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Introductory element — Collaborative Technology — Part 1: Collaborative Learning Communication

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Foreword

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ISO/IEC 19780-1 was prepared by Technical Committee ISO/TC JTC1, *Information Technology*, Subcommittee SC 36, *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 19780 consists of the following parts, under the general title *Introductory element — Collaborative Technology*:

- *Part 1: Collaborative Learning Communication*
- *Part [n]:*
- *Part [n+1]:*

Introduction

Collaborative communication in General

Collaborative learning that is supported with information and communication technologies (ICTs) can involve the use of a range of media, including audio (e.g., IP telephony), video (e.g., video over IP), graphics (e.g., shared whiteboard) and text (e.g., chat, computer conferencing). Combinations of these media (e.g. audio telegraphics) can also be used in collaborative learning activities. This multi-part standard, *ISO/IEC JTC1 19780 ITLET - Collaborative technology – Collaborative learning communication*, focuses on messages and events arising in the course of collaborative learning activities, using a range of *collaborative tools* and media types. This multi-part standard understands and defines these expressions and events as being sent and received by *participants* and within environments, as these are conceptualized and defined in a second collaborative learning standard, *ISO/IEC JTC1 19778 ITLET - Collaborative technology - Collaborative workplace*.

The current standard, the first of the multi-part ISO/IEC JTC1 19780 ITLET standard, focuses on text-based communications and messages.

In this context, "text" can be defined in terms provided by the Oxford English Dictionary: "the wording of anything expressed; the structure formed by the words in their order; the very words, phrases, and sentences as written." Text is further understood here as that which can be expressed using a specified character set (here: the "coded character sets" defined in ISO10646:2003, Information technology—Universal Multiple-Octet Coded Character Set (UCS)). The use of markup languages derived from the specified character set used is also admissible.

Some of the most common forms of ICT-supported collaborative learning involve the exchange of messages or expressions using text. As defined here, text-based collaboration and communication is characterized by shorter message or expression lengths (e.g., a single word to a few paragraphs), and by shorter time intervals between expressions (seconds to days). The result is that content generated through this type of communication tends to be highly context-dependent, with any one expression gaining its meaning from sometimes complex relationships to others. This makes the portability and potential reconstruction of these relationships and of this context of great significance.

Within the general parameters described above, the length of, and time intervals between, text-based *expressions* or messages can vary. Collaborative technologies and activities with the shortest *expression* and interval lengths are often labeled "synchronous", and tend to be associated with the term "chat." Those with longer interval and *expression* lengths are often labeled "asynchronous", and tend to be associated with terms such as "discussion" or "conferencing." In the terminology defined in ISO/IEC JTC1 19778, both synchronous (chat) and asynchronous (discussion) represent particular *collaborative services*, composed of *collaborative tools* (e.g., ICQ, Windows Messenger, etc.) which provide *collaborative functions* (e.g., instant messaging). These functions, in turn, contribute to particular *collaborative effects* (e.g., facilitating the gradual achievement of consensus).

NOTE: Italicized terms in the paragraph above and in the sections below are defined in section 3 of this Standard (under "definitions").

Text-based communication in particular

The current document presents a data model for text-based *expressions*.

A *collaborative workplace* is defined as an instantiated independent entity, consisting of the *collaborative activities* of a *collaborative group* which works together by means of a *collaborative environment* (ISO/IEC JTC1 19778, Parts 1-3).

As the definitions above indicate, *collaborative workplaces* are associated with two major kinds of components:

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

This Standard provides a data model to accommodate the data constituted by and associated with text-based messages or *expressions*, which are exchanged between *collaborative group* members within a *collaborative environment*.

Expressions are composed by and exchanged between *collaborative group* members within a *collaborative workplace*. *Collaborative environment* components (*collaborative services*, *tools* and *functions*) facilitate these *collaborative activities*, resulting in various *collaborative effects*. Typical effects may include, e.g., "reaching a compromise on a controversial issue", "exploring arguments for and against a particular decision item", or "getting to know students in a class".

Expression data model instances are associated by reference to collaborative group data model and collaborative environment data model instances.

