

formats, including the properties and relationships specified in the security profile, which are in support of exchanging information about software vulnerabilities that may exist, the severity of those vulnerabilities, and a mechanism to express how a vulnerability may affect a specific software element including if a fix is available.

Conformance to the security profile compliance point does not entail support for the Licencing, Data Set, AI, Build, Lite, or Extension profiles of the SPDX.

This compliance point facilitates interchange of the security information produced by tools supporting SPDX.

2.5 Licencing Profile compliance point

The licencing profile includes capturing details relevant to software licencing and intellectual property information when producing or consuming SPDX content. Specifically, software that conforms to the SPDX specification at the Licencing profile compliance point shall be able to import and export serialized documents that conform with one of the SPDX serialization formats defined SPDX serialization formats, including the classes and fields that comprise the SPDX License Expression syntax and that relate to the SPDX License List.

Conformance to the Licencing profile compliance point does not entail support for the Software, Security, Data Set, AI, Build, Lite, or Extension profiles of the SPDX.

This compliance point facilitates interchange of the licencing documents expressing which licenses and copyright notices are determined by persons or automated tooling to apply to distributions of software that are produced by tools supporting SPDX.

2.6 Data Set Profile compliance point

The data set profile captures the relevant information about the datasets used in an AI system or other applications when producing or consuming SPDX content.

Software that conforms to the SPDX specification at the data set profile compliance point shall be able to import and export serialized documents that conform with one of the SPDX serialization formats defined SPDX serialization formats, including details such as dataset names, versions, sources, associated metadata, licencing information, and any other relevant attributes. The data set profile can convey a description characteristics, and statistical information about the data. The data set format, content, and properties of a dataset, helping users understand

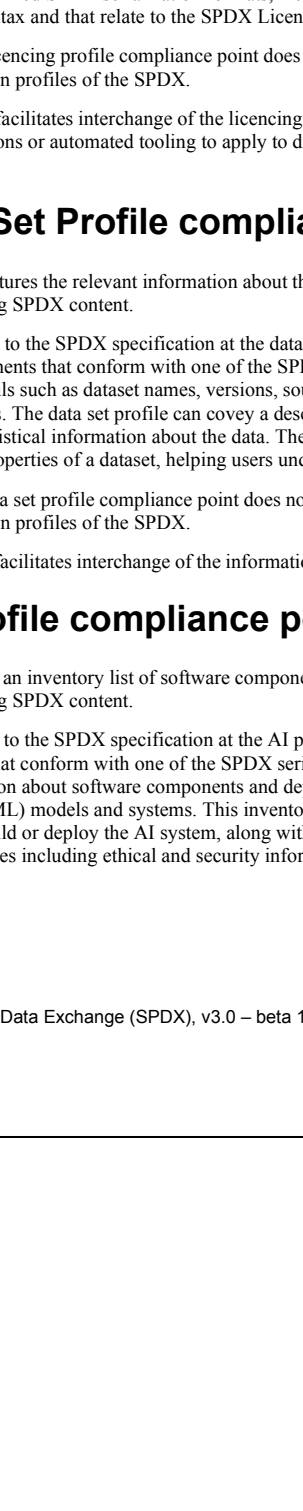
Conformance to the data set profile compliance point does not entail support for the Software, Security, Data Set, AI, Build, Lite, or Extension profiles of the SPDX.

This compliance point facilitates interchange of the information about data sets produced by tools supporting SPDX.

2.7 AI Profile compliance point

The AI profile captures an inventory list of software components and dependencies associated with an AI system when producing or consuming SPDX content.

Software that conforms to the SPDX specification at the AI profile compliance point shall be able to import and export serialized documents that conform with one of the SPDX serialization formats defined SPDX serialization formats, including the information about software components and dependencies associated with artificial intelligence and machine learning (AI/ML) models and systems. This inventory includes the software frameworks, libraries, and other components used to build or deploy the AI system, along with relevant information about their versions, licenses, and useful security references including ethical and security information.



There are two associated profiles, the SimpleLicencing Profile and the ExpandedLicencing profiles. Both allow expression of the same information, albeit in different ways.

Name	byteRange
Nature	DataProperty
Range	/Core/PositiveIntegerRange

Referenced

- /Software/Snippet

9.2.4 contentType

Summary

Provides information about the content type of an Element.

Description

This field is a reasonable estimation of the content type intrinsic to the Element, independent of how it is represented.

Metadata

<https://spdx.org/rdf/v3/Software>

Name	contentType
Nature	DataProperty
Range	/Core/MediaType

Referenced

- /Software/File

9.2.5 copyrightText

Summary

Identifies the text of one or more copyright notices.

Description

A copyrightText consists of the text(s) of the copyright notice.

If a copyrightText contains text, then it may contain a copyright notice (or a complete) for that software Package, File or Snippet.

If a copyrightText has a "NONE" value, this indicates that there is no copyright notice whatsoever.

If a copyrightText has a "NOASSERTION" value, this indicates that the creator has attempted to but cannot reach a reasonable determination (or is empty to determine this field; or * the SPDX data is implied by doing so).

Metadata

<https://spdx.org/rdf/v3/Software>

Name	copyrightText
------	---------------

System Package Data Exchange (SPDX), v3.0

9.2.4 contentIdentifier

Summary

A canonical, unique, immutable identifier of the artifact content, that may be used for verifying its identity and/or integrity.

Description

A contentIdentifier is a canonical, unique, immutable identifier of the content of a software artifact, such as a package, a file, or a snippet.

It may be used for verifying its identity and/or integrity.

Metadata

<https://spdx.org/rdf/3.0.1/terms/Software/contentIdentifier>

Name:	contentIdentifier
Nature:	DataProperty
Range:	ContentIdentifier

Referenced

- /Software/SoftwareArtifact

9.2.5 contentIdentifierType

Summary

Specifies the type of the content identifier.

Description

A contentIdentifierType specifies the type of the content identifier.

