Core Assessment Vocabulary (CAV)

v.1.0.0 BETA
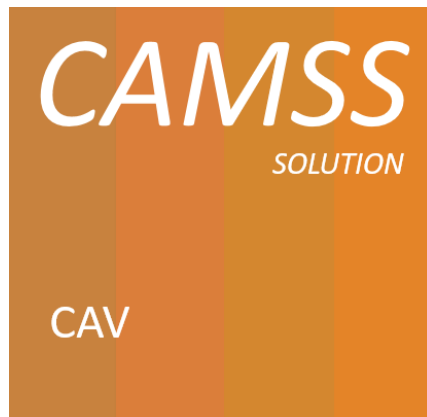
Specification

Change Control

Modification	Details
Version 1.0.0 BETA	
BETA version	

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1. INTRODUCTION

CAMSS stands for Common Assessment Method for Standards and Specifications. It is a development of the ISA2 Programme Action "*Achieving a modern ICT standardisation policy*[1]" aiming at "assessing and selecting standards and specifications for an eGovernment project, a reference when building an architecture and an enabler for justifying the choice of standards and specifications in terms of interoperability needs and requirements. It is fully aligned with the European Standardisation Regulation 1025/2012"[2].

The Core Assessment Vocabulary represents, expresses and defines what an "Assessment" of "Assets" is and how to perform the assessment based on "Criteria". It is a domain-agnostic vocabulary, meaning that it can be used to assess any asset. Hence, the CAV is at the very core of the CAMSS Ontology. Or, in other words, the CAMSS Ontology reuses and extends the CAV.

1.1. Objective and Scope of the document

The objective of this document is to provide an interoperability oriented solution for the expression and exchange of CAMSS Assessments.

The scope of this document encompasses:

- Conceptual data models used for the CAMSS Vocabulary;

- Constraints and rules specific to the CAMSS domain;

- A reference implementation of the Ontology as an OWL Turtle syntax.

1.2. Related Solutions

This section lists the different related solutions to the CAV. Note that some of them are still under development.

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[1] Achieving a modern standard ICT standardisation policy; CAMSS Action 2016.27: https://ec.europa.eu/isa2/actions/achieving-modern-ict-standardisation-policy_en.

[2] See CAMSS Joinup Community for additional details: https://joinup.ec.europa.eu/collection/common-assessment-method-standards-and-specifications-camss/about.

1.2.1. *CAMSS Ontology*

CAMSS stands for Common Assessment Method for Standards and Specifications and it is an action of the ISA2 Programme[3].

The CAMSS Ontology defines the CAMSS terminology and axioms that define the CAMSS concepts and logic rules. The interpretation of the CAMSS concepts cast a clear idea of the method defined in CAMSS to assess standards and specifications.

The CAMSS Ontology is currently under development.

1.2.2. *EIRA Library of Interoperability Specifications (ELIS)*

The ELIS is a family of interoperability specifications that define the interoperability aspects of the Architecture Building Blocks (ABBs) contained in EIRA©. Its aim is supporting architects for the modelling of solutions based on EIRA©. The current version of ELIS will have to be slightly revamped to accommodate the concepts defined in the CSSV and support the requirement of all the stakeholders, e.g. EIRA-based solution developer needs, NATO profiles, other.

The CSSV is based on the CISSV model, which was used for the development of the BETA version of the ELIS in 2018.

1.2.3. *Core Standards and Specifications Vocabulary (CSSV)*

The CSSV is the vocabulary used for the information exchange related to standards and specifications amongst software solutions, as well as, it is the key element for the development of the new release of the EIRA Library of Interoperability Specifications (ELIS). In order to improve the quality of this vocabulary, it has been reviewed publicly through a public consultation[4] where some stakeholders contributed to the improvement of the CSSV.

1.2.4. *DCAT-AP and ADMS-AP*

The DCAT Application profile for data portals in Europe (DCAT-AP[5]) is a specification based on W3C's Data Catalogue vocabulary (DCAT[6]) for describing public sector datasets in Europe. The Asset Description Metadata Schema (ADMS[7]) in turn was developed as an application profile of the DCAT vocabulary for the description of assets. Hence, DCAT-AP can be used to describe any type of asset (treated as a dataset, especially if you consider that metadata are also data).

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[3] Achieving a modern standard ICT standardisation policy; CAMSS Action 2016.27:
   https://ec.europa.eu/isa2/actions/achieving-modern-ict-standardisation-policy_en.