This can be illustrated through the example of a mailing list considered as a collaborative workplace. Such a collaborative workplace is instantiated as an independent entity by associating a particular list of email addresses (each address being associated with a participant) with a particular email service (or with specific aspects of such a service). Collaborative group members (being identified in the system by their email addresses) interact with each other and with the email service by composing, sending, receiving, reading and responding to email messages or expressions. The email service accepts emails from collaborative group members only, and forwards or reflects them to all other collaborative group members as specified in the email address list of the collaborative group.

Naturally, such a collaborative context, as an abstract entity, does not encompass the holders of the email addresses nor the email server, the email clients or the computers of the participants.

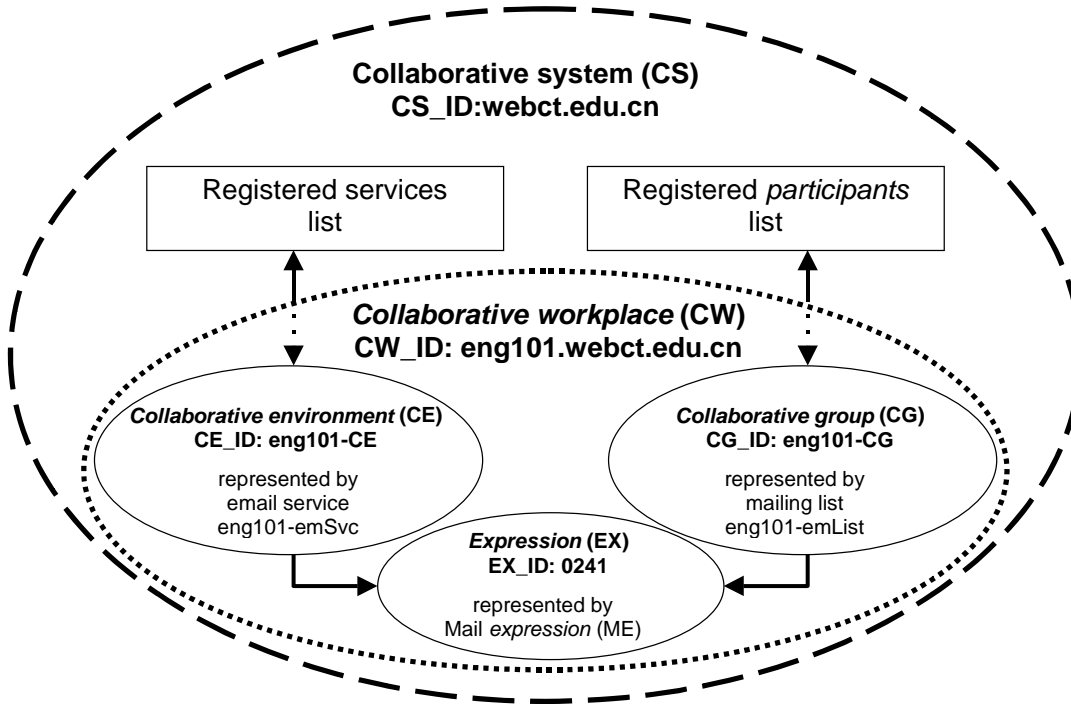


Figure 1: Email list example of an expression located in a collaborative workplace

Expressions are composed, sent and received by members of the collaborative group. These collaborative activities are made possible through the email service provided through the collaborative environment.

Introductory element — Collaborative Technology — Part 1: Collaborative Learning Communication

1 Scope

This Part 1 - **Text-based communication** - of the multipart standard ISO/IEC 19780 specifies the data model for text-based *expressions*.

The purpose of this Standard is to provide a standardized way of isolating and describing textual expressions composed and communicated by collaborative group members.

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 JTC1 19778 ITLET - Collaborative Technology - Collaborative Workplace

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/IEC 24703:2004 Information technology -- Participant Identifiers.

