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Author(s) : Martin Bryan and Jay Cousins
Responsible Organisation : CSW
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Author(s) : Martin Bryan and Jay Cousins, CSW.
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1 Executive summary

Version 1.0 of the Terminology Service Model has been prepared as an annex to the MYCAREVENT deliverable *D3.7 Generic and Integrated Information Reference Model Version 3* (GIIRM) [MYCAREVENT D3.7]. The GIIRM describes the core information model which supports the services developed by MYCAREVENT. It defines the core classes of information that are used to describe and express vehicle faults, identify vehicles, describe repair information, and express relationships between faults/symptoms and appropriate repair information.

The MYCAREVENT Terminology Service Model described in this annex is designed to provide a more detailed description of how the set of terms forming a named terminology can be defined, managed and deployed.

Chapter 2, [Introduction](#) describes the context to the model, its relation to other deliverables, and its purpose.

Chapter 3, [Terms, Conventions and Abbreviations](#) explains the significance of the styles and terminology used in the document.

Chapter 4, [Methodology of model development](#) describes how the model was developed, and the context in which it is intended to be applied and developed.

Chapter 5, [Definition of the Terminology Service Model the Elements of the Model and their Description](#) specifies the model itself.

Chapter 6, [Conclusions](#) sets forth conclusions on the model and its application and use within the MYCAREVENT project.

Finally, the deliverable contains the following Appendices: [References](#).

2 Introduction

The MYCAREVENT Terminology Service Model provides a generalized model for terminology and code list maintenance that can be used to extend the basic terminology model provided in the MYCAREVENT GIIRM. In the GIIRM only Term and Terminology are defined, with no supporting model, other than relationships that show that a Term can be applied to one or more Terminologies, and can be related to other Terms. The main purpose of Term within the GIIRM is to indicate that the words and phrases used to identify Faults, Conditions, Symptoms and Vehicle Systems, etc, can be defined using multiple terms from multiple terminologies (e.g. language specific terms developed by a group of companies).

The MYCAREVENT Terminology Service Model is designed to provide a more detailed description of how the set of terms forming a named terminology can be defined, managed and deployed. As well as distinguishing Term Definitions from Term Descriptors within Terms, it also allows Coded Values from a Code List to be used to reference terms. To allow Coded Values and Terms to be generalized a Concept class has been introduced into the model. A Managed Vocabulary class has been introduced to generalize the Code List and Terminology classes.

3 Terms, Conventions, Abbreviations and Acronyms

3.1 Terms and their Definitions

Term	Definition
application	Computer program that makes a call to the <i>terminology service</i> .

Term	Definition
association	A semantic <i>relationship</i> between two <i>classes</i> . REFERENCE ISO/IEC 11179-3:2003.
attribute	A <i>characteristic</i> of an <i>object</i> or <i>entity</i> . REFERENCE ISO/IEC 11179-3:2003.
attribute instance	A specific instance of an <i>attribute</i> . REFERENCE ISO/IEC 11179-3:2003.
attribute value	The value associated with an <i>attribute instance</i> . REFERENCE ISO/IEC 11179-3:2003.
characteristic	Abstraction of a <i>property</i> of an <i>object</i> or of a set of <i>objects</i> . NOTE: Characteristics are used for describing concepts. REFERENCE ISO/IEC 11179-3:2003.
class	A description of a set of objects that share the same attributes, operations, methods, relationships, and semantics. REFERENCE ISO/IEC 11179-3:2003.
coded value	Data used to identify a <i>concept</i> without describing or defining it.
concept	Unit of knowledge created by a unique combination of <i>characteristics</i> . REFERENCE ISO/IEC 11179-3:2003.
conceptual data model	A <i>data model</i> that represents an abstract view of the real world. REFERENCE ISO/IEC 11179-3:2003.
constraints	Restrictions that determine the value an <i>attribute</i> can take or the <i>relationships</i> that can exist between <i>objects</i> or <i>entities</i> .
data	A re-interpretable representation of information in a formalized manner suitable for communication, interpretation or processing. REFERENCE ISO/IEC 11179-3:2003.
datatype	A set of distinct values, characterized by properties of those values and by operations on those values. REFERENCE ISO/IEC 11179-3:2003.
data model	A graphical and/or lexical representation of <i>data</i> , specifying their properties, structure and inter-relationships. REFERENCE ISO/IEC 11179-3:2003.
designation	Representation of a <i>concept</i> by a sign which denotes it. NB Referred to as a <i>term descriptor</i> in the Terminology Service Model REFERENCE ISO/IEC 11179-3:2003.
entity	Any concrete or abstract thing that exists, did exist, or might exist, including associations among these things. REFERENCE ISO/IEC 11179-3:2003.

