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Language resource management — Semantic annotation framework (SemAF) —

Part 2: Dialogue acts

Gestion des ressources langagières — Cadre d'annotation sémantique (SemAF) —
Partie 2: Actes de dialogue

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 37, *Language and terminology*, Subcommittee SC 4, *Language resource management*.

This second edition cancels and replaces the first edition (ISO 24617-2:2012), which has been technically revised.

The main changes compared to the previous edition are as follows:

— in 6.2, 'reference segments' are introduced to allow more accurate annotations of feedback dependence relations;

— in 6.3, a more detailed way of annotating rhetorical relations between dialogue acts is made possible by importing concepts from ISO 24617-8:2016 (DR-core);

— in 7.2, the Contact Management dimension, known from the DIT++ annotation scheme, and the Task Management dimension, known from the DAMSL annotation scheme, have been added, along with a few communicative functions specific for contact management;

— in 7.5 and Annex D, a possibility is introduced for importing elements from the W3C recommendation EmotionML in order to add affective information to dialogue acts;

— in Clause 9 and Annex D, the mechanism of 'triple-layered annotation scheme plug-in' with 'plug-in interface' is introduced; this mechanism allows the dialogue act annotation to be customized, using application-specific concepts, and to be enriched with semantic content information.

A list of all parts in the ISO 24617 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Since its publication in 2012, ISO 24617-2 has been used in a number of annotation efforts as well as in the development of language-based interactive systems. These experiences have brought to light

— that the standard allowed dialogue act annotations that are slightly inaccurate in some respects,

— that some applications would benefit from the availability of mechanisms for customizing the set of concepts defined in the standard, and

— that certain use cases require the representation of functional dialogue act information to be extended with semantic content information.

This second edition seeks to remedy the noted inaccuracies, and to provide mechanisms

a) for customizing the set of defined concepts, and

b) for extending the information types in dialogue act annotations.

The improved accuracy of this second edition concerns the annotation of semantic dependence relations of dialogue acts and their scopes, and of rhetorical relations between dialogue acts. The mechanisms for extending and customizing the standard for a specific application concern most notably the annotation of information about the (domain-specific) semantic content of dialogue acts, the introduction of application-specific dialogue act types, the addition of communicative functions for fine-grained specification of feedback, and the annotation of speaker emotions.

This second edition is downward compatible with the original ISO 24617-2:2012 in the sense that every annotation made with the original version is a valid annotation according to the second edition. Existing annotations do not need to be revised in order to be compliant with this second edition.

Language resource management — Semantic annotation framework (SemAF) —

Part 2: Dialogue acts

1 Scope

This document provides a set of empirically and theoretically well-motivated concepts for dialogue annotation, a formal language for expressing dialogue annotations (the Dialogue Act Markup Language, DiAML), and a method for segmenting a dialogue into semantic units. This allows the manual or automatic annotation of dialogue segments with information about the communicative actions which the participants perform by their contributions to the dialogue. The annotation scheme specified in this document supports multidimensional annotation of spoken, written, and multimodal dialogues involving two or more participants. Dialogue units are viewed as having multiple communicative functions in different dimensions. The markup language DiAML has an XML-based representation format and a formal semantics which makes it possible to perform inferences with DiAML representations. This document also specifies data categories for dimensions of dialogue analysis, for communicative functions, for dialogue act qualifiers, and for relations between dialogue acts. Additionally, it provides mechanisms for customizing these sets of concepts, extending them with application-specific or domain-specific concepts and descriptions of semantic content, or selecting relevant coherent subsets of them. These mechanisms make the dialogue act concepts specified in this document useful not only for annotation but also for the recognition and generation of dialogue acts in interactive systems.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
addressee
dialogue (3.5) *participant* (3.13) oriented to by the *sender* (3.20) in a manner to suggest that his/her *utterances* (3.25) are particularly intended for this participant, and that some response is therefore anticipated from this participant, more so than from the other participants

Note 1 to entry: This definition is a *de facto* standard in the linguistics literature.

[SOURCE: Reference [34], modified - ‘speaker' replaced by ‘sender', and use of ambiguous pronouns avoided.]

3.2
allo-feedback act
feedback act (3.8) where the *sender* (3.20) elicits information about the *addressee's* (3.1) processing of an *utterance* (3.25) that the sender contributed to the *dialogue* (3.5), or where the sender provides information about his perceived processing by the addressee of an utterance that the sender contributed to the dialogue

EXAMPLE 1. A: Now move up.