ISO 8601:2000 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 Definitions

NOTE: Where noted, the definitions provided below are taken from ISO/IEC JTC1 19778 ITLET - Collaborative Technology - Collaborative Workplace

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

3.1 Collaborative activity

The pursuit of intended results through the efforts of several or all members of a *collaborative group* in a *collaborative workplace* (ISO/IEC JTC1 19778, Parts 1-3).

3.2 Collaborative effect

A particular intended result, supportive or constitutive of learning that can be achieved by the employment of a *collaborative service* or a *collaborative tool* (ISO/IEC JTC1 19778, Part 2).

3.3 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* (ISO/IEC JTC1 19778, Parts 1, 3).

3.4 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 (ISO/IEC JTC1 19778, Parts 1-3).

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*.

3.5 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* (ISO/IEC JTC1 19778, Parts 1-3).

NOTE: Accommodating on-the-fly changes in membership or in participation status (e.g. on-line vs. off-line) of *participants* or *role holders* is considered outside of the scope of this Standard. For example, whisper (a subset of a larger group being temporarily created for the purposes of confidential communication) is a function not directly accommodated by this Standard.

3.6 Collaborative service

One or several *collaborative tools* provided in a *collaborative environment*, and administered as a single, compound set (ISO/IEC JTC1 19778, Part 2).

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

3.7 Collaborative tool

Hardware and related software and data providing a single or a combination of *collaborative functions* for several or all members of a *collaborative workplace* (ISO/IEC JTC1 19778, Parts 1-3).

3.8 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* (ISO/IEC JTC1 19778, Parts 1-3).

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*.

3.9 Expression

That which is generated or composed, and communicated or exchanged between *participants* in a *collaborative environment*, including both composed contents (*expression body*) and metadata that is typically both composed and generated (*expression data model instance*) (ISO/IEC JTC1 19778, Part 2).

3.10 Expression body

Composed contents of the *expression* communicated between *participants* in a *collaborative environment*, related through reference to the *expression data model instance*.

3.11 Expression data model instance

An instantiation of the data model (metadata) describing the *expression* as a whole. It references the *expression body* (and any attachments), and also provides *expression metadata* (e.g. date, time, title, etc.).

3.12 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.

3.13 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*.

3.14 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).

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.

3.15 Text

The wording of anything that can be expressed in written form, using a specified character set. The use of markup languages derived from this specified character set is admissible.

4 Conformance

NOTE: The character set specified for use with this Standard is ISO/IEC 10646:2003 Information technology—Universal Multiple-Octet Coded Character Set (UCS).

These conformance specifications are concerned solely with 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 *text-based communication* data instance shall be an instance of the data model as defined in section 5.

5 Data model

5.1 Overview

The *expression* entity and data model is related through reference (using ID_refs) to the other entities constituting the *collaborative workplace* as indicated in Figure 2. Each *expression* is related in this way both to the tool with which it is sent, read and received (the *collaborative tool* and its *collaborative function*), and also to the group member who generated it (as both *participant* and *role holder*).

