desired terminological data.

EXAMPLE Examples include the querying functions of a computer system, the indexes in dictionaries, etc.

Different terminological resources will employ different technologies to provide these possibilities. Efficiency and convenience achieved are the most important factors for the access to target information content. Through such an access, usually the ratio of accurate answers and ratio of pertinent answers obtained serve as measurements of efficiency and convenience. Statistics of the ratios can be measured to assess this attribute.

4.3.3.3 Customized selection of data

Customized selection of data refers to the possibility for users to predefine the data content of output data or, in other words, to predefine what they intend to retrieve as terminological data (e.g. term, definition, synonyms, etc.) from a terminological resource. Attributes related to this include:

— flexible selection of data categories;

— flexible structure of output data.

4.3.3.3.1 Flexible selection of data categories

Flexible selection of data categories refers to possible options for users to select data categories that make up the output data. It is possible, in fact, to define a subset of all the data categories covered by the terminological resource.

Two aspects of this usability attribute are measurable:

— if the date category selection meets the user's need (see also 4.3.1.2);

— if there is flexibility in the allowed choices of data categories.

4.3.3.3.2 Flexible structure of output data

Flexible structure of output data refers to the capability of a terminological resource to output data with pre-specified data structure. This attribute is measurable when the output data structure and the user's specification of the required data structure are comparable.

To support reusability of data, many International Standards use specified standardized methodology for establishing a data structure for a collection of terminological data. Among these, ISO 11179 (*Metadata registries*) and ISO 16642 (*Terminological markup framework*) are important because conformity to these International Standards will facilitate reusability of data and interoperability between terminological resources.

4.3.4 Usability attributes related to data input

Usability attributes related to data input involve data management needs as well as, more directly, the initial recording of terminological data. Attributes used for this aspect of assessment shall include

— user-friendly format for data input,

— data validation,

— compatibility with other data structures.

4.3.4.1 User-friendly format for data input

User-friendly format for data input refers to the layout of the interface used to process terminological data and to record them in a terminological resource.

To be user-friendly, the requirement of readability is important. Therefore, 4.3.3.1 shall be considered when trying to measure this usability attribute.

4.3.4.2 Data validation

For this usability attribute, the attribute descriptions in 4.3.2.1 apply.

Before any data are accepted to be recorded in a terminological resource, necessary validation shall be done to ensure that the input data fit the overall requirements of the terminological resource.

4.3.4.3 Compatibility with other data structures

Compatibility with other data structures refers to the capability to process data to be imported from other terminological resources. Two attributes shall be studied:

— mapping data categories of the data to be imported;

— transforming the structure of the data to be imported.

4.3.4.3.1 Mapping data categories of the data to be imported

Mapping data categories of the data to be imported refers to whether or not the data categories of the data to be imported can be accepted and processed by a terminological resource in order to incorporate the imported data. When making a judgment on this usability attribute, take into account whether the data categories being imported are standardized or conform to existing known standards, such as ISO 12620. (See also 4.3.1.2.)

4.3.4.3.2 Transforming the structure of the data to be imported

Transforming the structure of the data to be imported refers to whether the structure of the data to be imported can be adapted by the terminological resource in order to incorporate the imported data. When making a judgment on this usability attribute, take into account whether the structure of the data to be imported conforms to known standard models such as those specified in ISO 16642. (See also 4.3.1.1.)

5 Guidelines for an assessment and benchmarking project

5.1 Overview

There are two approaches to an assessment of a terminological resource.

One approach is to start from a target terminological resource and systematically establish usability attributes on the basis of those specified in this International Standard. The desirable usability attributes of the target terminological resource shall then be used as benchmarks against which to match the user's potential needs.

The other approach is to start from the user's needs while no resource is targeted. The user's needs shall be clarified. Then essential usability attributes shall be identified based on the user’s needs and this International Standard. These usability attributes can serve as the benchmarks against which available terminological resources can be rated or measured. The project management information in ISO 15188 will be useful for this approach.

5.2 Main steps of the workflow

5.2.1 Specifying the goals

The ultimate purpose of an assessment and benchmarking project shall be to find a terminological resource, then make efficient use of this resource. The project shall also serve the following goals:

— establish general usability levels of a terminological resource, e.g. for rating services or certification services related to terminological resources;

— develop or improve a terminological resource to reach the specified usability level;

— demonstrate the suitability of a terminological resource for potential users, e.g. for making choices among terminological resources or for “resource-hunting” services.

5.2.2 Identifying benchmarks

Depending upon the goal of the project and based upon this International Standard, a selection of usability attributes shall be identified as benchmarks.