2. B: Slightly northeast you mean?

3. A: Slightly yeah

With utterance 3, A performs an allo-feedback act signalling that he/she thinks B understood utterance 1 correctly.

3.3
auto-feedback act
feedback act (3.8) where the *sender* (3.20) provides information about his/her own processing of an *utterance* (3.25) contributed to the *dialogue* (3.5) by another *participant* (3.13)

EXAMPLE B's utterance in the example dialogue fragment in 3.2 signals that he/she is uncertain whether he/she understood the previous utterance correctly.

3.4
communicative function
property of certain stretches of communicative behaviour, describing how the behaviour changes the *information state* (3.12) of an understander of the behaviour

3.5
dialogue
exchange of *utterances* (3.25) between two or more persons or artificial agents

3.6
dialogue act
communicative activity of a *dialogue* (3.5) *participant* (3.13), interpreted as having a certain *communicative function* (3.4) and *semantic content* (3.18)

Note 1 to entry: A dialogue act can additionally also have certain *functional dependence relations* (3.10), *rhetorical relations* (3.17) and *feedback dependence relations* (3.9) with other units in a dialogue.

3.7
dimension
class of *dialogue acts* (3.6) that are concerned with a particular aspect of communication, corresponding to a particular category of *semantic content* (3.18)

EXAMPLE (1) Dialogue acts advancing the task or activity that motivates the dialogue (the 'Task' dimension); (2) dialogue acts providing and eliciting feedback (the Auto- and Allo-Feedback dimensions); (3) dialogue acts for allocating the speaker role (the Turn Management dimension).

3.8
feedback act
dialogue act (3.6) that provides or elicits information about the *sender's* (3.20) or the *addressee's* (3.1) processing of something that was uttered in the *dialogue* (3.5)

Note 1 to entry: Two classes of feedback are distinguished: *allo-feedback acts* (3.2) and *auto-feedback acts* (3.3).

3.9
feedback dependence relation
relation between a *feedback act* (3.8) and the stretch of communicative behaviour the processing of which the act provides or elicits information about

EXAMPLE In the example in 3.2, both the allo-feedback act expressed by utterance 3 and the auto-feedback act expressed by utterance 2 have a feedback dependence relation to utterance 1.

Note 1 to entry: Feedback dependence relations are also used to relate self-corrections, partner corrections, and other speech editing acts, which strictly speaking are not feedback acts, to the segments that they apply to.

3.10
functional dependence relation
relation between a *dialogue act* (3.6) with a *responsive communicative function* (3.16) and one or more previous dialogue acts that it responds to

EXAMPLE The relation between an answer and the corresponding question, such as between utterance 3 and utterance 2 in the example in 3.2; or the relation between the acceptance of an offer and the corresponding offer.

3.11
functional segment
minimal stretch of communicative behaviour that has one or more *communicative functions* (3.4)

Note 1 to entry: The condition of being 'minimal' ensures that functional segments do not include material that does not contribute to the expression of a communicative function that identifies the segment.

EXAMPLE The functional segment corresponding to the answer given by S in the following dialogue fragment does not include the parts *"Just a moment please"* and *".... let me see..."* but only the parts "*the first train to the airport on Sunday morning is"* and *"at 5:45"*.

1. U: What time is the first train to the airport on Sunday morning please?

2. S: Just a moment please... the first train to the airport on Sunday morning is ... let me see... at 5:45.

Note 2 to entry: A consequence of this definition is that functional segments can be discontinuous, can overlap or be embedded, and can contain parts from more than one turn.

3.12
information state
context
totality of a *dialogue* (3.5) *participant's* (3.13) beliefs, assumptions, expectations, goals, preferences, hopes, and other attitudes that may influence the participant's interpretation and generation of communicative behaviour

3.13
participant
person or artificial agent involved in the exchange of *utterances* (3.25)

3.14
qualifier
predicate that can be associated with a *communicative function* (3.4)

EXAMPLE A: Would you like to have some coffee?

B: Only if you have it ready.

B's utterance accepts A's offer under a certain condition; this can be described by qualifying the communicative function Accept Offer with the predicate 'conditional'.