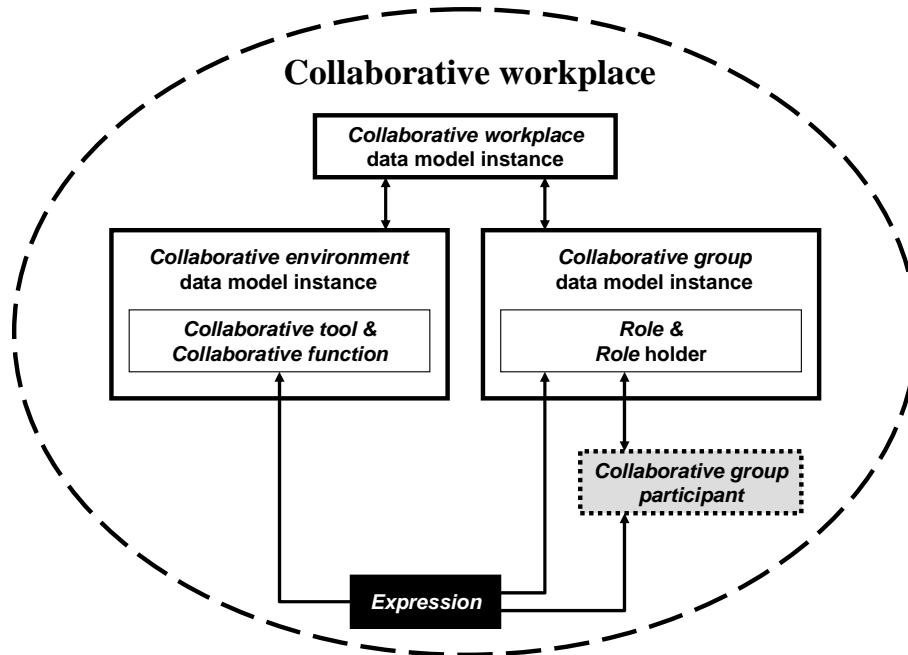


Figure 2: Collaborative environment, collaborative group, and expression entities located and interrelated within a collaborative workplace

The general approach for formulating identifiers in this Standard is the same as that put forward in ISO/IEC JTC1 19778, Parts 1-3. In order to support more than a single identifier format, both standards utilizes a "source" - "value" approach for identifier data elements, in which the value of sub-element "source" specifies a URI (Uniform Resource Identifier, e.g. the URL where the specification for the identifier format is found), and the sub-element "value" carries the identifier value itself, which is compliant to the earlier format description. It is the responsibility of the users of this Standard to assure that their identifiers are unique at least within a particular domain or application context.

5.2 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 - PID - Participant Identifier (ISO/IEC 24703:2004 Information technology—Participant Identifiers)
- 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.

5.3 Expression data model

5.3.1 Tabular description

Table 2: Expression Data Model

No	Name	Explanation	Pres Type	Multi	Data-type	Example
EX1	EX_ID	The identifier of this <i>expression data model instance</i> . Identifies this <i>expression instance</i> uniquely in the context of the larger <i>collaborative workplace</i> .	M	1	Identifier_type	0241

EX2	EX_Title	Name or subject given to this <i>expression</i> . NOTE: The title of this <i>expression</i> can be inherited from a previous <i>expression</i> to which it is related.	O	1	Char SPM 100 char	Re: Welcome to the course
EX3	EX_BRef	Reference to the <i>body</i> of this <i>expression</i> .	M	1	Agg	
EX3.1	EX_BRef_source	The name or URI of the identification scheme used to generate the value for the <i>expression body</i> reference. A namespace scheme.	O	1	Identifier_type	http://refreg.org/id=192837
EX3.2	EX_BRef_value	Value of the <i>expression body</i> reference. NOTE: In exceptional cases, the <i>expression body</i> may not contain any text; however, a reference to this "null" or "empty" body is still required. The manner in which this empty body is constituted is considered out of scope for this standard.	M	1	Identifier_type	8693073_ss22
EX4	EX_ARef	Reference(s) to file(s) which are made accessible with this <i>expression</i> .	O	[0..*] SPM 20	Agg	
EX4.1	EX_ARef_source	The name or URI of the identification scheme used to generate the value for the attachment reference. A namespace scheme.	O	1	Identifier_type	http://refreg.org/id=192837
EX4.2	EX_ARef_value	Value of the attachment reference.	CM	1	Identifier_type	xyz_768594
EX5	EX_Time_Date	The point in time when this <i>expression</i> was sent	M	1	T/D	2005-03-11T23:05:33.043
EX6	CG_Role_name	Name of the <i>role</i> played by the member of the <i>collaborative group</i> while generating and exchanging this <i>expression</i> .			Char SPM 100	Moderator
EX7	CG_Role_holder_IDRef	Identifier of the holder of the role (a <i>collaborative group</i> member) who generated and exchanged this <i>expression</i> .	M	1	PID	norm_friesen@sfu.ca
EX8	CW_IDRef	A reference to or identifier for the <i>collaborative workplace</i> that serves as the context for this <i>expression</i> .	M	1	Identifier_type	http://www.sfu.ca#WP2006-10-28_16-30-44.12
EX9	EX_Function	Indicates the <i>collaborative tool</i> and that tool's <i>collaborative function</i> as they are utilized in the generation and communication of this <i>expression</i> .	O	1	Agg	