Metadata

<https://spdx.org/rdf/3.0.1/terms/Software/contentIdentifierType>

Name:	contentIdentifierType
Nature:	ObjectProperty
Range:	ContentIdentifierType

Referenced

- /Software/ContentIdentifier

9.2.6 contentIdentifierValue

Summary

Specifies the value of the content identifier.

Description

A contentIdentifierValue specifies the value of a content identifier.

Metadata

<https://spdx.org/rdf/3.0.1/terms/Software/contentIdentifierValue>

Name:	contentIdentifierValue
Nature:	DataProperty
Range:	xsd:anyURI

Referenced

- /Software/ContentIdentifier

Name	byteRange
Nature	DataProperty
Range	/Core/PositiveIntegerRange

Referenced

- /Software/Snippet

9.2.4 contentType

Summary

Provides information about the content type of an Element.

Description

This field is a reasonable estimation of the content type of the Element, from a creator perspective. Content type is intrinsic to the Element, independent of how the Element is being used.

Metadata

<https://spdx.org/rdf/v3/Software/contentType>

Name	contentType
Nature	DataProperty
Range	/Core/MediaType

Referenced

- /Software/File

9.2.5 copyrightText

Summary

Identifies the text of one or more copyright notices for a software Package, File or Snippet, if any.

Description

A copyrightText consists of the text(s) of the copyright notice(s) found for a software Package, File or Snippet, if any.

If a copyrightText contains text, then it may contain any text related to one or more copyright notices (even if not complete) for that software Package, File or Snippet.

If a copyrightText has a "NONE" value, this indicates that the software Package, File or Snippet contains no copyright notice whatsoever.

If a copyrightText has a "NOASSERTION" value, this indicates that one of the following applies: * the SPDX data creator has attempted to but cannot reach a reasonable objective determination; * the SPDX data creator has made no attempt to determine this field; or * the SPDX data creator has intentionally provided no information (no meaning should be implied by doing so).

Metadata

<https://spdx.org/rdf/v3/Software/copyrightText>

Name	copyrightText
------	---------------

If a copyrightText is present, but consists of solely an empty string or a string with no substantive content (e.g., a string that contains only whitespace), then this should be interpreted as equivalent to a “NOASSERTION” value as described above.

If a copyrightText is present, but consists of solely an empty string or a string with no substantive content (e.g., a string that contains only whitespace), then this should be interpreted as equivalent to a “NOASSERTION” value as described above.

Referenced

- /Software/SoftwareArtifact

9.2.8 homePage

Summary

A place for the SPDX document creator to record a website that serves as the package's home page.

Description

HomePage is a place for the SPDX document creator to record a website that serves as the package's home page. This saves the recipient of the SPDX document who is looking for more info from having to search for and verify a match between the package and the associated project home page. This link can also be used to reference further information about the package referenced by the SPDX document creator.

Metadata

<https://spdx.org/rdf/v3/Software/homePage>

Name	homePage
Nature	DataProperty
Range	xsd:anyURI

Referenced

- /Software/Package

9.2.9 isDirectory

Summary

If true, denotes the Element is a directory.

Description

If true, denotes the Element is a directory.

Metadata

<https://spdx.org/rdf/v3/Software/isDirectory>

Name	isDirectory
Nature	DataProperty
Range	xsd:boolean

Referenced

- /Software/File

9.2.10 lineRange

Summary

Defines the line range in the original host file that the snippet information applies to.

9.3 Software Profile Vocabularies

9.3.1 S bomType

Summary

Provides a set of values to be used to describe the common types of SBOMs that tools may create.

Description

The set of SBOM types with definitions as defined in Types of Software Bill of Material (SBOM) Documents, published on April 21, 2023. An SBOM type describes the most likely type of an SBOM from the producer perspective, so that consumers can draw conclusions about the data inside an SBOM. A single SBOM can have multiple SBOM document types associated with it.

Metadata

<https://spdx.org/rdf/v3/Software/SbomType>

Name	SbomType
------	----------

Entries

- analyzed: SBOM generated through analysis of artifacts (e.g., executables, packages, containers, and virtual machine images) after its build. Such analysis generally requires a variety of heuristics. In some contexts, this may also be referred to as a “3rd party” SBOM.
- build: SBOM generated as part of the process of building the software to create a releasable artifact (e.g., executable or package) from data such as source files, dependencies, built components, build process ephemeral data, and other SBOMs.
- deployed: SBOM provides an inventory of software that is present on a system. This may be an assembly of other SBOMs that combines analysis of configuration options, and examination of execution behavior in a (potentially simulated) deployment environment.
- design: SBOM of intended, planned software project or product with included components (some of which may not yet exist) for a new software artifact.
- runtime: SBOM generated through instrumenting the system running the software, to capture only components present in the system, as well as external call-outs or dynamically loaded components.

Entries

analyzed SBOM generated through analysis of artifacts (e.g., executables, packages, containers, and virtual machine images) after its build. Such analysis generally requires a variety of heuristics. In some contexts, this may also be referred to as a “3rd party” SBOM.

Element is being used rather than the content of the Element. This field is a reasonable estimate of the most likely usage of the Element from the producer and consumer perspective from which both parties can draw conclusions about the context in which the Element exists.

Metadata

<https://spdx.org/rdf/v3/Software/SoftwarePurpose>

Name	SoftwarePurpose
------	-----------------

System Package Data Exchange (SPDX), v3.0 – beta 1

73

source SBOM created directly from the development environment, source files, and included dependencies used to build an product artifact.

10.1 Security Profile Classes

10.1.1 CvssV2VulnAssessmentRelationship

Summary

Provides a CVSS version 2.0 assessment for a vulnerability.

Description

A CvssV2VulnAssessmentRelationship relationship describes the determined score and vector of a vulnerability using version 2.0 of the Common Vulnerability Scoring System (CVSS) as defined at <https://www.first.org/cvss/v2/guide>. It is intended to communicate the results of using a CVSS calculator.

Constraints

- The relationship type must be set to hasAssessmentFor.