3.15
reference segment
stretch of communicative behaviour that a *feedback dependence relation* (3.9) refers to and that is not a *functional segment* (3.11)

3.16
responsive communicative function
communicative function (3.4) of a *dialogue act* (3.6) that depends for its *semantic content* (3.18) on one or more dialogue acts that it responds to

Note 1 to entry: See 5.2.

Note 2 to entry: In 7.3.4, the set of responsive communicative functions is listed of the annotation scheme defined in this document.

3.17
rhetorical relation
discourse relation
semantic or pragmatic relation between two *dialogue acts* (3.6) or their *semantic contents* (3.18)

Note 1 to entry: Relations such as *elaboration, explanation, justification, cause,* and *concession* have been studied extensively in the analysis of (monologue) text, where they are often called 'rhetorical relations' or 'discourse relations', and are mostly viewed either as relations between text segments or as relations between events or propositions, described in text segments. Many of these relations also occur in *dialogue* (3.5).

EXAMPLE 1 In the following example, the statement in the second utterance provides a *motivation* for the question in the first utterance:

A: Can you tell me what flights there are to Sydney on Saturday? I'd like to attend my mother's 80th birthday.

EXAMPLE 2 A rhetorical relation between the semantic contents of two dialogue act occurs in the following, where the content of B's statement mentions a *cause* for the content of A's statement:

A: I can never find these stupid remote controls.

B: That's because they don't have a fixed location.

3.18
semantic content
information, situation, action, event, or objects that a stretch of communicative behaviour refers to

3.19
semantic content category
semantic content type
type of the *semantic content* (3.18) of a *dialogue act* (3.6)

EXAMPLE The various *dimensions* (3.7) defined in this document correspond to categories of semantic content. In particular, the Task dimension corresponds to the category of task-specific actions and information; the Allo- and Auto-Feedback dimensions correspond to the categories of information about the processing by the current speaker or by the addressee, respectively, of something that was said before; the Turn Management dimension corresponds to the category of information about the allocation of the speaker role, and so forth.

3.20
sender
dialogue (3.5) *participant* (3.13) who performs a *dialogue act* (3.6)

3.21
speaker
sender (3.20) of a *dialogue act* (3.6) in spoken form, possibly combining speech with nonverbal communicative behaviour

Note 1 to entry: A *dialogue* (3.5) *participant* (3.13) can contribute to a dialogue without having the *speaker role* (3.22), for example by nodding in agreement to what the other participant says. Therefore, the term 'speaker' is not synonymous with 'participant who occupies speaker role'.

3.22
speaker role
role occupied by a *participant* (3.13) who has temporary control of a *dialogue* (3.5) and speaks for some period of time

[SOURCE: DAMSL annotation scheme (see Reference [3]).]

3.23
speech act
act that a *speaker* (3.21) performs when producing an *utterance* (3.25)

Note 1 to entry: The notion 'utterance' in this definition is commonly interpreted as mentioned in Note 1 to entry of 3.25.

[SOURCE: SIL Glossary of linguistic terms (https://glossary.sil.org/term/speech-act), modified - Added Note 1 to entry.]

3.24
turn unit
stretch of communicative activity produced by one *participant* (3.13) who occupies the *speaker role* (3.22), bounded by periods of inactivity of that *sender* (3.20) or by periods where another participant occupies the speaker role

Note 1 to entry: The term 'turn unit' corresponds to one of the meanings of the often used term 'turn', which is ambiguous between 'turn unit' and 'right to speak", as in "to have the turn" and "turn-taking". The term 'turn' is only used in this document when the context makes it clear in what sense the term is meant.

Note 2 to entry: The term 'turn unit' is also closely related to the term 'turn construction unit' (TCU), introduced by Reference [51]. The TCU seems a rather intuitive and holistic notion, of which the usefulness has been the subject of debate (see e.g. Reference [52]). The term is therefore avoided in this document.

Note 3 to entry: The term 'turn unit' is useful in the description of *dialogue* (3.5) behaviour, but is not of central importance in this document, since *dialogue acts* (3.6) are not assumed to correspond to turn units.

3.25
utterance
anything said, written, keyed, signed, or otherwise expressed, possibly in multimodal form

Note 1 to entry: An utterance is part of a *turn unit* (3.24). In the literature, the term is commonly used in the sense of '*everything* contributed by a *sender* (3.20) within a turn unit'.