EX9.1	CE_Tool_name	Name of the <i>collaborative tool</i> used for generating and communicating this <i>expression</i> .	CM	1	Char SPM 100	Windows Messenger
EX9.2	CE_Function_name	Name of the <i>collaborative function</i> used for generating and communicating this <i>expression</i> .	CM	1	Char SPM 100	Instant messaging
EX10	EX_Reply-to_IDRef	The identifier of an <i>expression</i> (i.e. the value of element EX1 of a different <i>expression data model instance</i>) to which this <i>expression</i> is a reply. NOTE: The <i>expression</i> replied to must be generated and communicated inside this <i>collaborative workplace</i> . NOTE: When this <i>expression</i> is the first in a thread, the value of this element will be a "null value", a particular value as used, for example, at http://www.ukoln.ac.uk/metadata/tf-chic/soif/ .	M	[0..1]	Identifier_type	vo78
EX11	EX_Relation	Specification of a relation to another <i>expression</i> (other than Reply-to) generated and communicated inside this <i>collaborative workplace</i> .	O	[0..*] SPM 10	Agg	
EX11.1	EX_Relation_IDRef	The identifier (i.e. the value of the associated data element EX1) of that <i>expression</i> (generated and communicated inside this <i>collaborative workplace</i>) to which this <i>expression</i> relates.	CM	1	Identifier_type	vo99
EX11.2	EX_Relation_type-source	Source of the vocabulary used to indicate the type of relation.	CM	1	Identifier_type	http://vocabreg.org/id=1649237
EX11.3	EX_Relation_type	Specification of the type of relationship.	CM	1	Char SPM 100	Counterargument

5.3.2 Textual description

5.3.2.1 Data element EX_ID

The *expression* identifier serves as a label for an *expression*, allowing (among other things) for the inter-linking of related *expressions* within a particular collaborative workplace.

NOTE: As every *expression* is an entity internal to a particular *collaborative workplace*, *expression* identifiers do not use a "source-value" approach (like the *collaborative workplace* identifiers do). However, *expression* identifiers should be unambiguous within the context of the *collaborative workplace* within which they are generated and communicated. Precisely how this is done is outside the scope of this Standard.

5.3.2.2 Data element EX_Title

Name given to the *expression*.

NOTE: This name is typically intended for human use. In many cases, the title of an *expression* may be inherited from a previous *expression* to which it is related.

5.3.2.3 Data element EX_BRef

A reference to the *expression body*.

In order to support more than a single identifier reference format, a "source-value" approach has been applied in this data element structure. Accordingly, the value of the sub-element "source" specifies a URI (Uniform Resource Identifier, e.g. a URL) in which the specification of the identifier reference format is provided. This same sub-element can also be used to identify a base address for a folder system that provides associated.

5.3.2.4 Data element EX_BRef_source

This data element specifies a URI providing information indicating the type of identifier used to reference the expression body. The URI provided serves multiple purposes:

- The URI identifies a particular source from which reference values, unambiguous within the application context, can be derived;
- The URI can also provide access to information regarding the format of the admissible body identifier reference values for expression bodies. These regulations generally specify how such identifier references are constructed (within the limits of their datatype). Typically, such a specification may restrict the permitted character set, may specify particular characters with special meaning (e.g. separators between distinct fields of the character string), and may restrict the SPM value for the number of characters of the character string.

NOTE: The precise format of such "source" specifications is outside of the scope of this Standard. In particular, this Standard is neutral on the question as to whether such specifications are intended for automated use or (also) for human reading and interpretation.

NOTE: This data element is optional (not mandatory) in order to allow simple applications of this data model, in which the uniqueness of identifier references within the collaborative workplace is ensured through other means.

5.3.2.5 Data element EX_BRef_value

This data element represents the reference to the body of the *expression*. This identifier shall be unique at least within the technical context in which this data model instance is utilized.

5.3.2.6 Data element EX_ARef

A reference to the attachment associated with the *expression*.