Term	Definition
generalization	A <i>relationship</i> between a more general <i>class</i> (the parent) and a more specific <i>class</i> (the child) that is fully consistent with the parent <i>class</i> (i.e. it has all of its <i>attributes</i> and <i>relationships</i>) and that adds additional information. NOTE: A generalization is a type of <i>relationship</i> . REFERENCE ISO/IEC 11179-3:2003.
identifier	A sequence of characters, capable of uniquely identifying that with which it is associated, within a specified context. NOTE: A <i>name</i> should not be used as an identifier because it is not linguistically neutral. REFERENCE ISO/IEC 11179-3:2003.
information model	A high level description of the organization of information in a manner that reflects its structure. It takes the form of logical groupings of entities and levels of sub-entities, without showing any relationships between entities other than the hierarchies of sub-entities. REFERENCE ISO/IEC 11179-3:2003.
language	System of signs for communication, usually consisting of a vocabulary and rules. REFERENCE ISO/IEC 11179-3:2003.
metadata	<i>Data</i> that defines and describes other <i>data</i> REFERENCE ISO/IEC 11179-3:2003.
name	The <i>designation</i> of an <i>object</i> by a linguistic expression. REFERENCE ISO/IEC 11179-3:2003.
object	Anything perceivable or conceivable REFERENCE ISO/IEC 11179-3:2003.
ontology	Ontology defines the terms used to describe and represent an area of knowledge. Ontologies are used by people, databases, and <i>applications</i> that need to share domain information (a domain is just a specific subject area or area of knowledge, like medicine, tool manufacturing, real estate, automobile repair, financial management, etc.). Ontologies include computer-usable definitions of basic concepts in the domain and the relationships among them (note that here and throughout this document, definition is not used in the technical sense understood by logicians). They encode knowledge in a domain and also knowledge that spans domains. In this way, they make that knowledge reusable. REFERENCE http://www.w3.org/TR/webont-req/#onto-def query 2005-06-27
portal	A system that manages end-user access to multiple <i>applications</i> and information sources. Portals are used to retrieve and manage data and documents, facilitate collaboration and information sharing and the capture of knowledge, and to provide end-users access to other systems information and services.
property	Quality of an <i>entity</i> . REFERENCE ISO/IEC 11179-3:2003.

Term	Definition
reference model	A framework for understanding significant <i>relationships</i> among the entities of some environment, and for the development of consistent standards or specifications supporting that environment. A reference model is based on a small number of unifying <i>concepts</i> and may be used as a basis for education and explaining standards to a non-specialist. REFERENCE CCSDS 650.0-B-1:2002. NOTE: CCSDS 650.0-B-1:2002 has been adopted as ISO 14721:2003.
relationship	A connection among model elements. REFERENCE ISO/IEC 11179-3:2003.
term	Verbal <i>designation</i> of a general concept in a specific subject field. REFERENCE ISO 1087-1:2000.
term definition	Text that indicates the meaning of a <i>term</i> .
term descriptor	<i>Name</i> used to refer to a <i>term</i> .
terminology	A set of <i>designations</i> belonging to one user community. REFERENCE Amended from ISO 1087-1:2000.
terminology service	<i>Web service</i> that is called by <i>applications</i> wishing to find <i>terms</i> related to a specific <i>concept</i> .
URI	A Uniform Resource Identifier (URI) is a compact sequence of characters that identifies an abstract or physical resource. REFERENCE http://www.ietf.org/rfc/rfc3986.txt query date 2005-07-01
XML	Extensible Markup Language, abbreviated XML, describes a class of data objects called XML documents and partially describes the behaviour of computer programs which process them. XML is an application profile or restricted form of SGML, the Standard Generalized Markup Language [ISO 8879]. REFERENCE http://www.w3.org/TR/REC-xml/ query date 2005-07-01

3.2 Conventions

3.2.1 Typographical conventions

A word highlighted in italicised print indicates a *defined term*. Any *defined terms* so highlighted are defined in this document; see Section 3.1 [Terms and their Definitions](#).