5.2.3 Checking conformity to benchmarks

Benchmarks shall be applied to candidate terminological resources to determine the degree of the suitability for the target requirements.

5.3 Test-case assessment

A limited output of a terminological resource shall be used or processed to see if the user's requirements are met.

The terminological resource shall be used for a certain time and then the judgment shall be made based on the user’s real experience.

Note that the final conclusion of a test-case assessment shall also take into account the users’ psychological impressions or subjective prejudices.

Annex A
(normative)

Usability attributes of terminological resources and basic rules for measurement

Usability attributes		Basic rules for measurement (minimum requirements)
4.3.1 Usability attributes related to terminological data		
4.3.1.1	Data structure specification	An explicit description, or a DTD (document type definition) or schema shall make it possible for users to understand or distinguish units of terminological data. EXAMPLE To meet the need of terminology standardization, the data structure specification has to provide for the minimum entry structure specified in ISO 10241 or for the simplest derivative model based on the generic specification in ISO 16642.
4.3.1.2	Data category coverage	The data categories needed by users shall be mapped with those of the terminological resource, either through the use of standardized data categories or through an agreed mapping mechanism. The metric value can be the percentage of successful matching to the user-needed data categories.
4.3.1.3	Subject field coverage	Domain and sub-domain data categories shall be available. The most weighed subject field for users shall be covered by the target terminological resource. The metric value can be the percentage of the matched items on a check list of subject field indicators, or the result of a predefined statistical calculation on such matchings.
4.3.1.4	Language coverage	The explicit descriptions or data categories that contain language indicators shall be available. The indication of user-needed languages can be matched manually or automatically through an analysis of the explicit text; or the comparison between indicators can be made with reference to standardized codes of ISO 639, ISO 15924 and ISO 3166 or other industry standards. The result can be a “yes” or “no” list of the user-needed language species.
4.3.1.5	Compliance with rules of coherence	The rules observed by the terminological resource shall be made explicit to users by using either descriptive instructions or specific data categories. To assess this attribute, two aspects shall be considered: whether a user requires coherence, and the degree of such compliance.

Usability attributes	Basic rules for measurement (minimum requirements)
4.3.1.6 Use of controlled external data	This attribute applies especially to electronic terminological resources. There shall be specific data categories to record pointers/links to such data. An automatic check of the pointers/links shall be adopted for an assessment of this attribute. The integrity of the specified pointers/links can be the metric for assessing.
4.3.1.7 Use of authoritative sources	Based on the content recorded as values of the bibliographical data categories in a terminological resource, a qualitative study of the specified/designated sources will help in judging the degree of authority or in determining whether or not authoritative sources have been used.
4.3.1.8 Intellectual property rights ownership indication	Prescriptive legal information or a link to copyright information is generally needed. The assessment of this attribute clarifies qualitatively the user's rights when using the terminological data of a terminological resource.
4.3.1.9 Symmetry of the terminological data collection	This attribute applies especially to terminological resources that consist of language sections. The balanced content for key data categories that make up the data structure shall be taken into account to assess this attribute. The result of a predefined statistical calculation on empty/filled data categories can be made. Such calculations on user-required data categories can be the metric for assessments. For automatic measuring, data categories that specify the filling status and validation status are needed.
4.3.1.10 Size of the terminological data collection	A large enough amount of data content shall be available in a terminological resource. The calculation of the “size”, i.e. the amount of information content for user-required data categories, is the metric.
4.3.2 Usability attributes related to data management	
4.3.2.1 Data validation	Data validation rules shall be explicit to users. Users can check the terminological data provided based on the rules. In electronic resources, automatic examination of the effectiveness of the validation rules can be possible.
4.3.2.1.1 Completeness	Whether or not the related controlling mechanisms are (or have been) established in a terminological resource shall be the metric. The approach for 4.3.1.9 (in this annex) can also be referred to when assessing this attribute.
4.3.2.1.2 Linguistic correctness	Whether or not the related controlling mechanisms are established in a terminological resource shall be the metric.

