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**Information technology — Learning, education and training —
Collaborative technology — Collaborative workplace — Part 1:
Collaborative workplace data model**

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Foreword

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ISO/IEC 19778-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, JTC, Subcommittee SC 36, *Information Technology for Learning, Education, and Training*.

This second/third/... edition cancels and replaces the first/second/... edition (), [clause(s) / subclause(s) / table(s) / figure(s) / annex(es)] of which [has / have] been technically revised.

ISO/IEC 19778 consists of the following parts, under the general title *Information technology — Learning, education and training — Collaborative technology — Collaborative workplace*:

- *Part2: Collaborative environment data model*
- *Part3: Collaborative group data model*

Introduction

Many, if not all activities in the field of learning, education, and training are collaborative in nature, involving turn-taking, statement-and-response or feedback loops which, in turn, take place between *participants* over periods of time ranging from seconds to entire human generations. These "collaborative loops" can also span diverse categories of specialization (e.g. topical, educational, social, political, etc.) and levels of abstraction (e.g. operational, scientific, philosophical). The ISO/IEC standards on the employment of collaborative technology for the support of learning, education, and training, however, focus on a particular subset of these collaborative activities. This subset is characterized by:

- Information exchange in small or medium-sized *collaborative groups* of *participants* (typically above 2 and below 50) who collaborate over relatively short periods of time (typically several days to several months);
- Information exchange taking place through the use of communication technology, using either a single, well-defined *collaborative tool* supporting *collaborative functions*, or a set of *collaborative tools*, organized in a *collaborative environment*;
- Short information turn-around times for individual messages or exchanges (seconds to hours);
- The exchange of small information chunks (comparable to a range between a single word and a small number of paragraphs);
- Collaborative activities are characterized by a high level of responsiveness and engagement of the *collaborative group* members.
- Information exchanged between *participants* (due to a number of the factors listed above) tends to be highly context-dependent or -sensitive

The multipart standard ISO/IEC JTC1 19778 Information technology - Learning, education and training - Collaborative Technology - Collaborative Workplace provides data models for specifying *collaborative workplaces* and their components: *collaborative environment* and *collaborative group*, that in combination make up a *collaborative workplace*.

A *collaborative workplace* is primarily an administrative rather than a physical entity or setting. Instead of being a compound physical object, being composed of physical *participants* and physical *collaborative tools* (as one might initially expect), a *collaborative workplace* is an abstract object, instantiated by associating *participants* with *collaborative services*.

A well-known and example of a *collaborative workplace* is a mailing list, managed within an email system, a system that typically manages the transport, storage, access to, and sometimes also filtering of emails. Such a *collaborative workplace* is characterized by turn-around times of minutes to days for collaborative exchanges or loops, and by the use of information chunks or messages with a typical size of several paragraphs. It is instantiated by associating a particular list of email addresses (each address being associated with a *participant*), with a particular e-mail service (or specific aspects of such a service). This email service accepts emails only from group members (being identified by their email addresses), and forwards or reflects emails to all other group members as specified in the email address list of the group.

Naturally, such a collaborative context, as an abstract entity, encompasses neither the holders of the email addresses nor the email server as a hardware and software arrangement, the mail clients, the computers of the *participants* and the like. The *collaborative workplace* presented by this example is constituted solely through:

- 1) the instantiation of a *collaborative group* (instantiated by specifying the email addresses of its members in a mailing list that, in the domain of the collaborative system, is identified by a particular mailing list name);
- 2) the instantiation of a *collaborative environment* (in this case, a particular email service, that is identified by a string formulated as "mailing list name @ the email server URI", with the URI identifying the domain of the collaborative system); and,
- 3) the association of the *collaborative group* and the *collaborative environment* with this *collaborative workplace*.