Note 2 to entry: The term 'utterance' is useful in the description of *dialogue* (3.5) behaviour, but is not of central importance in this standard, since *dialogue acts* (3.6) are not assumed to correspond to utterances, but rather to the communicative behaviour in *functional segments* (3.11).

4 Use cases

The notion of a dialogue act plays a key role in the analysis of spoken and multimodal dialogue, as well as in the design of spoken dialogue systems and embodied conversational agents. These applications all depend on the availability of dialogue corpora, annotated with dialogue act information. The main purpose of this document is to define a reference set of domain-independent basic concepts for dialogue act annotation, and their use for representing such annotations, in the Dialogue Act Markup Language (DiAML). The set of concepts defined in ISO 24617-2:2012 was based on the DIT++ taxonomy, which was originally developed to serve a double purpose: the articulate functional description of communicative activity in natural human dialogue, and a basis for the design of modules in dialogue systems. As part of the ISO 24617 series, a focus came to lie on annotation. Still, like DIT++, this document has multiple use cases, which can be grouped into four types:

— UC1: manual annotation of spoken, written, or multimodal human-human or human-computer dialogue;

— UC2: automatic annotation of spoken, written, or multimodal human-human or human-computer dialogue starting from transcriptions or recordings of communicative behaviour;

— UC3: recognition of dialogue acts in (multimodal) communicative user behaviour;

— UC4: generation of dialogue acts by the dialogue manager component of a dialogue system.

The different use cases bring different requirements and desiderata, as follows.

— UC1: manual annotation is costly and only feasible for limited amounts of data, but has the advantage of producing annotations of the highest quality since expert annotators have a wealth of context information, general world knowledge, and common-sense reasoning abilities to infer speaker beliefs and intentions. Expert annotators are therefore able to make fine-grained annotations. In order to support this use case, the annotation scheme should include fine-grained concepts.

— UC2: automatic annotation systems typically cannot characterize dialogue behaviour with the same level of detail as expert human annotators, since they lack common world knowledge, and usually have access to context information only as far as represented in the dialogue history. Automatic annotation is therefore in general less fine-grained. To effectively support this use case, the annotation scheme should contain more coarse-grained concepts than those needed for use case UC1.

— UC3: recognition of dialogue acts by an interactive system is almost the same as automatic dialogue act annotation, except that in an interactive system the semantic contents of dialogue acts play a prominent role. For a given application, it may be beneficial to define application-specific functions for specific types of content. For effectively supporting this use case, it may be useful to extend the annotation scheme with application-specific concepts.

— UC4: generation of dialogue acts in an interactive system concerns the decision how to continue a dialogue, and this is the main task of a dialogue manager component. This task is typically organized as a two-stage process: (1) decide on the communicative functions and semantic contents of one or more possible dialogue acts; (2) decide on a realization in an appropriate form. In contrast with human dialogue participants, who may be somewhat vague or unspecific about their beliefs and intentions, a system's dialogue manager typically works with precise beliefs and goals, and generates, in stage (1), dialogue acts with fine-grained communicative functions, for example for feedback acts, since the system may report a processing problem with great accuracy. This calls for the annotation scheme to include very fine-grained functions.

The new elements in this second edition of this document were introduced for providing more effective support for each of these use cases, in particular for the cases UC3 and UC4.

5 Basic concepts and metamodel

5.1 Dialogue acts

The term 'dialogue act' is often used rather loosely in the sense of speech act used in dialogue. Indeed, the idea of interpreting communicative behaviour in terms of actions, such as questions, promises, and requests goes back to speech act theory [9],[50]. But where speech act theory is primarily an action-based approach to meaning within the philosophy of language, dialogue act theory is an empirically-based approach to the computational modelling of linguistic and nonverbal communicative behaviour in dialogue.

Dialogue acts offer a way of characterizing the meaning of communicative behaviour in terms of update operations, to be applied to the information states of participants in the dialogue; this approach is commonly known as the 'information-state update' or 'context-change' approach; see e.g. References [12] and [56]. For instance, when an addressee understands the utterance "*Do you know what time it is?*" as a question about the time, then the addressee's information state is updated to contain (among other things) the information that the speaker does not know what time it is and would like to know that. If, by contrast, it is understood that the speaker is reproaching the addressee for being late, then the addressee's information state is updated to include (among other things) the information that the

speaker *does* know what time it is. Distinctions such as that between a question and a reproach concern the *communicative function* of a dialogue act, which is one of its two main components. The other main component is its *semantic content*, which describes the objects, properties, relations, situations, actions or events that the dialogue act is about. The communicative function of a dialogue act specifies how an addressee updates his information state with the information expressed in the semantic content when he/she understands the dialogue act.