~~Syntax~~ Example

```
{
  "@type": "CvssV2VulnAssessmentRelationship",
  "@id": "urn:spdx.dev:cvssv2-cve-2020-28498",
  "relationshipType": "hasAssessmentFor",
  "score": 4.3,
  "vectorString": "(AV:N/AC:M/Au:N/C:P/I:N/A:N)",
  "from": "urn:spdx.dev:vuln-cve-2020-28498",
  "to": ["urn:product-acme-application-1.3"],
  "assessedElement": "urn:npm-elliptic-6.5.2",
  "externalRefs": [
    {
      "@type": "ExternalRef",
      "externalRefType": "securityAdvisory",
      "locator": "https://nvd.nist.gov/vuln/detail/CVE-2020-28498"
    },
    {
      "@type": "ExternalRef",
      "externalRefType": "securityAdvisory",
      "locator": "https://snyk.io/vuln/SNYK-JS-ELLIPTIC-1064899"
    },
    {
      "@type": "ExternalRef",
      "externalRefType": "securityFix",
      "locator": "https://github.com/indutny/elliptic/commit/441b742"
    }
  ],
  "suppliedBy": ["urn:spdx.dev:agent-my-security-vendor"],
  "publishedTime": "2023-05-06T10:06:13Z"
},
{
  "@type": "Relationship",
  "@id": "urn:spdx.dev:vulnAgentRel-1",
  "relationshipType": "publishedBy",
  "from": "urn:spdx.dev:cvssv2-cve-2020-28498",
  "to": ["urn:spdx.dev:agent-snyk"],
  "startTime": "2021-03-08T16:06:50Z"
}
```

Metadata

<https://spdx.org/rdf/v3/Security/CvssV2VulnAssessmentRelationship>

Name	CvssV2VulnAssessmentRelationship
Instantiability	Concrete
SubclassOf	VulnAssessmentRelationship

Properties

Property	Type	minCount	maxCount
score	xsd:decimal	1	1
vectorString	xsd:string	1	1

Add new **All Properties** section with details of all inherited properties from classes and super-classes

10.1.2 CvssV3VulnAssessmentRelationship

Summary

Provides a CVSS version 3 assessment for a vulnerability.

Description

A CvssV3VulnAssessmentRelationship relationship describes the determined score, severity, and vector of a vulnerability using version 3.0 or 3.1 of the Common Vulnerability Scoring System (CVSS). It is intended to communicate the results of using a CVSS calculator.

Constraints

- ~~The value of severity must be one of 'NONE', 'LOW', 'MEDIUM', 'HIGH' or 'CRITICAL'.~~
- The relationship type must be set to hasAssessmentFor.

~~Syntax~~ *Example*

```
{
  "@type": "CvssV3VulnAssessmentRelationship",
  "@id": "urn:spdx.dev:cvssv3-cve-2020-28498",
  "relationshipType": "hasAssessmentFor",
  "score": 6.8,
  "severity": "MEDIUM",
  "vectorString": "CVSS:3.1/AV:N/AC:H/PR:N/UI:N/S:C/C:H/I:N/A:N",
  "from": "urn:spdx.dev:vuln-cve-2020-28498",
  "to": ["urn:product-acme-application-1.3"],
  "assessedElement": "urn:npm-elliptic-6.5.2",
  "externalRefs": [
    {
      "@type": "ExternalRef",
      "externalRefType": "securityAdvisory",
      "locator": "https://nvd.nist.gov/vuln/detail/CVE-2020-28498"
    },
    {
      "@type": "ExternalRef",
      "externalRefType": "securityAdvisory",
      "locator": "https://snyk.io/vuln/SNYK-JS-ELLIPTIC-1064899"
    },
    {
      "@type": "ExternalRef",
      "externalRefType": "securityFix",
      "locator": "https://github.com/indutny/elliptic/commit/441b742"
    }
  ],
  "suppliedBy": ["urn:spdx.dev:agent-my-security-vendor"],
  "publishedTime": "2023-05-06T10:06:13Z"
},
{
  "@type": "Relationship",
  "@id": "urn:spdx.dev:vulnAgentRel-1",
  "relationshipType": "publishedBy",
  "from": "urn:spdx.dev:cvssv3-cve-2020-28498",
  "to": "urn:spdx.dev:agent-snyk",
  "startTime": "2021-03-08T16:06:50Z"
}
```

Metadata

<https://spdx.org/rdf/v3/Security/CvssV3VulnAssessmentRelationship>

Name	CvssV3VulnAssessmentRelationship
Instantiability	Concrete
SubclassOf	VulnAssessmentRelationship

Properties

Property	Type	minCount	maxCount
score	xsd:decimal	1	1
severity	CvssSeverityType	1	1
vectorString	xsd:string	1	1

Add new All Properties section with details of all inherited properties from classes and super-classes

10.1.3 CvssV4VulnAssessmentRelationship

Summary

Provides a CVSS version 4 assessment for a vulnerability.

Description

A CvssV4VulnAssessmentRelationship relationship describes the determined score, severity, and vector of a vulnerability using version 4 of the Common Vulnerability Scoring System (CVSS) as defined on <https://www.first.org/cvss/v4.0/specification-document>. It is intended to communicate the results of using a CVSS calculator.

Constraints

- The value of severity must be one of 'NONE', 'LOW', 'MEDIUM', 'HIGH' or 'CRITICAL'.
- The relationship type must be set to hasAssessmentFor.