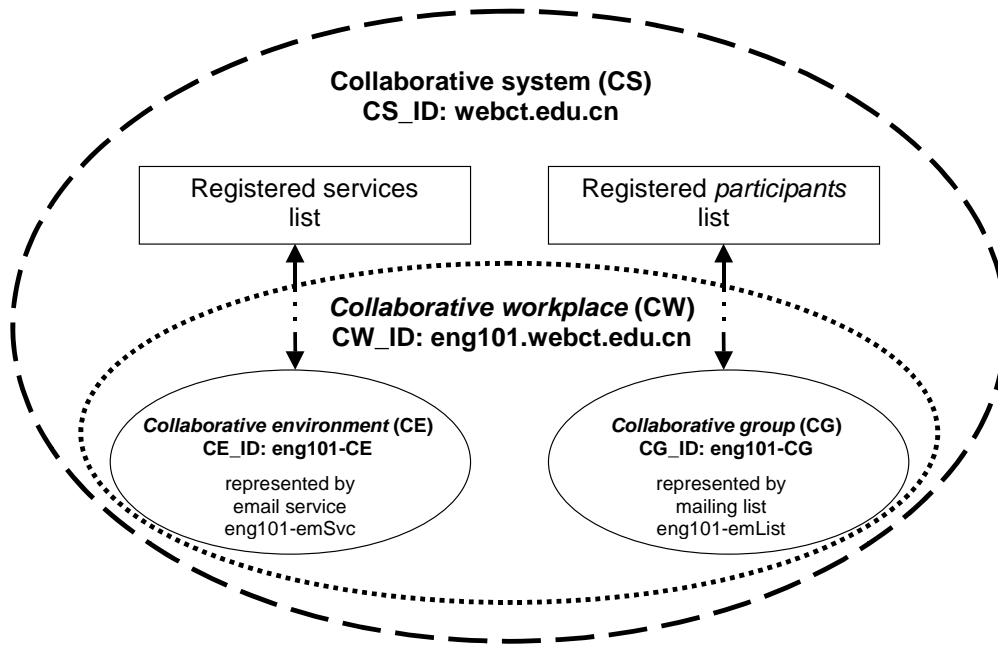


Figure 1 — Email list example of a *collaborative workplace*, where the email address would be "eng101@webct.edu.cn"

A *collaborative workplace* is thus associated with two major kinds of components:

- 1) *collaborative service* components, and
- 2) *collaborative group* membership components.

This is reflected by the first three Parts of the multipart standard ISO/IEC 19778 Information technology - Learning, education and training - Collaborative Technology - Collaborative Workplace:

Part 1: **Collaborative workplace data model**: specifying and providing information regarding the *collaborative workplace* generally - this document.

Part 2: **Collaborative environment data model**: specifying and providing information regarding the *collaborative services* of a *collaborative workplace* - being provided as a separate Part.

Part 3: **Collaborative group data model**: specifying and providing information regarding the members of a *collaborative workplace* - being provided as a separate Part.

Information technology — Learning, education and training — Collaborative technology — Collaborative workplace — Part 1: Collaborative workplace data model

1 Scope

This Part 1 - **Collaborative workplace data model** - of the multipart standard ISO/IEC 19778 specifies the data model for a *collaborative workplace*.

The purpose of this Standard is:

- to provide a standardized way of defining and instantiating, as an independent entity the service(s), the membership, and the associated artifacts of a *collaborative workplace*. (This is done by associating them with a *collaborative workplace* identifier unique within a particular domain or application context).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- ISO/IEC 11404 Information technology -- Programming languages, their environments and system software interfaces -- Language-independent datatypes.
- ISO/IEC 10646:2003 Information technology -- Universal Multiple-Octet Coded Character Set (UCS).
- ISO 8601:2004 Data elements and interchange formats – Information interchange – Representation of dates and times.
- RFC 3986 - Uniform Resource Identifiers (URI): Generic Syntax (see <http://www.ietf.org/rfc/rfc3986.txt>)

3 Terms and Definitions

NOTE The terms defined here are closely interrelated. When a term is utilized anywhere in this document as defined in this list, that term is *italicized*.