[4] CSSV Public Consultation: https://github.com/SEMICeu/CAMSS_CSSV

[5] DCAT-AP: https://joinup.ec.europa.eu/solution/dcat-application-profile-data-portals-europe/release/200

[6] W3C DCAT specification: https://www.w3.org/TR/vocab-dcat/

[7] ADMS: https://joinup.ec.europa.eu/collection/semantic-interoperability-community-semic/adms

The figure below shows the DCAT-AP classes and properties:

Figure 1: DCAT-AP classes and properties

In the CSSV model, the class Specification can be considered the "root" class and it is an "Asset" as defined in ADMS, which in turn inherits from the *dcat:Dataset class*. The figure below shows how ADMS defines the concept Asset, based on DCAT:
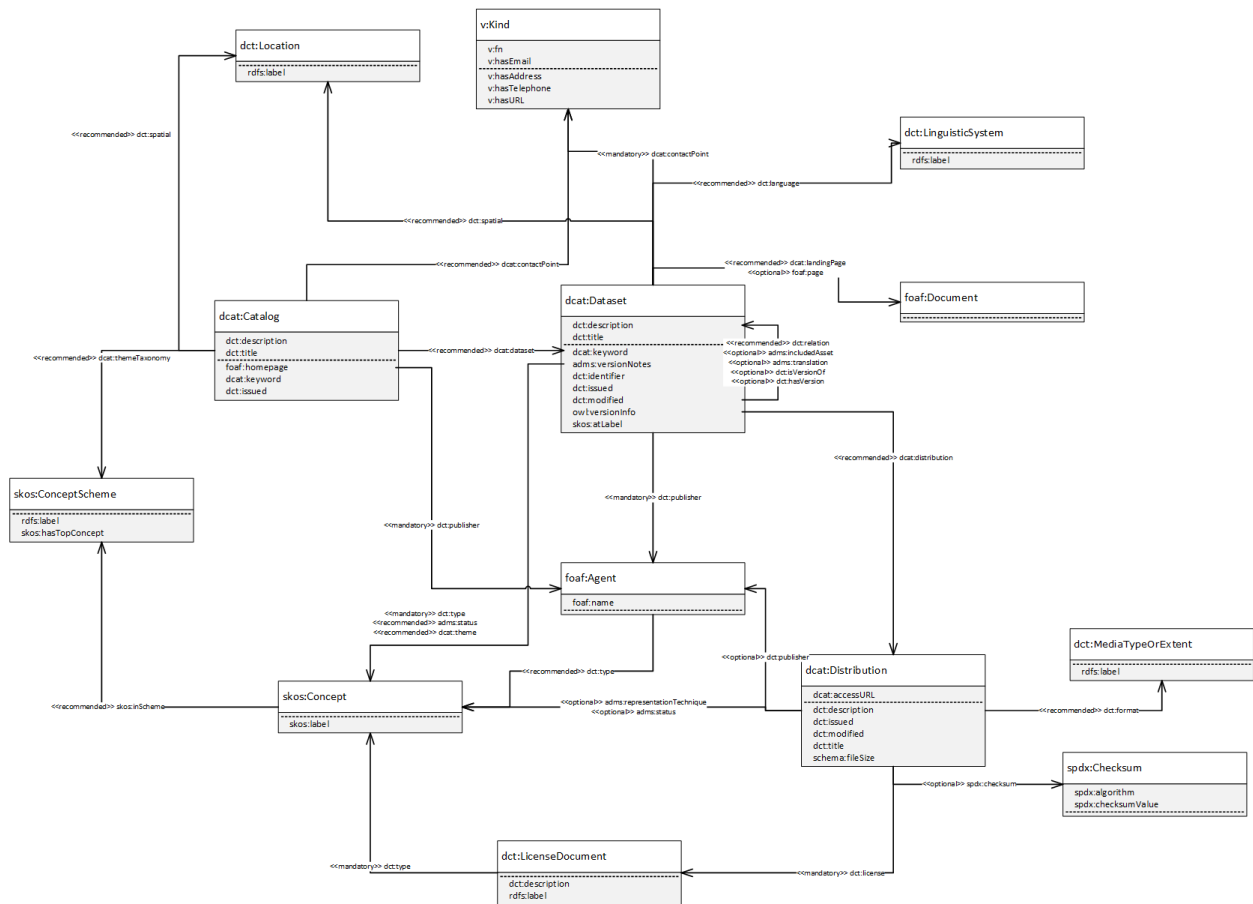
Figure 2: ADMS-AP model