In order to support more than a single identifier reference format, a "source-value" approach has been applied in this data element structure. Accordingly, the value of the sub-element "source" specifies a URI (Uniform Resource Identifier, e.g. a URL) in which the format of the identifier reference is specified. This same sub-element can also identify a base address for a folder system that provides associated attachments. The sub-element "value" is the URI or identifier reference itself, corresponding to the format specified through "source."

5.3.2.7 Data element EX_ARef_source

This data element specifies a URI providing information indicating the type of identifier used to reference the *expression body*. The URI provided serves multiple purposes:

- The URI identifies a particular source from which reference values, unambiguous within the application context, can be derived;
- The URI can also provide access to the information regarding the format of the admissible identifier reference values. These regulations generally specify how such identifier references are constructed (within the limits of their datatype). Typically, such specifications may restrict the permitted character set, may specify particular characters with special meaning (e.g. separators between distinct fields of the character string), and may (for data model instances only) restrict the SPM value for the number of characters of the character string..

NOTE: The precise format of such "source" specifications is outside of the scope of this Standard. In particular, this Standard is neutral on the issue as to whether such specifications are intended for automated use or (also) for human reading and interpretation.

NOTE: This data element is optional (not mandatory) in order to allow simple applications of this data model, in which the uniqueness of identifier references within the collaborative workplace is ensured through other means.

5.3.2.8 Data element EX_ARef_value

This data element represents the reference to the attachment

5.3.2.9 Data element EX_Time_Date

The point in time when the *expression* was sent.

5.3.2.10 Data element CG_Role_name

Name given to the *role* played by the *role* holder while generating and exchanging the *expression*.

NOTE: This name acts as the identifier for the *collaborative role* within the *collaborative workplace* (see ISO/IEC 19788 Parts 1-3).

5.3.2.11 Data element CG_Role_holder_IDRef

An identifier of the *participant* who is associated with the *role* holder who generated and exchanged the *expression*.

NOTE: Any *participant* may have more than a single *participant* identifier. If a *participant* has several identifiers, it is advisable to utilize only one within a particular *collaborative workplace*.

5.3.2.12 Data element CW_IDRef

This data element references the associated *collaborative workplace* data model instance.

NOTE: As every *expression* is internal to (is associated with) a particular *collaborative workplace*, this identifier reference corresponds to the identifier value of the associated *collaborative workplace*. A separate "source" of this identifier value need not be specified; it is assumed that the expression will be identified through the same identification scheme as is used to assign the *collaborative workplace* identifier.

5.3.2.13 Data element EX_Function

This sub-structure identifies the *collaborative tool* and *collaborative function* used in generating and exchanging the *expression*.

5.3.2.14 Data element CE_Tool_name

Name given to the *collaborative tool* corresponding to the *collaborative function* used to generate and exchange the *expression*.

NOTE: This name acts as an identifier for the *collaborative tool*. Both the *collaborative tool* and *collaborative function* are identified or specified within the *collaborative workplace* using only their names (see ISO/IEC 19788 Parts 1-3).

5.3.2.15 Data element CE_Function_name

Name given to the *collaborative function* used to generate and exchange the *expression*.

NOTE: This name acts as an identifier for the *collaborative function* of a particular *collaborative tool*. Both of these entities (*collaborative function* and *tool*) are identified or specified within the *collaborative workplace* using only their names (see ISO/IEC 19788 Parts 1-3).

5.3.2.16 Data element EX_Reply-to_IDRef

This identifier reference is used to identify another *expression* to which the current *expression* relates as a reply, response or answer.

This single-purpose *expression* identifier serves the purpose of identifying other *expressions* that are generally related to the current *expression*. This relation may be more clearly structural or temporal than explicitly semantic in nature.

5.3.2.17 Data element EX_Relation_IDRef

This multiple-purpose *expression* identifier reference enables the specification of relationships and relationship types (other than reply) between *expressions*.

5.3.2.18 Data element EX_Relation_type-source

This data element specifies the URI of a vocabulary used to express one or more types of relations between *expressions*.