3.1 Collaborative effect

A particular intended result supportive or constitutive of learning that can be achieved through the use of a *collaborative service* or a *collaborative tool*.

3.2 Collaborative environment

One or more *collaborative service(s)* provided within a *collaborative workplace*, for the purposes of supporting the *collaborative activities* of a *collaborative group*.

3.3 Collaborative function

An elementary functionality or capability provided for members of a *collaborative workplace* and enabling particular *collaborative effects* and collaborative activities that cannot be further decomposed without loss of this functionality.

NOTE A single *collaborative tool* frequently provides multiple *collaborative functions* (e.g. the combination of a voice communication function and a text-based chat function) which could also be provided individually, through separate *collaborative tools*.

3.4 Collaborative group

Two or more *participants*, in their capacity as members of the same *collaborative workplace* and through their involvement in the same *collaborative environment*.

3.5 Collaborative service

One or several *collaborative tools* provided in a *collaborative environment* and administered as a single, compound set.

NOTE *Collaborative services* are based on *collaborative tools* and additionally provide communicative functionalities for employing these tools in a *collaborative workplace*.

3.6 Collaborative tool

Hardware, and related software and data providing one or multiple *collaborative functions* for several or all members of a *collaborative workplace*.

3.7 Collaborative workplace

That which is instantiated as an independent entity, comprising the *collaborative activities* of a *collaborative group* defined in relationship to a *collaborative environment*.

NOTE A *collaborative workplace* is usually established with the intention of facilitating *collaborative activities* among the members of the *collaborative group* to achieve one or more *collaborative effects*.

3.8 Participant

An interactive entity such as a human being, an artifact such as an interactive computer process (enabled by appropriate software, data and interfaces), or a set of such entities and/or artifacts acting and reacting as a single entity.

3.9 Role

A profile or listing of rights and responsibilities specified for a potential or actual member of a *collaborative group*. By assigning a single *role* or several *roles* to a *collaborative group* member, the aggregate rights and responsibilities associated with the *role(s)* are transferred to this *participant*.

3.10 Smallest Permitted Maximum (SPM)

A declaration regarding the upper limit of the size of a data element value, which has a variable size.

Typical data elements whose specifications define SPMs are character strings, records, arrays, bags, sets, and the kind.

Generally, this term designates different concepts depending on the application of the data element, such as:

- For data elements in data model instances, the SPM specifies the upper size limit for a permissible value (i.e. data element values conforming to the standard shall not exceed this size limit); or
- For applications using the value of a data element, the SPM specifies the lowest permissible size limit regarding the capability of the application (i.e. applications conforming to the standard shall be able to handle data element values up to this size limit, or larger).

In the context of this Standard, SPM values are solely used for data elements in data model instances.

4 Conformance

These conformance specifications regard solely the conformance of data model instances themselves (in contrast to, e.g., conformance specifications regarding applications which may use such data model instances).

A conforming *collaborative workplace* data instance shall be an instance of the data model as defined in section 5.

5 Data Model

5.1 Notation

The following tabular notation is used in the data model.

Table 1 — The Tabular notation for the data model

No.	Name	Explanation	Presence Type	Multi	Datatype	Example

For each data element that has a value domain (i.e. that is not simply an aggregate or container for other, subordinate elements), the following information is provided:

No.: An alpha-numerical value associated with the data element. An element may be composed of sub-elements, and this numbering scheme reflects these relationships.

Name: A title for the element.

Explanation: A definition of the element. An asterisk (*) indicates that the explanation has been adapted from Dublin Core (ISO 15836) data element definitions.

Presence Type: Indicates, for conformance purposes, the conditions under which an element is to be provided:

- M = Mandatory Element. Must be provided in a conformant data instance or record.
- CM = Conditional Mandatory. Elements which must be provided only under certain conditions (e.g. a parent element must be provided when a sub-element is populated).
- O = Optional Element. Elements which can be included in an instance, but are not mandatory.