~~Syntax~~ Example

```
{
  "@type": "CvssV4VulnAssessmentRelationship",
  "@id": "urn:spdx.dev:cvssv4-cve-2021-44228",
  "relationshipType": "hasAssessmentFor",
  "severity": "MEDIUM",
  "score": 10.0,
  "vectorString": "CVSS:4.0/AV:N/AC:L/AT:N/AR:N/UE:N/VCH:VI:H/VA:H/SC:H/SI:H/SA:H/E:A",
  "from": "urn:spdx.dev:vuln-cve-2021-44228",
  "to": ["urn:product-acme-application-1.3"],
  "assessedElement": "urn:apache-log4j-2.14.1",
  "externalRefs": [
    {
      "@type": "ExternalRef",
      "externalRefType": "securityAdvisory",
      "locator": "https://nvd.nist.gov/vuln/detail/CVE-2021-44228"
    },
    {
      "@type": "ExternalRef",
      "externalRefType": "securityAdvisory",
      "locator": "https://logging.apache.org/log4j/2.x/security.html"
    },
    {
      "@type": "ExternalRef",
      "externalRefType": "securityOther",
      "locator": "https://www.first.org/cvss/v4.0/examples#Apache-log4j-JNDI-Command-Execution-log4shell-Vulnerability-CVE-2021-44228"
    }
  ]
}
```



```
"suppliedBy": ["urn:spdx.dev:agent-my-security-vendor"],
"publishedTime": "2023-10-05T23:09:13Z"
},
```

```
{
"@type": "Relationship",
"@id": "urn:spdx.dev:vulnAgentRel-1",
"relationshipType": "publishedBy",
"from": "urn:spdx.dev:cvssv4-cve-2021-44228",
"to": "urn:spdx.dev:agent-apache.org",
"startTime": "2021-12-11T18:39:00Z"
}
```

Metadata

<https://spdx.org/rdf/v3/Security/CvssV4VulnAssessmentRelationship>

Name	CvssV4VulnAssessmentRelationship
Instantiability	Concrete
SubclassOf	VulnAssessmentRelationship

Properties

Property	Type	minCount	maxCount
score	xsd.decimal	1	1
severity	CvssSeverityType	1	1
vectorString	xsd.string	1	1

Add new All Properties section with details of all inherited properties from classes and super-classes

10.1.4 EpssVulnAssessmentRelationship

Summary

Provides an EPSS assessment for a vulnerability.

Description

An EpssVulnAssessmentRelationship relationship describes the likelihood or probability that a vulnerability will be exploited in the wild using the Exploit Prediction Scoring System (EPSS) as defined at <https://www.first.org/epss/model>.

Constraints

- The relationship type must be set to hasAssessmentFor.
- The probability must be between 0 and 1.
- The percentile must be between 0 and 1.

~~Syntax~~ Example

```
{
"@type": "EpssVulnAssessmentRelationship",
"@id": "urn:spdx.dev:epss-CVE-2020-28498",
"relationshipType": "hasAssessmentFor",
"probability": 0.00105,
"percentile": 0.42356,
"from": "urn:spdx.dev:vuln-cve-2020-28498",
"to": ["urn:product-acme-application-1.3"],
"suppliedBy": ["urn:spdx.dev:agent-jane-doe"],
"publishedTime": "2023-10-05T00:30Z"
}
```

Metadata

<https://spdx.org/rdf/v3/Security/EpssVulnAssessmentRelationship>



SubclassOf	VulnAssessmentRelationship
------------	----------------------------

Properties

Property	Type	minCount	maxCount
percentile	xsd:decimal	1	1
probability	xsd:decimal	1	1
publishedTime	/Core/DateTime	1	1

Add new All Properties section with details of all inherited properties from classes and super-classes

10.1.5 ExploitCatalogVulnAssessmentRelationship

Summary

Provides an exploit assessment of a vulnerability.

Description

An ExploitCatalogVulnAssessmentRelationship describes if a vulnerability is listed in any exploit catalog such as the CISA Known Exploited Vulnerabilities Catalog (KEV) <https://www.cisa.gov/known-exploited-vulnerabilities-catalog>.

Constraints

- The relationship type must be set to hasAssessmentFor.

~~Syntax~~

Example

```
{
  "@type": "ExploitCatalogVulnAssessmentRelationship",
  "@id": "urn:spdx.dev:exploit-catalog-1",
  "relationshipType": "hasAssessmentFor",
  "catalogType": "kev",
  "locator": "https://www.cisa.gov/known-exploited-vulnerabilities-catalog",
  "exploited": "true",
  "from": "urn:spdx.dev:vuln-cve-2023-2136",
  "to": ["urn:product-google-chrome-112.0.5615.136"],
  "suppliedBy": ["urn:spdx.dev:agent-jane-doe"],
  "publishedTime": "2021-03-09T11:04:53Z"
}
```

Metadata

<https://spdx.org/rdf/v3/Security/ExploitCatalogVulnAssessmentRelationship>

Name	ExploitCatalogVulnAssessmentRelationship
Instantiability	Concrete
SubclassOf	VulnAssessmentRelationship

Properties

Property	Type	minCount	maxCount
catalogType	ExploitCatalogType	1	1
exploited	xsd:boolean	1	1
locator	xsd:anyURI	1	1

Add new All Properties section with details of all inherited properties from classes and super-classes

10.1.6 SsvcVulnAssessmentRelationship

Summary

Provides an SSVC assessment for a vulnerability.



SubclassOf	VulnAssessmentRelationship
------------	----------------------------

Properties

Property	Type	minCount	maxCount
percentile	xsd:decimal	1	1
probability	xsd:decimal	1	1
publishedTime	/Core/DateTime	1	1

Add new All Properties section with details of all inherited properties from classes and super-classes

10.1.5 ExploitCatalogVulnAssessmentRelationship

Summary

Provides an exploit assessment of a vulnerability.

Description

An ExploitCatalogVulnAssessmentRelationship describes if a vulnerability is listed in any exploit catalog such as the CISA Known Exploited Vulnerabilities Catalog (KEV) <https://www.cisa.gov/known-exploited-vulnerabilities-catalog>.

Constraints

- The relationship type must be set to hasAssessmentFor.