1.3. Methodological approach

The approach followed for the development of the CAV sticks to three fundamental principles:

1. Reuse and share (i.e., do not reinvent the wheel);

2. Do not betray the knowledge and experience of the domain, nor the terminology and interpretation of the concepts (i.e. do not invent new terms when they already exist in the communities of practice or generic domains);

3. Isolate technical and business constraints and rules as much as possible; (i.e. externalise them in separate artefacts, e.g. graph and data shapes for the control and validation of the data). This has a large impact on the quality and cost of the implementation and maintenance of the ontology.

Thus, one way of facilitating the semantic interoperability consists of reusing existing generic ontologies and vocabularies. This way, the semantics of common concepts and properties are agreed without having to re-discuss them. When concepts or properties have not been identified nor defined for the purposes pursued, they have to be proposed either as extensions or from scratch.

The methodological approach followed for the development of the CAV reuses the following ontologies and vocabularies:

- Friend of a Friend (FOAF);
- Core Person Vocabulary (CPV), only Natural Person;
- The Organization Ontology;
- Core Criterion and Core Evidence Vocabulary (CCCEV).

The rationale for defining this new vocabulary goes as follows:

1. No generic ontologies or vocabularies have been found defining what an Assessment are that fulfil the purposes of CAMSS, partially or totally (e.g. Some initiatives define methodologies for assessment, but not ontologies or vocabularies);

2. Existing concepts in other ontologies did not cover all the information requirements needed in CAV and therefore had to be reused or specialised by new classes (e.g. CAV benefit greatly of the existence of the ADMS Asset concept);

3. Concepts and properties existing in other ontologies have different semantics to the ones needed in CAV;

4. Concepts required in CAV have not been identified in any other existing ontologies and therefore needed to be defined at new (e.g. the concept Scenario in the CAV).

5. Given this is a "Core" vocabulary a key goal is to make them as flexible as possible. This means that predicates are set with optional and multiple cardinality (0..n) unless there is a strong reason to further restrict.

1.4. Current status and future evolution disclaimer

The version of the CAV is *BETA*. The word BETA refers to the fact that the CAV has dependencies of other vocabularies that are currently under development. These vocabularies are respectively under public revision, development or evolution in parallel to the development of the CAV.

2. CORE ASSESSMENT VOCABULARY (CAV)

The Core Assessment Vocabulary represents and defines what an "Assessment" of an "Asset" is and how to perform the Assessment using scenario-based "Criteria". It is a domain-agnostic vocabulary, meaning that it can be used to assess any type of assets. Hence, the CAV is at the very core of the CAMSS Ontology. Or, in other words, the CAMSS Ontology reuses 100% the CAV.

As the first Use Case identified for the CAV is CAMSS[8], the CAV and CAMSS Ontology are being developed in parallel. This entails that a revision needs to be performed by multi-domain experts and the CAMSS community. Until this revision is not completed a stable version of both the CAV and the CAMSS Ontology is not possible, and would be considered *BETA* versions.

The CAV is depicted in *Figure 3 The Core Assessment Vocabulary*. The figure shows the classes and properties that are used or defined in the vocabulary.