Multi: Multiplicity of the element:

- Number = the number of times the data element can occur (i.e. its “cardinality”).
- [Number1 .. Number2] = specifies a range for the cardinality of the data element (i.e. from Number1 up to Number2). Note that “*” is used in the context of this notation to indicate “unbounded.”

e.g.,

- [1..10] one to 10 instances of the element are acceptable
- [0..10] 0 to 10 instances of the element are acceptable
- [0..*] 0 to an unlimited number of instances of the element are acceptable

Multiplicity of an element implies that all sub-elements repeat with the parent element.

Datatype: A property of distinct values, indicating common features of those values. Where possible, these datatypes are taken from ISO/IEC 11404:

- Char - characterstring(ISO/IEC 10646:2003) (ISO/IEC 11404)
- T/D - Time Interval (ISO 8601:2004)

NOTE “Agg” designates an aggregate data element, having no value, value space or datatype, but having one or more leaf elements subsumed hierarchically underneath it.

Example: Possible value for the given element.

5.2 Collaborative environment data model

5.2.1 Relational description

Figure 2 (below), shows the *collaborative workplace* data model (bounded by a dashed line) as specified in this Standard. This diagram also indicates specifications or standards which are as of yet unidentified and out of scope for this standard, but which may play a significant role in its implementation.

The following graphical conventions are used in this diagram:

- boxes with a solid outline are data elements as defined in this Standard
- boxes with a dashed outline are standards or specifications

Lines or arrows (and the notation appearing next to them) describe the relationships among elements, and between elements and specifications or standards:

- An arrow joining two boxes indicates that they are related hierarchically, as parent (super-ordinate) and child (sub-ordinate) entities:

- The box at the arrow's origin is the parent (super-ordinate) data element, standard or specification.
- The box to which the arrow points is the child (sub-ordinate) data element, standard or specification.
- The notation appearing next to the origin or end of the arrow indicates the multiplicity of the adjacent data element, standard or specification:
 - "1" next to the origin of the arrow indicates that the relation applies to a single parent (super-ordinate) data element.
 - "1" next to the end of the arrow indicates that exactly one instance of the corresponding element, standard or specification is related to any parent (super-ordinate) data element.
 - "0..1" is used only in conjunction with data elements, indicating that the data element is optional, and that if it is used, only a single instance shall exist.