Usability attributes	Basic rules for measurement (minimum requirements)
4.3.2.1.3 Conformity to presentation conventions	Terminological data shall conform to the presentation convention specified in the terminological resource where they are being recorded. Otherwise, the terminological data provided by a terminological resource shall conform to the presentation convention required by the user. A manual process or a computable program can be set up to examine values of target data categories in order to see whether or not the presentation standards set by the users are complied with. Either a qualitative description or a quantitative calculation based on the user's requirements can be made as the metric.
4.3.2.2 Control of redundancy	The condition for the existence of data redundancy shall be declared.
Control of concept level duplication	When there is a user-defined range of subject fields, a quantitative check is possible through comparison of terms or definitions, either manually or automatically with computer applications. The result of a predefined statistical calculation on duplicated concepts can then be measured.
4.3.2.3 Regular maintenance of data	Whether or not the mechanisms of such maintenance are established shall be the qualitative metric. Checking the values of the data categories for dates can also be a measurement. EXAMPLE A list of regular editions of a hard-printed resource shows that the data of the resource are constantly studied and updated.
4.3.2.4 Regular maintenance of metadata	The specification of metadata shall be kept explicit to users in order to map them to users' needs. Whether such mechanisms are established or not can be the qualitative metric.
4.3.3 Usability attributes related to data output	
4.3.3.1 Readability of output data	The output data shall make it possible for users to read or to process the data. The user's requirements to access output data, conformity to the user's standards or the “best practice” of terminology can all be the metric. EXAMPLE ISO 10241:1992 specifies the layout of terminology entries for an ISO terminology standard.
4.3.3.2 Access to data	There shall be an effective way through which the data in the target terminological resource can be accessed by its users. EXAMPLE An index is indispensable for hard-copy Chinese terminological resources to be usable. A statistical calculation on the ratio of accurate and pertinent outcomes in a sample of queries can be a metric. But the judgment for accuracy and pertinence will be the user's qualitative conclusion. EXAMPLE The user can provide predefined questions to query together with expected data elements of answers. Based on this, the user can query the target terminological resource manually or with an automatic computerized program, if possible. Then a qualitative or even quantitative judgment can be achieved.

Usability attributes	Basic rules for measurement (minimum requirements)
4.3.3.3 Customized selection of data	A user-defined subset of data categories shall be allowed.
4.3.3.3.1 Flexible selection of data categories	The data category selections which are allowed to output data in a terminological resource shall be compared against the user's needs. Refer to 4.3.1.2 when assessing this attribute.
4.3.3.3.2 Flexible structure of output data	An explicit description, or a DTD or schema shall make it possible to compare the output structure against the user's requirements. Refer to 4.3.1.1 when assessing this attribute.
4.3.4 Usability attributes related to data input	
4.3.4.1 User-friendly format for data input	Readability shall be the most important aspect (see 4.3.3.1)
4.3.4.2 Data validation	See 4.3.2.1
4.3.4.3 Compatibility with other data structures	A target terminological resource shall be able to deal with data with other structures.
4.3.4.3.1 Mapping data categories of the data to be imported	The target terminological resource shall have compatible data categories that can match the user's selection of data categories. (See 4.3.1.2 and 4.3.3.3.1.)
4.3.4.3.2 Transforming of the structure of the data to be imported	This is particularly applied to computerized manageable terminological resources. To possess such usability attributes, a terminological resource shall be able to permit users to define their own set of structural elements. (See 4.3.1.1 and 4.3.3.3.2.) Being “compatible” or “incompatible” to the user-defined explicit description, DTD or schema can be the metric.

Annex B
(informative)

Typical application of usability attributes as benchmarks

B.1 General view

When a terminological resource is being used, the greatest concerns for users are the content pertinence, structural conformity and formalistic quality of the terminological data. Based on this, the following generalized approaches to assessment and benchmarking of terminological resources are provided.

B.2 Typical assessment and benchmarking of terminological resources

B.2.1 Pertinence and quality of content

B.2.1.1 Pertinence

Whether or not a terminological resource contains the terminological data that a user really needs can be judged using the following benchmarks:

— data category coverage (4.3.1.2);

— subject field coverage (4.3.1.3);

— language coverage (4.3.1.4);

— symmetry of the terminological data collection (4.3.1.9);

— size of the terminological data collection (4.3.1.10).

Subject fields, languages and data categories covered by the terminological resource are assessed in order to maximize the match to user requirements. The greater the degree of matching, the more positive the assessment result is.

If no specific need related to the first three aspects has been established, the more comprehensive the terminological resource is, the more likely it is that the terminological resource will cover the scope of terminological content desired by the users.

B.2.1.2 Quality

The word “quality” here refers to the content quality of terminological data that a terminological resource holds. Two aspects are concerned: 1) the level of quality from the standpoint of linguistics/language; and 2) the level of quality from the standpoint of specialized knowledge.

Usability attributes concerned with the quality of terminographical work can serve as benchmarks for terminological data. Conformity to these benchmarks will indirectly reflect to some extent the quality from the standpoint of specialized knowledge or language. Such benchmarks can include:

— compliance with rules of coherence (4.3.1.5);

— use of controlled external data (4.3.1.6);

— use of authoritative sources (4.3.1.7);

— linguistic correctness (4.3.2.1.2);

— conformity to presentation conventions (4.3.2.1.3);

— control of redundancy (4.3.2.2).