5.3.2.19 Data element EX_Relation_type

This data element provides the value used to designate the type of relationship between the current *expression* and a second, previous *expression*.

6 Auxiliary data types

6.1 Identifier_type

Values of datatype *identifier_type* are based on datatype *characterstring* (ISO/IEC 10646:2003) with an SPM of 250 characters.

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

Annex A (informative) Use Cases

A.1 Purpose of providing use cases

These use cases are provided to illustrate how the data model described in this Standard might work in real-world situations.

A.2 Use case: Administrator “backs up” data at the end of a course

Actors:

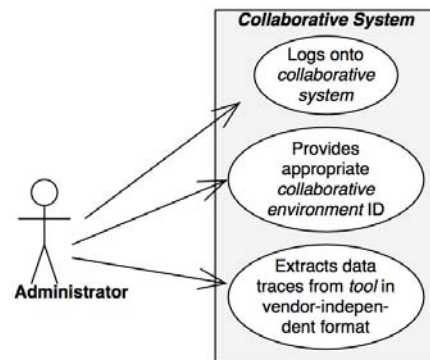
Administrator: is responsible for preservation of data created through *collaborative activities*. Administrator is required to deliver raw content to instructor and to enterprise systems in the institutions in a readily-accessible format.

Preconditions:

Administrator has access to the collaborative system, its *collaborative workplaces* and the services and tools subsumed under them.

Basic Flow:

- 1) Administrator accesses collaborative system
- 2) Administrator provides appropriate *collaborative environment ID*
- 3) Administrator chooses full backup option



Post-conditions:

Administrator is able to reestablish the *collaborative workplace* information (e.g. for the purpose of later evaluation or review) or to restore the most recent backup (e.g. for recovering from a system crash). Administrator is able to accomplish these things even if a transition is being made to a new collaborative system .

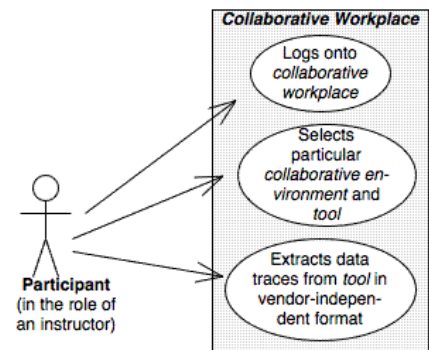
A.3 Use case: Instructor evaluates collaborative data

Actors:

Instructor: Evaluates all *collaborative activity* occurring in *collaborative environment*. This evaluation takes place multiple times during a course or semester.

Preconditions:

Instructor is able to access *collaborative workplace* and tool data **Basic Flow:**



- 1) Instructor accesses *collaborative workplace*
- 2) Instructor extracts data in vendor-independent format

Post-conditions:

Instructor is able to import and analyze data using latent semantic analysis or network analysis tools.

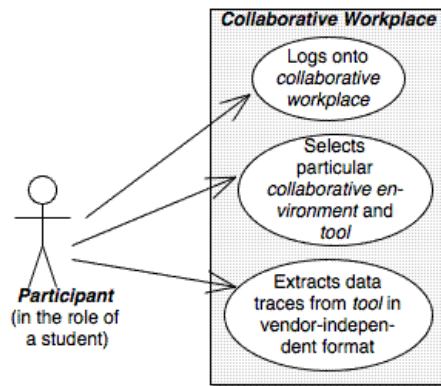
A.4 Use case: Student ports data to multiple systems

Actors:

Student: is required to monitor and participate in activity occurring in multiple *collaborative services*

Preconditions:

- Student is able to access *collaborative workplace*
- Student is able to access (and create) *expressions* and associated data
- Student has access to tools for aggregating/analyzing *collaborative activity*



Basic Flow:

- 1) Student accesses *collaborative workplace*
- 2) Student accesses data from workplace tool(s)
- 3) Student is able to extract data in vendor-independent format

Post-conditions:

Student is able to import and analyze *collaborative activities* using various tools to learn more about the location and nature of activity, and thereby improve his/her own participation.