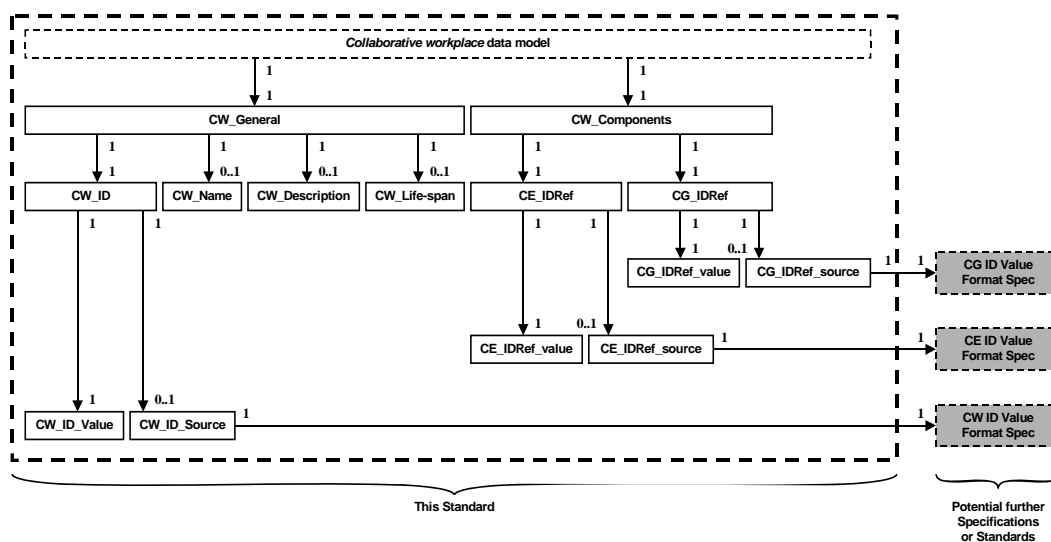


Figure 2 — Collaborative workplace data model and external specifications

As indicated above, all of the data elements and interrelationships that comprise the *collaborative workplace* data model are indicated within the framed area on the left of Figure 2. At the highest level, the *collaborative workplace* data model is divided into two sub-structures:

- The sub-structure specifying the *collaborative workplace* as a whole (sub-structure CW_General); and
- the sub-structure specifying the components of the *collaborative workplace*: references to the *collaborative environment* (sub-structure CE_IDRef) and the *collaborative group* (sub-structure CG_IDRef).

The "potential" specifications and standards provided on the far right of the diagram are those which have either not yet been fully developed, or which are not yet widely recognized in the use of Information and Communication Technologies (ICTs) in learning, education and training. Their development is seen as dependent on experience and practices that are only gradually emerging through the widespread use of ICTs in collaborative and other forms of learning. These potential specifications or standards could serve as sources or namespaces that provide values for specific *collaborative workplace* data model elements. Should these kinds of specifications or standards eventually be developed or identified, the degree to which data model instances conforming to the this Standard could be reused would be substantially increased.

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In the case of ISO/IEC 19778 Part 1, these "potential specifications or standards" are seen as addressing a single issue in this data model (two further issues of this kind, regarding **collaborative tools**, **collaborative functions**, and **roles**, are addressed in the Parts 2 and 3 of this multipart standard ISO/IEC 19778):

- Identifiers and identifier references.

Globally unique identifiers are already in use in many fields of technical application. The standardized creation and management of such identifiers for ICT-supported learning, education, and training (LET) has been gradually emerging. However, this use has yet to become a matter of formalized consensus.

5.2.2 Tabular description

Table 2 — Collaborative Environment Data Model

No	Name	Explanation	Presence Type	Multi	Datatype	Example
W1	CW_General	Information on the <i>collaborative workplace</i> as a whole	M	1	Agg	-/-
W1.1	CW_Name	Name of the <i>collaborative workplace</i>	O	1	Char SPM: 100	Computer Graphics Exercises
W1.2	CW_Description	Description of the <i>collaborative workplace</i>	O	1	Char SPM: 4000	Workplace for collaborative work on Computer Graphics exercises
W1.3	CW_ID	<i>Collaborative workplace</i> identifier	M	1	Agg	-/-
W1.3.1	CW_ID_source	"The name or URI of the identification scheme used to generate the value of the <i>collaborative workplace</i> identifier. A namespace scheme."	O	1	Identifier_type	http://www.gris.informatik.tu-darmstadt.de/idformats/identifier_type.pdf
W1.3.2	CW_ID_value	Value of the <i>collaborative workplace</i> identifier	M	1	Identifier_type	de_tu-darmstadt_informatik_gris_20060906_14545134
W1.4	CE_Lifespan	Time period of the existence of the <i>collaborative workplace</i> .	M	1	T/D	2006-10-01T12:00:00+02:00/2007-06-01T12:00:00+02:00
W2	CW_Components	Identification of the components of the <i>collaborative workplace</i>	M	1	Agg	-/-