These benchmarks can be applied to the output of terminological resources to determine the level of the quality.

If the terminological resource has mechanisms to control these aspects, e.g. data validation, when the data are input or managed, the data can be expected to be of high quality.

In addition to these benchmarks, a sample of data that has been proved to be of high quality can be used as a standard to which the output of a terminological resource is compared. Such a comparison is also an approach to evaluate the quality.

B.2.2 Accessing terminological knowledge

This aspect mainly involves usability attributes of data output. The following usability attributes can serve as benchmarks to assess this aspect of usability:

— intellectual property rights ownership indication (4.3.1.8);

— readability of output data (4.3.3.1);

— access to data (4.3.3.2);

— customized selection of data (4.3.3.3).

EXAMPLE 1 A database system with extensive options for searching terminological information will enable its users to access more usable data.

EXAMPLE 2 A good dictionary will have, in addition to a variety of indexes, a clearly designed entry layout which is easy to read and differentiates parts of content very clearly. ISO terminology standards and other ISO standards have a clear terminological layout conforming to the specifications in ISO 10241.

Customized selection of data on user interfaces will be possible only with electronic terminological resources.

If users want to use the data in a terminological resource for commercial purposes, they need know the copyright of the terminological data they plan to use.

B.2.3 Exchanging terminological data

The exchange of terminological data happens between people, institutes or information systems. The following usability attributes can be considered if the terminological data are to be used for this purpose:

— intellectual property rights ownership indication (4.3.1.8);

— customized selection of data (4.3.3.3);

— data validation (4.3.4.2);

— compatibility with other data structures (4.3.4.3).

Solving the issue of copyright is one precondition for the exchangeability of terminological data.

The data categories for different exchanges can be different. Data exchange will be made easier if the choice of data categories is possible and flexible.

Data formats that are structured in conformity with the meta-model of ISO 16642, the data categories of ISO 12620 or the XML mark-ups in ISO 30042 are interoperable, i.e. it is possible to convert data from one format into another format and back without loss of information. “By following the integrated approach described here, it is more likely that the resulting format will be adaptable to varied circumstances and will be compatible with other database structures or formats.” (ISO 16642:2003, 5.5)

B.2.4 Facilitating terminological work processes

Terminology work can be considered from two perspectives.

a) Terminology work is usually supported by a terminological resource that is a computerized information-processing system. (In previous years, it might have been card files or manuscript folders.)

b) In the process of terminology work, new terminological resources for other users are often produced.

When a terminological resource is intended to support overall terminology work, in addition to the attributes discussed in B.2.1 to B.2.3, the following benchmarks can be included:

— benchmarks for usability related to data input:

  — user-friendly format for data input (4.3.4.1);

  — data validation (4.3.4.2);

  — compatibility with other data structures (4.3.4.3);

— benchmarks related to content quality; these can focus on whether controls have been established for the following usability attributes:

  — data validation (4.3.2.1);

  — control of redundancy (4.3.2.2).

For a product produced by the terminological work process, benchmarks are based on the specific purpose that the product is intended to serve.

B.2.5 Semantic web

For semantic web technology, terminological data are used to “understand” knowledge; the necessary assessment is done automatically. The following usability attributes (specifying the knowledge position, as well as the accessibility, of the data) can be considered:

— data structure specification (4.3.1.1);

— data category coverage (4.3.1.2);

— subject field coverage (4.3.1.3);

— language coverage (4.3.1.4);

— control of redundancy (4.3.2.2);

— regular maintenance of data (4.3.2.3);

— regular maintenance of metadata (4.3.2.4);

— access to data (4.3.3.2).

It is essential to represent the data pertinent to these attributes in a standardized way.

B.2.6 Merging distributed parallel data resources

Online content service systems are increasingly supported by distributed terminological resources. Successful merging of such terminological resources is important. One key point is that it is possible that data from different resources could match. Hence, the following usability attributes are important:

— data structure specification (4.3.1.1);

— data category coverage (4.3.1.2);

— subject field coverage (4.3.1.3);

— language coverage (4.3.1.4);

— intellectual property rights ownership indication (4.3.1.8);

— regular maintenance of data (4.3.2.3);

— regular maintenance of metadata (4.3.2.4);

— access to data (4.3.3.2);

— customized selection of data (4.3.3.3).

The use of standardized approaches that take into account related usability attributes will guarantee interoperability between different resources.

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