~~Syntax~~ Example

```
{
  "@type": "ExploitCatalogVulnAssessmentRelationship",
  "@id": "urn:spdx.dev:exploit-catalog-1",
  "relationshipType": "hasAssessmentFor",
  "catalogType": "kev",
  "locator": "https://www.cisa.gov/known-exploited-vulnerabilities-catalog",
  "exploited": "true",
  "from": "urn:spdx.dev:vuln-cve-2023-2136",
  "to": ["urn:product-google-chrome-112.0.5615.136"],
  "suppliedBy": ["urn:spdx.dev:agent-jane-doe"],
  "publishedTime": "2021-03-09T11:04:53Z"
}
```

Metadata

<https://spdx.org/rdf/v3/Security/ExploitCatalogVulnAssessmentRelationship>

Name	ExploitCatalogVulnAssessmentRelationship
Instantiability	Concrete
SubclassOf	VulnAssessmentRelationship

Properties

Property	Type	minCount	maxCount
catalogType	ExploitCatalogType	1	1
exploited	xsd:boolean	1	1
locator	xsd:anyURI	1	1

Add new All Properties section with details of all inherited properties from classes and super-classes

10.1.6 SsvcVulnAssessmentRelationship

Summary

Provides an SSVC assessment for a vulnerability.

Description

An SsvcVulnAssessmentRelationship describes the decision made using the Stakeholder- Specific Vulnerability Categorization (SSVC) decision tree as defined on <https://www.cisa.gov/stakeholder-specific-vulnerability-categorization-ssvc>. It is intended to communicate the results of using the CISA SSVC Calculator.

Constraints

- The relationship type must be set to hasAssessmentFor.

~~Syntax~~ Example

```
{
  "@type": "SsvcVulnAssessmentRelationship",
  "@id": "urn:spdx.dev:ssvc-1",
  "relationshipType": "hasAssessmentFor",
  "decisionType": "act",
  "from": "urn:spdx.dev:vuln-cve-2020-28498",
  "to": ["urn:product-acme-application-1.3"],
  "assessedElement": "urn:npm-elliptic-6.5.2",
  "suppliedBy": ["urn:spdx.dev:agent-jane-doe"],
  "publishedTime": "2021-03-09T11:04:53Z"
}
```

Metadata

<https://spdx.org/rdf/v3/Security/SsvcVulnAssessmentRelationship>

Name	SsvcVulnAssessmentRelationship
Instantiability	Concrete
SubclassOf	VulnAssessmentRelationship

Properties

Property	Type	minCount	maxCount
decisionType	SsvcDecisionType	1	1

Add new All Properties section with details of all inherited properties from classes and super-classes

10.1.7 VexAffectedVulnAssessmentRelationship

Summary

Connects a vulnerability and an element designating the element as a product affected by the vulnerability.

Description

VexAffectedVulnAssessmentRelationship connects a vulnerability and a number of elements.

The relationship marks these elements as products affected by the vulnerability. This relationship corresponds to the VEX affected status.

Constraints

When linking elements using a VexAffectedVulnAssessmentRelationship, the following requirements must be observed:

- Elements linked with a VulnVexAffectedAssessmentRelationship are constrained to the affects relationship type.

~~Syntax~~ Example

```
{
  "@type": "VexAffectedVulnAssessmentRelationship",
  "@id": "urn:spdx.dev:vex-affected-1",
}
```

```

"relationshipType": "affects",
"from": "urn:spdx.dev:vuln-cve-2020-28498",

"to": ["urn:product-acme-application-1.3"],
"assessedElement": "urn:npm-elliptic-6.5.2",
"actionStatement": "Upgrade to version 1.4 of ACME application.",
"suppliedBy": ["urn:spdx.dev:agent-jane-doe"],
"publishedTime": "2021-03-09T11:04:53Z"
}

```

Metadata

<https://spdx.org/rdf/v3/Security/VexAffectedVulnAssessmentRelationship>

Name	VexAffectedVulnAssessmentRelationship
Instantiability	Concrete
SubclassOf	VexVulnAssessmentRelationship

Properties

Property	Type	minCount	maxCount
actionStatement	xsd:string	0	1
actionStatementTime	/Core/DateTime	0	*

Add new All Properties section with details of all inherited properties from classes and super-classes

10.1.8 VexFixedVulnAssessmentRelationship

Summary

Links a vulnerability and elements representing products (in the VEX sense) where a fix has been applied and are no longer affected.

Description

VexFixedVulnAssessmentRelationship links a vulnerability to a number of elements representing VEX products where a vulnerability has been fixed and are no longer affected. It represents the VEX fixed status.

Constraints

When linking elements using a VexFixedVulnAssessmentRelationship, the following requirements must be observed:

- Elements linked with a VulnVexFixedAssessmentRelationship are constrained to using the fixedIn relationship type.
- The from: end of the relationship must be a /Security/Vulnerability classed element.

~~Syntax~~ *Example*

```

{
"@type": "VexFixedVulnAssessmentRelationship",
"@id": "urn:spdx.dev:vex-fixed-in-1",
"relationshipType": "fixedIn",
"from": "urn:spdx.dev:vuln-cve-2020-28498",
"to": ["urn:product-acme-application-1.3"],
"assessedElement": "urn:npm-elliptic-6.5.4",
"suppliedBy": ["urn:spdx.dev:agent-jane-doe"],
"publishedTime": "2021-03-09T11:04:53Z"
}

```

Metadata

<https://spdx.org/rdf/v3/Security/VexFixedVulnAssessmentRelationship>

Name	VexAffectedVulnAssessmentRelationship
------	---------------------------------------

Instantiability	Concrete
SubclassOf	VexVulnAssessmentRelationship

Properties

Property	Type	minCount	maxCount
actionStatement	xsd:string	0	1
actionStatementTime	/Core/DateTime	0	*

Add new All Properties section with details of all inherited properties from classes and super-classes

10.1.9 Vex NotAffectedVulnAssessmentRelationship

Summary

Links a vulnerability and one or more elements designating the latter as products not affected by the vulnerability.

Description

VexNotAffectedVulnAssessmentRelationship connects a vulnerability and a number of elements designating them as products not affected by the vulnerability. This relationship corresponds to the VEX not_affected status.