W2.1	CE_IDRef	<i>Collaborative environment</i> identifier reference	M	1	Agg	-/-
W2.1.1	CE_IDRef_source	The name or URI of the identification scheme used to generate the value of the <i>collaborative environment</i> identifier reference. A namespace scheme.	O	1	Identifier_type	http://www.gris.informatik.tu-darmstadt.de/idformats/identifier_type.pdf
W2.1.2	CE_IDRef_value	Value of the <i>collaborative environment</i> identifier reference	M	1	Identifier_type	de_tu-darmstadt_informatik_gris_20060907_13582578
W2.2	CG_IDRef	<i>Collaborative group</i> identifier reference	M	1	Agg	-/-
W2.2.1	CG_IDRef_source	The name or URI of the identification scheme used to generate the value of the <i>collaborative group</i> identifier reference. A namespace scheme.	O	1	Identifier_type	http://www.gris.informatik.tu-darmstadt.de/idformats/identifier_type.pdf
W2.2.2	CG_IDRef_value	Value of the <i>collaborative group</i> identifier reference	M	1	Identifier_type	de_tu-darmstadt_informatik_gris_20060907_14033718

5.2.3 Textual description

5.2.3.1 Data element CW_General

This sub-structure groups the general information that describes this *collaborative workplace* as a whole.

5.2.3.2 Data element CW_Name

Name given to the *collaborative workplace*.

NOTE This name is solely intended for human use.

5.2.3.3 Data element CW_Description

Description of the *collaborative workplace*.

NOTE This description is solely intended for human reading and understanding.

5.2.3.4 Data element CW_ID

The *collaborative workplace* identifier serves as a label for a *collaborative workplace* data model instance (for allowing references from its associated *collaborative environment* and *collaborative group* data model instances, or from external objects).

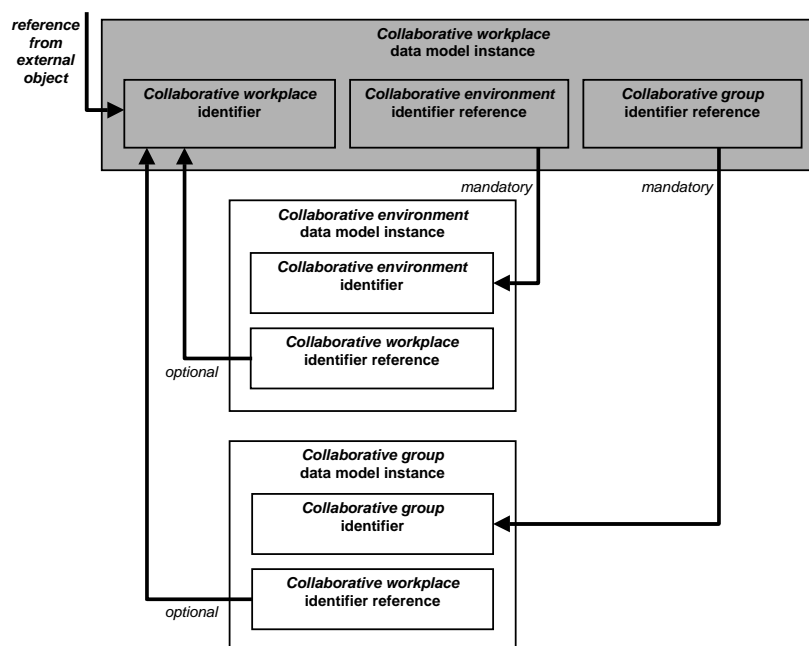


Figure 3 — Linkages between the *collaborative environment*, the associated *collaborative workplace*, and the associated *collaborative group*

In order to support more than a single identifier format, a "source-value" approach has been applied in this data element structure. Accordingly, the value of the sub-element "source" specifies a Uniform Resource Identifier (URI), that can be used for establishing the range of uniqueness for the *collaborative workplace* identifier value; it could also represent a URI that procures access to a data object that specifies the identifier format. The sub-element "value" serves as a label for the associated *collaborative workplace*.