3.2.2 Legend for the tables in Chapter 6

The Legend for Occurrence indicators within the UML diagram is:

- 0..1 - optional
- 1...1 - required
- 1...* - required and repeatable
- 0...* - optional and repeatable

3.3 Abbreviations and Acronyms

Abbreviation	Definition
DL	Deliverable
EC	European Commission
GIIRM	Generic and Integrated Information Reference Model
OEM	Original Equipment Manufacturer
OWL	W3C Web Ontology Language. OWL is a vocabulary extension of RDF; an OWL ontology is an RDF graph.
RDF	The W3C Resource Description Framework. A W3C standard for describing resources on the Web.
TS	Terminology Service
UML	Unified Modelling Language
W3C	Worldwide Web Consortium. Organisation developing technical standards for use on the World Wide Web. (http://www.w3.org/)

4 Methodology of model development

The Terminology Service Model was developed in response to the *MYCAREVENT Terminology Service requirements summary*¹ and the *MYCAREVENT Terminology Service Software Requirements Specification (SRS) Version 1.0*.

As stated in the requirements document, "The requirement of a *terminology service* is to enable the user to be guided to a piece of information regardless of the supplier's terminology or the term used to request it. The selection presented to the user is required to be in the requested language and preferred terminology."

The scope of the requirement is stated as "This service should enable MYCAREVENT users to address the portal to request assistance, using specific terms with which they are familiar. The Terminology Service should provide all relevant terms to the MYCAREVENT services to retrieve data from all sources regardless of the initial terminology selected by the user. The process of translating those terms, which may be in any of 3 languages, into generic terms used by MYCAREVENT and other specific terms used by the information provider, should be the main function of the Terminology Service."

In the SRS it is stated that "The terminological data will be recorded in the form of an ontology that asserts term properties including language labels, broader, narrower, related, and equivalence or 'match' relationships." It also asserts that "The terminological representation will need to support concepts with:

- Annotation properties such as labels and identifier pertaining to the class itself
- Datatype & object properties such as "identifier", "name", "description", (strings associated with human languages), "origin/vocabulary", & relationships, etc. that pertain to the Individual(s) of the class"

Before the MYCAREVENT ontology was updated a UML model for the *terminology service* information requirements was created. Once the contents of this had been reviewed the model was incorporated into the ontology. This identified inconsistencies in the UML model that were corrected prior to documentation of

¹ Developed by RAC.

² Prepared by CSW in response to the requirements summary.

the results. The type of relationships between terms, as to whether they are broader, narrower or related, etc, are not reflected in the UML model but have been implemented within the ontology by specialization of the relatedTo relationship.

5 Definition of the Terminology Service Model – the Elements of the Model and their Description

The Terminology Service Model is a static model showing how *terms* and *coded values* are used within domains such as the automotive repair information domain modelled by MYCAREVENT. It defines a *reference model* from which specific information models can be derived in order to meet the information requirements of a specific use case. The core *classes* of the model are structured so that they can be extended or restricted for use within a project.

As with any *information model*, the Terminology Service Model is defined in terms of *classes* representing the *objects* (or *entities*) of the modelled domain, the *attributes* (or *properties*) describing the *characteristics* of those *objects*, *constraints* on the allowed *attribute values* of *attribute instances*, dependencies between *classes*, and the *relationships* that exist between the *objects* represented by the *classes* of the model.

The model is closely bounded, in terms of its static nature, being a logical model only. The model is static in that it models only the *characteristics*, that is the *attributes* and *relationships*, and not the behaviour, that is the operations, of the *objects* in its domain.

The information items and the relationships required for the *terminology service* represent a set of core *objects* and *relationships* that extend the domain represented by the MYCAREVENT GIIRM. The model is generic – it is not an *information model* specific to any single actor or system in MYCAREVENT but defines a generic model for use in the automotive repair information domain and elsewhere.

5.1 Scope of the model

The model defines the logical *information model* of the data structures required for the provision of *terminology services*; it does not define a physical *data model*. The actual implementation, processes and interfaces of the *information model* will be covered in companion deliverables.

The information modelled for the *terminology service* is based on the assumption that the *terminology service* will provide a *web service* that will be called by other *applications* prior to requesting a search for information stored within MYCAREVENT repositories and linked systems. The *terminology service* will be provided with a term *identifier*, *term descriptor* or *coded value* and asked to return either *term definitions*, alternative *term descriptors* used by other companies or details of *terms* that are related to the term supplied in the service request. The messages exchanged between the *portal* and the TS will need to conform to the messaging schemas for the *portal*.

Additional information supporting the technical running of the *portal* – such as user authentication and device capability – is not included in the model as this information is deemed to already have been managed within the *application* calling the *terminology service*.

5.2 Conceptual model

The *classes* and *relationships* between the main information *objects* that comprise a *terminology service* as modelled for MYCAREVENT are shown by the *conceptual data model* shown in Figure 1.