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[8] Other domains have already been identified as candidates for the CAV, e.g. the Interoperability Maturity Assessment of a Public Service (IMAPS), but also for assessment of products in both public and private sectors.
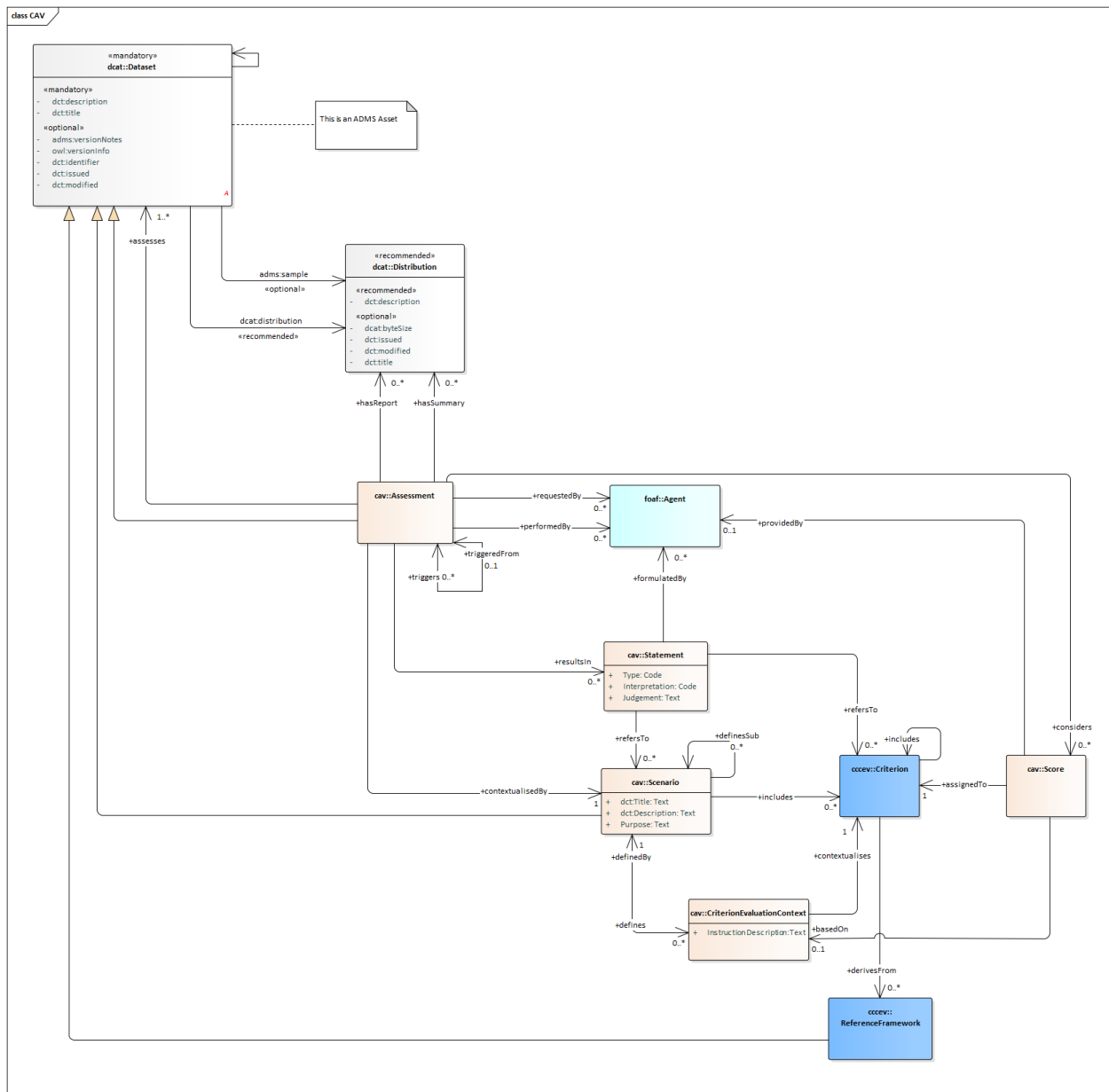
2.1. Data Model for the CAV

Figure 3 The Core Assessment Vocabulary

2.1.1. *Interpretation*

A CAV **Assessment** is a specialisation of the *dcat:Dataset*, i.e. it is an Asset as represented in ADMS[9]. Like any Asset, it can be identified and described and has individual distributions, publishers, etc. In addition to these properties, the CAV class Assessment needs to specify who are the requestors and evaluators of the Assessments. These can be anything represented by a FOAF[10] Agent, such as a natural person, an organisation or a system. Notice that the objects assessed are also Assets meaning that the CAV may be used to assess anything that is considered a valuable resource. Example of such resources could be products, services, or, in the case of CAMSS, specifications.

An Assessment results in **Statements** capturing the produced knowledge and providing value judgments. These can refer to the Assessment as a whole or a specific section, even being as detailed as to refer to individual evaluated criteria. A **Criterion** is typically derived from a Reference Framework, which is to be understood as a series of "agreed and descriptive reference requirements" coming from one or more sources (e.g. legislation, specifications and standards, ICT policy-related works like the EIF within the EIS, etc.). Throughout the Assessment each Criterion is assigned a **Score** (in principle by humans, but potentially also by systems) as its value output that is considered when formulating the resulting Statement(s).