5.2.3.5 Data element CW_ID_source

The value of this data element specifies the URI of the source where the regulations are provided that are associated with the used *collaborative workplace* ID value. The purpose of this value is manifold:

- The URI (in its capacity of being a globally unique identifier) unambiguously identifies a particular community that is responsible for the unambiguousness of the used *collaborative workplace* ID values within this community
- The URI provides access to the regulations regarding the format of the admissible *collaborative environment* ID values. These regulations generally specify, how such identifiers are constructed (within the limits of their datatype). Typically, such a specifications may restrict the permitted character set, may specify particular characters with special meaning (e.g. separators between distinct fields of the character string), may (for data model instances only) restrict the SPM value for the number of characters of the character string, etc.

NOTE The format of such regulations is not specified in this Standard. Particularly, it is left open whether such regulations are appropriate for automated use or just for human reading, understanding, and observance.

NOTE This data element is optional (and not mandatory) in order to allow simple applications of this data model, where the practicing community takes care that within the range of their visibility the *collaborative workplace* identifier values are unambiguous.

5.2.3.6 Data element CW_ID_value

This data element represents the identifier of this *collaborative workplace* data model instance. This identifier shall be unique at least within the application range of this data model instance.

5.2.3.7 Data element CW_Life-span

Time period of the existence of the *collaborative workplace*.

5.2.3.8 Data element CW_Components

Two sub-structures providing identifier references to the data model instances of the *collaborative environment* and the *collaborative group* which are associated with this *collaborative workplace*.

5.2.3.9 Data element CE_IDRef

A reference to the data model instance of the *collaborative environment* which is associated with this *collaborative workplace*. This reference is specified by providing the identifier of the data model instance of the *collaborative environment*.

5.2.3.10 Data element CE_IDRef_source

The value of this data element specifies the URI of the source where the regulations are provided that are associated with the used *collaborative environment* ID value. The purpose of the data element value (in combination with the *collaborative environment* identifier reference value) is the linkage of (and thus allowing access to) the data model instance which specifies the associated *collaborative environment*.

NOTE This data element is optional (and not mandatory) in order to allow simple applications of this data model, where the practicing community takes care that within the range of their visibility the *collaborative environment* identifier values are unambiguous.

5.2.3.11 Data element CE_IDRef_value

This data element provides the reference to the data model instance specifying the *collaborative environment* that is associated with the *collaborative workplace*. The purpose of the data element value (possibly in combination with the *collaborative environment* identifier reference source) is the linkage of (and thus allowing access to) the data model instance which specifies the associated *collaborative environment*.

NOTE This identifier reference value shall be unique at least within the application range of this *collaborative workplace* data model instance.

5.2.3.12 Data element CG_IDRef

A reference to the data model instance of the *collaborative group* which is associated with this *collaborative workplace*. This reference is done by providing the identifier of the data model instance of the *collaborative group*.

5.2.3.13 Data element CG_IDRef_source

The value of this data element specifies the URI of the source where the regulations are provided that are associated with the used *collaborative group* ID value. The purpose of the data element value (in combination with the *collaborative group* identifier reference value) is the linkage of (and thus allowing access to) the data model instance which specifies the associated *collaborative group*.

NOTE This data element is optional (and not mandatory) in order to allow simple applications of this data model, where the practicing community takes care that within the range of their visibility the *collaborative group* identifier values are unambiguous.

5.2.3.14 Data element CG_IDRef_value

This data element provides the reference to the data model instance specifying the *collaborative group* that is associated with the *collaborative workplace*. The purpose of the data element value (possibly in combination with the *collaborative group* identifier reference source) is the linkage of (and thus allowing access to) the data model instance which specifies the associated *collaborative group*.

NOTE This identifier reference value shall be unique at least within the application range of this *collaborative workplace* data model instance.

6 Auxiliary data types

6.1 Identifier_type

Values of datatype identifier_type are based on datatype characterstring(iso-10646-1) with an SPM of 250 characters.

This data type is provided for identifiers that identify a single object and possibly one or more exact equivalents. These identifiers shall be unique within the context in which such objects are utilized. The character string shall conform to the syntax for Uniform Resource Identifiers (URIs) as defined by RFC 3986.