This approach to the definition of communicative functions is strictly semantic, in contrast to approaches based on linguistic form. For example, the behaviour of a speaker who repeats something that was said by someone else may be characterized as a 'repetition' (which is a communicative function in some annotation schemes); however, this only says something about the *form* of the behaviour compared to the repeated behaviour, not about its function. A repetition often has a feedback function, as in (1.2), but it can also have other functions, as in (1.4), where it is used as a confirmation in response to a check question.

(1) 1. S: There are evening flights at seven-fifteen and eight-thirty.

2. C: Seven-fifteen and eight-thirty.

3. C: And that's on Sunday too.

4. S: And that's on Sunday too.

A form-related requirement for introducing a communicative function is however that there are observable features of communicative (linguistic and/or nonverbal) behaviour which are indicative for that function in the context in which the behaviour occurs. This requirement puts all communicative functions on an empirical basis.

Dialogue act annotation is the marking up of stretches of dialogue with information about the dialogue acts they contain. Spoken dialogues are traditionally segmented into *turns*, in the sense of 'turn units' as defined in 3.24. Such turns can be quite long and complex, and are therefore not the most useful units of behaviour to assign communicative functions to. Communicative functions can be assigned more accurately to smaller units that are functionally relevant. Such units are called *functional segments*, and are defined as the minimal stretches of communicative behaviour that have one or more communicative functions. Subclause 6.3 discusses dialogue segmentation.

Inherent to the notion of a dialogue act is that there is an agent who produces the dialogue act, called the 'sender', and one or more agents who are addressed, called the 'addressee(s)'. Dialogue studies often focus on two-person dialogues, in which case the dialogue acts have only one addressee. Besides sender and addressee(s), there may be various types of side-participants who are present but do not or only marginally participate[29].

Dialogue act annotation is often limited to assigning communicative functions to dialogue segments, which corresponds intuitively to indicating the type of communicative action that is performed. A semantically more complete characterization additionally provides information about the category of semantic content. The DAMSL annotation scheme distinguishes three categories of semantic content: Task, Task Management, and Communication, which indicate whether the semantic content of the dialogue act advances the task which underlies the dialogue, or discusses how to perform the task, or concerns the communication process. The DIT++ scheme distinguishes a number of subcategories of communication-related information, such as feedback information, turn allocation information, and speech management information. The scheme in this document inherits the DIT++ categories of semantic content, also called 'dimensions'; see Clause 7.

Example (2) illustrates the use of the key attributes of a dialogue act in the DiAML-XML annotation of a task-related yes-no question addressed by speaker 'a' to addressee 'b', expressed by the functional segment 'm1'.

(2) <dialogueAct xml:id="da1" target="#m1" sender="#a" addressee="#b" dimension="task" communicativeFunction="propositionalQuestion"/>

5.2 Dependence relations

Some types of dialogue acts are inherently dependent for their full meaning on one or more dialogue acts earlier in the dialogue, which they respond to. This is for example the case for answers, whose meaning is partly determined by the question that is being answered, and also for the acceptance or rejection of offers, suggestions, requests, and apologies. This is illustrated in example (3), where the meaning of the answer in turn 3 depends on whether it is an answer to the question in turn 1 or to the one in turn 2.

(3) 1. B: Do you know who's coming tonight?

2. B: Which of the project members do you think will be there?

3. A: I'm expecting Jan, Alex, Claudia, and David, and maybe Olga and Andrei.

As an answer to the question in 1, A's answer says that nobody else is expected to come than the people that are mentioned, but as an answer to the question in 2 it leaves open the possibility that other people will come, who are not members of 'the project'.

This kind of semantic dependence, which is due to the responsive character of some communicative functions, is called a *functional dependence relation*. Marking up this relation between a dialogue act with a responsive communicative function and its 'antecedent' dialogue acts allows the annotation to not just indicate e.g. that an utterance has the function of an answer, but also to indicate *to which question* it is an answer, as illustrated in (4). Subclause 7.3.4 lists the responsive communicative functions defined in this document.