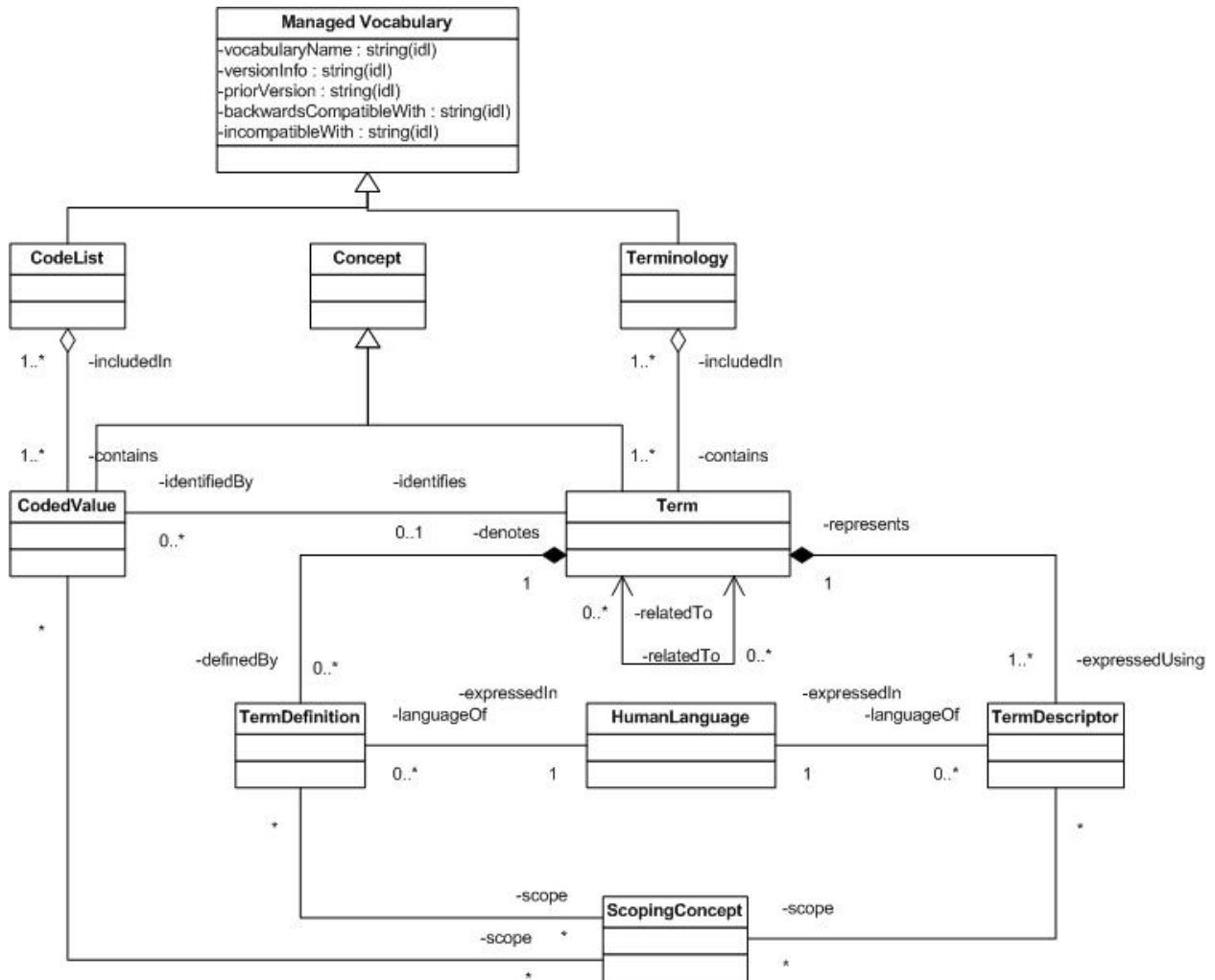


Figure 1: Conceptual model of the information items and relationships in the Terminology Service Model

Figure 1 depicts a logical model of the information domain, identifying the principal objects and identifying the key *relationships* that “connect” *terms* and coded representations of terms. It depicts the logical structure; how and how many of these relations are actually implemented and mapped between these entities – e.g. by using SQL database relations or OWL -- is implementation specific and so not further specified in this *reference model* document.

As shown by the model, there are ten main information items or *objects*: ManagedVocabulary; Terminology; CodeList; CodedValue; Concept; Term; TermDefinition; TermDescriptor; ScopingConcept and HumanLanguage.

From these, two *objects* form the focus of the model, Terminology and CodeList. A *Terminology* is used to describe symptoms, conditions, and vehicle systems within the MYCAREVENT GIIR. The use of *terminology* gives semantic interoperability by providing a common *language* against which OEM or third party specific *terminology* can be matched. The Terms that make up a *terminology* are defined as, and expressed using, text and phrases expressed in a HumanLanguage. The ability to support repair information in multiple human languages is an important aspect of the MYCAREVENT project.