Any Assessment is performed in the context of a **Scenario**. The Scenario defines the purpose of the Assessment and the set of Criteria to be scored by one or more Agents. Scenarios can be defined with a flexible structure including nested sections (represented as sub-Scenarios) that serve to provide additional context, group thematically Criteria and be referred to by the assessment's resulting Statement(s). Criteria can themselves be simple or complex and originate from various reference sources. The overall context for the evaluation of the Criteria is provided by the Scenario, however in case certain Criteria require additional contextualisation or evaluation instructions these can exceptionally be provided by means of **CriterionEvaluationContexts**.

Finally, an Assessment might trigger another related Assessment of different content which has its own Scenario and Criteria. Note that it is also possible to model work in progress, expressed by having the Assessment defining optional links to Scores, Statements, reports and summaries.

2.2. Class: cav:Assessment

OWL Class	cav:Assessment

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[9] More specifically have a look into the ADMS-AP and DCAT-AP models in the Joinup platform. ADMS Application Profile https://joinup.ec.europa.eu/solution/asset-description-metadata-schema-adms/releases. DCAT Application Profile https://joinup.ec.europa.eu/solution/dcat-application-profile-data-portals-europe/releases

[10] FOAF Vocabulary Specification http://xmlns.com/foaf/spec/

Label:	Assessment
Definition:	The intellectual work to evaluate an asset against the criteria of a given scenario.
Subclass of:	dcat:Dataset

2.2.1. Property: cav:hasReport

OWL Property	cav:hasReport
OWL type:	owl:ObjectProperty
Label:	hasReport
Definition:	A manifestation[11] of all the information related to and resulting from an assessment. Additional Information: The included information usually contains everything about the assessment, e.g. the purpose of the assessment, the criteria defined in the scenario, the responses and the scoring provided by the evaluator; 1. The report may be manifested in one or multiple ways (distributed as different formats), e.g. as OWL triples, as an HTML, as a narrative text (pdf, doc, ods, etc.).
Domain:	*cav:Assessment*
Range:	*dcat:Distribution*
Cardinality:	0..n

2.2.2. Property: cav:hasSummary

OWL Property	cav:hasSummary
OWL type:	owl:ObjectProperty
Label:	hasSummary

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11 The term "manifestation" is used herein as defined in the IFLA Library Reference Model (IFLA LRM): https://www.ifla.org/publications/node/11412

Definition:	An abbreviated manifestation of the performed assessment.
Domain:	*cav:Assessment*
Range:	*dcat:Distribution*
Cardinality:	0..n

2.2.3. Property: cav:assesses

OWL Property	cav:assesses
OWL type:	owl:ObjectProperty
Label:	assesses
Definition:	The reference to the asset(s) that are the object of the assessment.
Domain:	*cav:Assessment*
Range:	*dcat:Dataset*
Cardinality:	1..n

2.2.4. Property: cav:performedBy

OWL Property	cav:performedBy
OWL type:	owl:ObjectProperty
Label:	performedBy
Definition:	The agent(s) that carry out the assessment.
Domain:	*cav:Assessment*
Range:	*foaf:Agent*
Cardinality:	0..n

2.2.5. Property: cav:requestedBy

OWL Property	cav:requestedBy
OWL type:	owl:ObjectProperty

Label:	requestedBy
Definition:	The agent(s) requesting the assessment of an asset.
Domain:	*cav:Assessment*
Range:	*foaf:Agent*
Cardinality:	0..n

2.2.6. Property: cav:contextualisedBy

OWL Property	cav:contextualisedBy
OWL type:	owl:ObjectProperty
Label:	contextualisedBy
Definition:	The assignment of the scenario for the current assessment providing its context, purpose and criteria.
Domain:	*cav:Assessment*
Range:	*cav:Scenario*
Cardinality:	1

2.2.7. Property: cav:resultsIn

OWL Property	cav:resultsIn
OWL type:	owl:ObjectProperty
Label:	resultsIn
Definition:	The creation of the statement(s) resulting from the assessment. Additional Information: The cardinality allows for optional associations to express an Assessment that is typically a work in progress.
Domain:	*cav:Assessment*
Range:	*cav:Statement*
Cardinality:	0..n