Constraints

When linking elements using a VexNotVulnAffectedAssessmentRelationship, the following requirements must be observed:

- Relating elements with a VexNotAffectedVulnAssessmentRelationship is restricted to the doesNotAffect relationship type.
- The from: end of the relationship must be a /Security/Vulnerability classed element.
- Both impactStatement and justificationType properties have a cardinality of 0..1 making them optional. Nevertheless, to produce a valid VEX not_affected statement, one of them MUST be defined. This is specified in the Minimum Elements for VEX.

~~Syntax~~ Example

```
{
  "@type": "VexNotAffectedVulnAssessmentRelationship",
  "@id": "urn:spdx.dev:vex-not-affected-1",
  "relationshipType": "doesNotAffect",
  "from": "urn:spdx.dev:vuln-cve-2020-28498",
  "to": ["urn:product-acme-application-1.3"],
  "assessedElement": "urn:npm-elliptic-6.5.2",
  "justificationType": "componentNotPresent",
  "impactStatement": "Not using this vulnerable part of this library.",
  "suppliedBy": ["urn:spdx.dev:agent-jane-doe"],
  "publishedTime": "2021-03-09T11:04:53Z"
}
```

Metadata

<https://spdx.org/rdf/v3/Security/VexFixedVulnAssessmentRelationship>

Name	VexFixedVulnAssessmentRelationship
Instantiability	Concrete
SubclassOf	VexVulnAssessmentRelationship

Properties

Property	Type	minCount	maxCount
impactStatement	xsd:string	0	1
impactStatementTime	/Core/DateTime	0	1
justificationType	VexJustificationType	0	1

Add new All Properties section with details of all inherited properties from classes and super-classes

10.1.10 VexUnderInvestigationVulnAssessmentRelationship

Summary

Designates elements as products where the impact of a vulnerability is being investigated.

Description

VexUnderInvestigationVulnAssessmentRelationship links a vulnerability to a number of products stating the vulnerability's impact on them is being investigated. It represents the VEX under_investigation status.

Constraints

When linking elements using a VexUnderInvestigationVulnAssessmentRelationship the following requirements must be observed:

- Elements linked with a VexUnderInvestigationVulnAssessmentRelationship are constrained to using the underInvestigationFor relationship type.
- The from: end of the relationship must be a /Security/Vulnerability classed element.

~~Syntax~~ *Example*

```
{
  "@type": "VexUnderInvestigationVulnAssessmentRelationship",
  "@id": "urn:spdx.dev:vex-underInvestigation-1",
  "relationshipType": "underInvestigationFor",
  "from": "urn:spdx.dev:vuln-cve-2020-28498",
  "to": ["urn:product-acme-application-1.3"],
  "assessedElement": "urn:npm-elliptic-6.5.2",
  "suppliedBy": ["urn:spdx.dev:agent-jane-doe"],
  "publishedTime": "2021-03-09T11:04:53Z"
}
```

Metadata

<https://spdx.org/rdf/v3/Security/VexUnderInvestigationVulnAssessmentRelationship>

Name	VexNotAffectedVulnAssessmentRelationship
Instantiability	Concrete
SubclassOf	VexVulnAssessmentRelationship

Properties

Property	Type	minCount	maxCount
----------	------	----------	----------

Add new All Properties section with details of all inherited properties from classes and super-classes

10.1.11 VexVulnAssessmentRelationship

Summary

Abstract ancestor class for all VEX relationships

Description

VexVulnAssessmentRelationship is an abstract subclass that defined the common properties shared by all the SPDX-VEX status relationships.

Constraints

When linking elements using a VexVulnAssessmentRelationship, the following requirements must be observed:

- The from: end must be a /Security/Vulnerability classed element

Summary

Specifies a vulnerability and its associated information.

Description

Specifies a vulnerability and its associated information.

~~Syntax~~ *Example*

```
{
  "@type": "Vulnerability",
  "@id": "urn:spdx.dev:vuln-1",
  "summary": "Use of a Broken or Risky Cryptographic Algorithm",
  "description": "The npm package 'elliptic' before version 6.5.4 are vulnerable to Cryptographic Issues via the secp256k1 implementation in elliptic/ec-key.js. There is no check to confirm that the public key point passed into the derive function actually exists on the secp256k1 curve. This results in the potential for the private key used in this implementation to be revealed after a number of ECDH operations are performed.",
  "modified": "2021-03-08T16:02:43Z",
  "published": "2021-03-08T16:06:50Z",
  "externalIdentifiers": [
    {
      "@type": "ExternalIdentifier",
      "externalIdentifierType": "cve",
      "identifier": "CVE-2020-2849",
      "identifierLocator": [
        "https://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2020-28498",
        "https://www.cve.org/CVERecord?id=CVE-2020-28498"
      ],
      "issuingAuthority": "urn:spdx.dev:agent-cve.org"
    },
    {
      "type": "ExternalIdentifier",
      "externalIdentifierType": "securityOther",
      "identifier": "GHSA-r9p9-mrjm-926w",
      "identifierLocator": "https://github.com/advisories/GHSA-r9p9-mrjm-926w"
    },
    {
      "type": "ExternalIdentifier",
      "externalIdentifierType": "securityOther",
      "identifier": "SNYK-JS-ELLIPTIC-1064899",
      "identifierLocator": "https://security.snyk.io/vuln/SNYK-JS-ELLIPTIC-1064899"
    }
  ],
  "externalRefs": [
    {
      "@type": "ExternalRef",
      "externalRefType": "securityAdvisory",
      "locator": "https://nvd.nist.gov/vuln/detail/CVE-2020-28498"
    },
    {
      "@type": "ExternalRef",
      "externalRefType": "securityAdvisory",
      "locator": "https://ubuntu.com/security/CVE-2020-28498"
    },
    {
      "@type": "ExternalRef",
      "externalRefType": "securityOther",
      "locator": "https://github.com/indutny/elliptic/pull/244/commits"
    },
    {
      "@type": "ExternalRef",
      "externalRefType": "securityOther",
      "locator": "https://github.com/christianlundkvist/blog/blob/master/2020_05_26_secp256k1_twist_attacks/secp256k1_twist_attacks.md"
    }
  ],
  {
    "@type": "Relationship",
    "@id": "urn:spdx.dev:vulnRelationship-1",
    "relationshipType": "hasAssociatedVulnerability",
  }
}
```


- /Security/CvssV2VulnAssessmentRelationship
- /Security/CvssV3VulnAssessmentRelationship
- /Security/CvssV4VulnAssessmentRelationship

10.2.19 vexVersion

Summary

Specifies the version of the VEX document.