The concept of a CodedValue that can be used to identify (or otherwise locate) a Term is an addition to the MYCAREVENT GIIR which allows CodeLists, such as those used for identification of Diagnostic Test Codes, to be associated with *terms* recorded in *terminologies*.

A ScopingConcept can be used to identify the origin of a descriptor or definition for a Term, or a coded value within a code list, or an application that uses the term. A ScopingConcept can be assigned a name and a description, and can identify where the description was derived from through a Unique Resource Identifier where appropriate.

The *objects* that make up the Terminology Service Model, and the *relationships* between them, determine the structure of the *information model*; this structure is described in more detail below,

- Managed Vocabulary. A *generalization* that is the parent for both the Terminology and CodeList classes. A Managed Vocabulary may have the following properties:
 - vocabularyName – name displayed in lists of available vocabularies (required)
 - versionInfo – uniquely identifies the version of the vocabulary recorded in the ontology (required)
 - priorVersion – identifies the version of the vocabulary this version was derived from
 - backwardCompatibleWith – identifies last version of vocabulary this version is backwards compatible with (e.g. only contains extensions with respect to)
 - incompatibleWith – identifies a version of the vocabulary that this version is not backwards compatible with because it removes terms available in that version
- Concept. A *generalization* that is the parent of both the Term and CodedValue classes.
- Code List. An aggregation consisting of a set of Coded Values that are to be used by a specific user community to identify *concepts* when entering *attribute values* in an *application*. A Code List contains values representing related *concepts* (e.g. currency or language) and each Coded Value in the Code List represents an instance of that *concept*. (e.g. EN to identify English). A Code List inherits the properties of a Managed Vocabulary.
- Coded Value. A string used within a Code List to identify a *concept* recorded as a Term. A Coded Value must have the following property:
 - value – string used to identify a concept
- Terminology. An aggregation of Terms that are used by a specific user community to describe one or more of the concepts used in an *application*, such as the Symptoms, Conditions and Faults that can be identified using the MYCAREVENT *portal*. A Terminology inherits the properties of a Managed Vocabulary.
- Term. A Term is associated with the following *objects*,
 - TermDefinition. A definition of a *term*, expressed in an identified Human Language, which can be used to differentiate between *concepts* that share *term descriptors*.
 - TermDescriptor. A word or phrase expressed in an identified Human Language that is used by a specific user community to describe/identify a *concept*.
 - CodedValue. A string used within a Code List to identify a Term.
 - Term. A Term that is related to another Term. The *relationship* may be specialized. For example, into terms that are narrower or broader than the related term.
- TermDefinition. A definition of a *term*, expressed in an identified Human Language, which can be used to differentiate between *concepts* that share *term descriptors*. A Term Definition may have the following properties:
 - definition – XML literal that contains a displayable definition of the concept represented by the associated Term.

- expressedIn – reference to the Human Language the definition is provided in.
- scope – reference to a Scoping Concept that has been used to limit the scope (domain) of the definition.
- TermDescriptor. A word or phrase expressed in an identified Human Language that is used by a specific user community to describe/identify a *concept*. A Term Descriptor may have the following properties:
 - descriptor – string used to identify an occurrence of the concept defined by a Term.
 - expressedIn – reference to the Human Language the definition is provided in.
 - scope – reference to a Scoping Concept that has been used to limit the scope (domain) of the definition.
- HumanLanguage. The HumanLanguage represents the *language* in which a Term Descriptor or Term Definition is written. A Human Language has the following property:
 - regionalLanguage – IETF RFC 3066 language/dialect code conforming to the XML Schema Language language datatype.
- ScopingConcept. A concept that identifies the origin or application of a term or coded value. A ScopingConcept can be assigned a name and a description, and can identify where the description was derived from through a Unique Resource Identifier where appropriate. A Scoping Concept may have the following properties:
 - scopeName – Unique name (as defined by XML Schema's definition of the NCName datatype) used to identify scope
 - description – Optional string that describes the purpose for which the scoping concept has been defined.

6 Conclusions

The Terminology Service Model extends the simple model of a Terminology consisting of a set of Terms that is used in the definition of the MYCAREVENT GIIRM to provide a generalized vocabulary management service that allows concepts to be identified using coded values as well as text. Coded values in code lists are always linked to an explanatory term, which may have one or more definitions, expressed in multiple human languages, and one or more descriptors that can be used by different user communities to identify the concept represented by the selected term or code.

7 Appendices

7.1 References

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