2.2.8. Property: cav:considers

OWL Property	cav:considers
OWL type:	owl:ObjectProperty
Label:	considers
Definition:	The evaluation of a criterion score in the context of the current assessment as input to issue one or more statement(s).
	Additional Information:
	Scores are optional to allow expression of Assessments that are in progress, and to express Assessments that are informal and don't include specific Criteria.
Domain:	*cav:Assessment*
Range:	*cav:Score*
Cardinality:	0..n

2.2.9. Property: cav:triggeredFrom

OWL Property	cav:triggeredFrom
OWL type:	owl:ObjectProperty
Label:	triggeredFrom
Definition:	The event causing the current assessment as the result of another related assessment.
Domain:	*cav:Assessment*
Range:	*cav:Assessment*
Cardinality:	0..1

2.2.10. Property: cav:triggers

OWL Property	cav:triggers
OWL type:	owl:ObjectProperty
Label:	triggers

Definition:	The event causing further related assessment(s) due to the current one.
Domain:	*cav:Assessment*
Range:	*cav:Assessment*
Examples:	0..n

2.3. Class: cav:Scenario

OWL Class	cav:Scenario
Label:	Scenario
Definition:	The context of the assessment establishing its purpose, the organisation of criteria being evaluated, and its reference Framework(s).
	Additional Information:
	A scenario can be used to include criteria sourced from various reference frameworks and organised in a flexible structure including nested parts (expressed as sub-scenarios each with a further specified context). A scenario with no included criteria is considered as high-level or informal.
Subclass of:	dcat:Dataset

2.3.1. *Property: cav:includes*

OWL Property	cav:includes
OWL type:	owl:ObjectProperty
Label:	includes
Definition:	The aggregation of criteria to one scenario or parts of it.
	Additional Information:
	This aggregation may be contextualised at different granularity levels, scenario, parts of the scenario or specific criteria.
	The cardinality is 0..* to allow assessments that are very high-level, informal or subjective without criteria and scoring. For CAMSS the cardinality is 1..*.
Domain:	*cav:Scenario*

Range:	cccev:Criterion
Cardinality:	0..n

2.3.2. Property: cav:definesSub

OWL Property	cav:definesSub
OWL type:	owl:ObjectProperty
Label:	definesSub
Definition:	The definition of nested scenarios grouped based on different sub-purposes, commonalities or particularities of the sub-sets of criteria.
Domain:	cav:Scenario
Range:	cav:Scenario
Cardinality:	0..n

2.3.3. Property: cav:defines

OWL Property	cav:defines
OWL type:	owl:ObjectProperty
Label:	defines
Definition:	The link to the evaluation contexts for specific criteria provided by the given scenario.
Domain:	cav:Scenario
Range:	cav:CriterionEvaluationContext
Cardinality:	0..n

2.3.4. Property: dct:Title

OWL Property	dct:Title
OWL type:	owl:DataProperty
Label:	Title

Definition:	A short self-descriptive name of the scenario.
Property Type:	xsd:String

2.3.5. Property: dct:Description

OWL Property	dct:Description
OWL type:	owl:DataProperty
Label:	Description
Definition:	An explanatory text about the scenario.
Property Type:	xsd:String

2.3.6. Property: cav:Purpose

OWL Property	cav:Purpose
OWL type:	owl:DataProperty
Label:	Purpose
Definition:	The reason for which the assessment is done.
Property Type:	xsd:String

2.4. Class: cav:Statement

OWL Class	cav:Statement
Label:	Statement
Definition:	A value judgement, resulting from the assessment, pertinent to its entirety or to one or more of its specific parts (sub-scenarios or even individual criteria). Additional Information: An assessment without resulting statements is considered as a work in progress.

2.4.1. Property: cav:Judgement

OWL Property	cav:Judgement
OWL type:	owl:DataProperty
Label:	Judgement
Definition:	The text expressing the statement's resulting value judgement.
Property Type:	xsd:String

2.4.2. Property: cav:Type

OWL Property	cav:Type
OWL type:	owl:DataProperty
Label:	Type
Definition:	The categorisation of the statement (e.g. Whether the statement is a strong value judgement, a recommendation, a comment, etc.).
Property Type:	skos:Concept

2.4.3. Property: cav:Interpretation

OWL Property	cav:Interpretation
OWL type:	owl:DataProperty
Label:	Interpretation
Definition:	A code expressing the degree of favourability implied by the statement. Additional Information: Different domains could use different code list to express this (e.g. positive, negative, neutral).
Property Type:	skos:Concept