Description

The document version default value is zero. When any VEX-related content changes, the version must be incremented.

Metadata

<https://spdx.org/rdf/v3/Security/vexVersion>

Name	vexVersion
Nature	DataProperty
Range	xsd:string

Referenced

- /Security/VexVulnAssessmentRelationship

10.2.20 withdrawnTime

Summary

Specifies the time and date when a vulnerability was withdrawn.

Description

Specifies the time and date when a vulnerability was withdrawn.

Metadata

<https://spdx.org/rdf/v3/Security/withdrawnTime>

Name	withdrawnTime
Nature	DataProperty
Range	/Core/DateTime

Referenced

- /Security/VulnAssessmentRelationship
- /Security/Vulnerability

statement

11 Licensing Profile

Summary

The Licensing Profile defines a minimum set of license information to facilitate compliance with typical license use cases.

Description

The Licensing profile only contains the additional requirement that any Software Artifact must have a ~~concludedLicense~~ Relationship. hasConcludedLicense

Classes and Property restrictions are defined in the SimpleLicensingProfile (Classes and Properties associated with string license expressions) and in the ExpandedLicensingProfile (Classes and Properties used for a fully parsed syntax tree of license expressions).

There are 2 relationship types related to licensing - ~~declaredLicense~~ and ~~concludedLicense~~. hasDeclaredLicense hasConcludedLicense

A ~~declaredLicense~~ hasDeclaredLicense identifies the license information actually found in the Software Artifact, for example as detected by use of automated tooling.

This field is not intended to capture license information obtained from an external source, such as a package's website. Such information can be included, as needed, in the concludedLicense field.

A ~~declaredLicense~~ hasDeclaredLicense may be expressed differently in practice for different types of Software Artifacts. For example:

- for Packages:
 - would include license info for the Package as a whole, found in the Package itself (e.g., LICENSE file, README file, metadata in the Package, etc.)
 - would not include any license information that is not in the Package itself (e.g., license information from the project's website or from a third party repository or website)
- for Files:
 - would include license info found in the File itself (e.g., license header or notice, comments indicating the license, SPDX-License-Identifier expression)
 - would not include license info found in a different file (e.g., LICENSE file in the top directory of a repository)
- for Snippets:
 - would include license info found in the Snippet itself (e.g., license notice, comments, SPDX-License-Identifier expression)
 - would not include license info found elsewhere in the File or in a different File (e.g., comment at top of File if it is not within the Snippet, LICENSE file in the top directory of a repository)

A ~~declaredLicense~~ hasDeclaredLicense relationship to NoneLicense indicates that the corresponding Package, File or Snippet contains no license information whatsoever.

A ~~declaredLicense~~ hasDeclaredLicense relationship to NoAssertionLicense indicates that one of the following applies: * the SPDX data creator has attempted to but cannot reach a reasonable objective determination; * the SPDX data creator has made no attempt to determine this field; or * the SPDX data creator has intentionally provided no information (no meaning should be implied by doing so).

If a declaredLicense relationship is not present, no assumptions can be made about whether or not a ~~declaredLicense~~ hasDeclaredLicense exists. Note that a missing ~~declaredLicense~~ hasDeclaredLicense is not the same as a relationship to NoAssertionLicense since the latter is a "known unknown" whereas no assumptions can be made from a missing ~~declaredLicense~~ hasDeclaredLicense relationship.

A ~~concludedLicense~~ hasConcludedLicense is the license identified by the SPDX data creator, based on analyzing the license information in the Software Artifact and other information to arrive at a reasonably objective conclusion as to what license governs the Software Artifact.

A ~~concludedLicense~~ hasConcludedLicense relationship to NoneLicense indicates that the SPDX data creator has looked and did not find any license information for this Software Artifact.

If the `hasConcludedLicense` for a Software Artifact is not the same as its `hasDeclaredLicense`, a written explanation SHOULD be provided in the `hasConcludedLicense` relationship comment field.

A written explanation of a relationship to a `NoAssertionLicense` MAY be provided in the comment field for the relationship.

`hasDeclaredLicense`

12 Dataset Profile

Summary

~~Everything having to do with datasets.~~

Description

~~The Dataset profile provides meta-data about data files. Figure 9 below shows the logical model for the Dataset profile with its classes and enumerations.~~

Metadata

Name	Dataset
------	---------

Move figures to Annex B

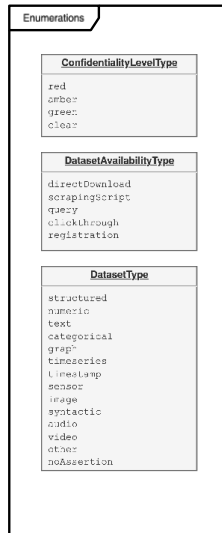
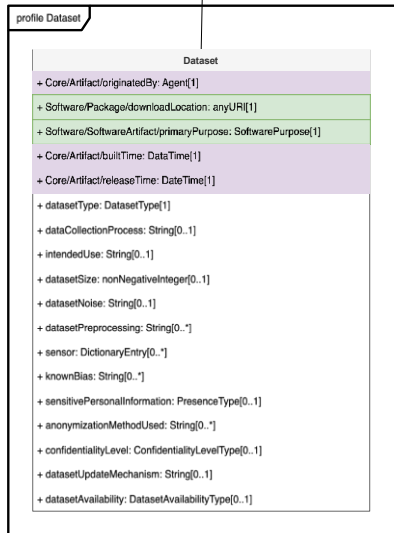
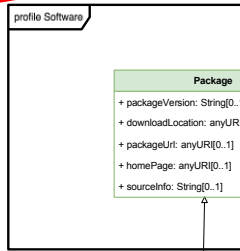


Figure 13 – Dataset Model profile and enumerations

Figure 5

Summary

The Dataset Profile provides additional metadata, based on Software Profile, that is useful for datasets.