(4) a. B: Which of the project members do you think will be there?

A: I'm expecting Jan, Alex, Claudia, and David, and maybe Olga and Andrei.

b. <dialogueAct xml:id="da1" target="#m1" sender="#b" addressee="#a" dimension="task" communicativeFunction="setQuestion"/>
<dialogueAct xml:id="da2" target="#m2" sender="#a" addressee="#b" dimension="task" communicativeFunction="answer" functionalDependence="#da1"/>

The property of 'responsiveness' is related to what in the literature is called 'backward-looking'. For example, in DAMSL the communicative functions are divided over two categories: forward-looking and backward-looking. Backward-looking functions are defined as those functions that indicate how the current utterance relates to the previous discourse. These include not only answers and other dialogue acts whose semantic content is co-determined by antecedent dialogue acts, but also feedback acts and other acts concerned with speech editing.

Positive and negative feedback-providing acts depend for their interpretation also on what happened earlier in the dialogue, but in a different way. They are concerned with the processing of what was said before - such as its perception or its interpretation. This is illustrated by the examples in (5).

(5) 1. A: The flight on Tuesday would suit me really well.

B: Okay.

2. A: The flight on Tuesday would suit me really well.

B: On Tuesday?

In the first example, B indicates that he/she has correctly understood A's remark; in the second, he/she checks whether he/she heard (or remembers) correctly what A said. This relation between a positive or negative feedback act and its 'antecedent' is called a *feedback dependence relation.*

A feedback dependence relation indicates one or more preceding *dialogue acts* if the feedback concerns high-level processing, such as understanding, and it indicates a *dialogue segment* in the case of low-level processing, such as hearing what was said. In the latter case, ISO 24617-2:2012 stipulated that the feedback dependence relation should refer to the smallest functional segment containing the segment

that the feedback act is about. This way of annotating feedback dependence relations is not quite accurate, since feedback about a stretch of communicative behaviour smaller than a functional segment is not about the entire segment. For example, negative feedback that signals a problem in hearing certain words may imply positive feedback about the rest of the segment. Similarly, for feedback-eliciting acts and for dialogue acts in the Own Communication Management (OCM) dimension or in the Partner Communication Management (PCM) dimension. In particular, Self-Corrections and Partner Corrections frequently refer to a single word or phrase which does not form a functional segment. To make more accurate annotation possible, this second edition introduces a 'reference segment', as a stretch of communicative behaviour that is the object of a feedback dependence relation and that is not a functional segment.

5.3 Rhetorical relations

The possibility of annotating rhetorical relations between dialogue acts in ISO 24617-2:2012 was limited in three respects:

a) no particular set of relations was specified;

b) there was no possibility to indicate the roles of the arguments;

c) it was not possible to distinguish between relations at the level of dialogue acts and relations at the level of their semantic contents.

Since the publication of this standard, ISO 24617-8:2016 (DR-core) was published, which defines an annotation scheme for rhetorical relations. This second edition provides an option for annotating rhetorical relations in dialogue in a more fine-grained manner by importing concepts of the DR-core annotation scheme. See 6.3.

Dialogue acts may also be semantically and pragmatically related through other relations, known as *rhetorical relations* or *discourse relations*, as in the examples shown in (6).

(6) 1. A: It ties you on in terms of the technology and the complexity that you want.

2. A: like for example voice recognition.

3. A: because you might need to power a microphone and other things.

4. A: So that's one constraint there.

In this example[1)], a sequence of four functional segments is contributed by the same participant. The segments in lines 2-4 are all related to the dialogue act expressed in the first segment. Segment 2 is related to the initial statement through an *Exemplification* relation, segment 3 through a *Cause* relation, and segment 4 through a *Restatement* relation.

In view of the lack of a general consensus on the rhetorical relations that should be distinguished and how (see e.g. References [11], [25] and [51]), the first edition of this document did not propose a specific set of relations but just offered a provision for specifying a rhetorical relation. In DiAML-XML this provision plays out in the use of an element called '<rhetoricalLink>' which has attributes referring to two dialogue acts and an attribute for specifying a rhetorical relation. Example (7) illustrates this for indicating a causal relation between two dialogue acts.

1) From the AMI corpus, see Reference [61].