2.4.4. Property: cav:formulatedBy

OWL Property	cav:formulatedBy
OWL type:	owl:ObjectProperty

Label:	formulatedBy
Definition:	The reference to the agent(s) responsible for issuing the current statement.
Domain:	*cav:Statement*
Range:	*foaf:Agent*
Cardinality:	0..n

2.4.5. *Property: cav:refersTo*

OWL Property	cav:refersTo
OWL type:	owl:ObjectProperty
Label:	refersTo
Definition:	The reference to the specific elements on the assessment for which the statement is used. These can be the assessment's complete scenario, its parts (sub-scenarios) or even individual criteria. A statement with no such references is considered to apply to the assessment as a whole.
Domain:	*cav:Statement*
Range:	*cav:Scenario*
Cardinality:	0..n

2.4.6. *Property: cav:refersTo*

OWL Property	cav:refersTo
OWL type:	owl:ObjectProperty
Label:	refersTo
Definition:	The reference to the specific elements of the assessment for which the statement is issued. These can be the assessment's complete scenario, its parts (sub-scenarios) or even individual criteria. A statement with no such references is considered to apply to the assessment as a whole.
Domain:	*cav:Statement*

Range:	*cccev:Criterion*
Cardinality:	0..n

2.5. Class: cav:CriterionEvaluationContext

OWL Class	**cav:CriterionEvaluationContext**
Label:	Criterion Evaluation Context
Definition:	The context for a criterion providing guidance on its evaluation considering the given scenario. This is used exceptionally to extend the context offered by the scenario when it is not sufficient for the evaluation of a given criterion.

2.5.1. *Property: cav:Description*

OWL Property	**cav:InstructionDescription**
OWL type:	owl:DataProperty
Label:	Instruction Description
Definition:	A text describing the context and evaluation instructions for the relevant criterion.
Property Type:	xsd:String

2.5.2. *Property: cav:definedBy*

OWL Property	**cav:definedBy**
OWL type:	owl:ObjectProperty
Label:	definedBy
Definition:	The link to the scenario that provides the evaluation context for one or more criteria. Additional Information: The current evaluation context is meant to extend or replace the overall context of its defining scenario.

Domain:	cav:CriterionEvaluationContext
Range:	cav:Scenario
Cardinality:	1

2.5.3. Property: cav:contextualises

OWL Property	cav:contextualises
OWL type:	owl:ObjectProperty
Label:	contextualises
Definition:	The provision of context for the evaluation of the criterion as an extension or replacement of the scenario's overall context.
Domain:	cav:CriterionEvaluationContext
Range:	cccev:Criterion
Cardinality:	1

2.6. Class: cav:Score

OWL Class	cav:Score
Label:	Score
Definition:	The value output assigned to the criterion as part of the assessment.
	Additional Information:
	An assessment with no scores can be a work in progress or an assessment that is high-level and that does not include specific criteria.

2.6.1. Property: cav:basedOn

OWL Property	cav:basedOn
OWL type:	owl:ObjectProperty
Label:	basedOn

Definition:	The consideration of a specific evaluation context when assigning the score to a criterion.
Domain:	*cav:Score*
Range:	*cav:CriterionEvaluationContext*
Cardinality:	0..1

2.6.2. Property: cav:assignedTo

OWL Property	cav:assignedTo
OWL type:	owl:ObjectProperty
Label:	assignedTo
Definition:	The assignment of a value output to the criterion.
Domain:	*cav:Score*
Range:	*cccev:Criterion*
Cardinality:	1

3. ACCESSIBILITY AND MULTILINGUAL ASPECTS

The CAV can operate in any language as:

- In a multilingual context, all those properties that are datatype "Text" the value may exist in multiple languages, the property may be instantiated multiple times and tagged with the language identifier for the value used for that property.

- The CAV specification encourages the use of PURIs as identifiers.

The labels used can be translated and added to the schema (please contact the working group if you can help with this).

4. ACRONYMS

Term	Description
SEMIC	Semantic Interoperability Community

CAV	Core Assessment Vocabulary	
DCAT	Data Catalogue Vocabulary	
DCAT-AP	Data Catalogue Vocabulary Application Profile	
ADMS	The Asset Description Metadata Schema	

5. REFERENCES

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6. ANNEX III – CAV MODEL

CAV.xml   CAV.eapx