Description

The Dataset namespace defines concepts related to dataset, including its preparation process, its characteristics, and its access methods.

Figure 5 in Annex B

Profile conformance

For an element collection to be conformant with this profile, the following has to hold:

1. for every /Dataset/DatasetPackage there MUST exist exactly one /Core/Relationship of type hasConcludedLicense having that element as its from property and an /SimpleLicensing/AnyLicenseInfo as its to property.
2. for every /Dataset/DatasetPackage there MUST exist exactly one /Core/Relationship of type hasDeclaredLicense having that element as its from property and an /SimpleLicensing/AnyLicenseInfo as its to property.

12.1 Dataset Classes

12.1.1 Dataset

Summary

Specifies a data package and its associated information.

~~Provides information about the fields in the Dataset profile.~~

Description

Metadata information that can be added to a dataset that may be used in a software or to train/test an AI package.

Metadata

<https://spdx.org/rdf/v3/Dataset/Dataset>

Name	Dataset
Instantiability	Concrete
SubclassOf	/Software/Package

Properties

Property	Type	minCount	maxCount
anonymizationMethodUsed	xsd:string	0	*
confidentialityLevel	ConfidentialityLevelType	0	1
dataCollectionProcess	xsd:string	0	1
dataPreprocessing	xsd:string	0	*
datasetAvailability	DatasetAvailabilityType	0	1
datasetNoise	xsd:string	0	1
datasetSize	xsd:nonNegativeInteger	0	1
datasetType	DatasetType	1	*
datasetUpdateMechanism	xsd:string	0	1
intendedUse	xsd:string	0	1
knownBias	xsd:string	0	*
sensitivePersonalInformation	/Core/PresenceType	0	1
sensor	/Core/DictionaryEntry	0	*

Add new All Properties section with details of all inherited properties from classes and super-classes

12.2 Dataset Properties

12.2.1 anonymizationMethodUsed

Summary

Describes the anonymization methods used.

Description

~~AnonymizationMethodUsed~~ **A free-form text that** describes the methods used to anonymize the dataset (of fields in the dataset).

Metadata

<https://spdx.org/rdf/v3/Dataset/anonymizationMethodUsed>

Name	anonymizationMethodUsed
Nature	DataProperty
Range	xsd:stringReferenced

/Dataset/Dataset

12.2.2 confidentialityLevel

Summary

Describes the confidentiality level of the data points contained in the dataset.

Description

~~ConfidentialityLevel~~ describes the levels of confidentiality of the data points contained in the dataset.

Metadata

<https://spdx.org/rdf/v3/Dataset/confidentialityLevel>

Name	confidentialityLevel
Nature	ObjectProperty
Range	ConfidentialityLevelType

Referenced

/Dataset/Dataset

12.2.3 dataCollectionProcess

Summary

~~Describes~~ **A free-form text that** describes how the dataset was collected.

Description

DataCollectionProcess describes how a dataset was collected. Examples include the sources from which a dataset was scrapped or the interview protocol that was used for data collection.

Metadata

<https://spdx.org/rdf/v3/Dataset/dataCollectionProcess>

Name	dataCollectionProcess
Nature	DataProperty
Range	xsd:string

Referenced

- /Dataset/Dataset

12.2.4 dataPreprocessing

Summary

Describes the preprocessing steps that were applied to the raw data to create the given dataset.

Description

A free-form text that

~~DataPreprocessing~~ describes the various preprocessing steps that were applied to the raw data to create the dataset.

Examples include standardization, normalization, deduplication, tokenization, and removal of tokens.

Metadata

<https://spdx.org/rdf/v3/Dataset/dataPreprocessing>

Name	dataPreprocessing
Nature	DataProperty
Range	xsd:string

Referenced

- /Dataset/Dataset

12.2.5 datasetAvailability

Summary

The field describes the availability of a dataset.

Description

Some datasets are publicly available and can be downloaded directly. Others are only accessible behind a clickthrough, or after filling a registration form. This field will describe the dataset availability from that perspective.

Metadata

<https://spdx.org/rdf/v3/Dataset/datasetAvailability>

Name	datasetAvailability
Nature	DataProperty
Range	DatasetAvailabilityType

Referenced

- /Dataset/Dataset

12.2.6 datasetNoise

Summary

Describes potentially noisy elements of the dataset.

Description

~~DatasetNoise~~ describes what kinds of noises a dataset might encompass. The ~~field uses~~ free form text ~~to specify the~~ fields or the samples that might be noisy. Alternatively, it can also be used to describe various noises that could impact the whole dataset. **specifies**

Metadata

<https://spdx.org/rdf/v3/Dataset/datasetNoise>

Name	datasetNoise
Nature	DataProperty
Range	xsd:string

Referenced

- /Dataset/Dataset

12.2.7 datasetSize

Summary

Captures the size of the dataset.

Description

~~DatasetSize~~ Captures how large a dataset is. The size is to be measured in bytes.

Metadata

<https://spdx.org/rdf/v3/Dataset/datasetSize>

fix pagination



Nature	DataProperty
Range	xsd:nonNegativeInteger

Referenced

- /Dataset/Dataset

12.2.8 datasetType

Summary

Describes the type of the given dataset.

Description

A free-form text that

~~type~~ describes the datatype contained in the dataset. For example a dataset can be an image dataset for computer vision applications, a text dataset such as the contents of a book or Wikipedia article, or sometimes a multimodal dataset that contains multiple types of data.

Metadata

<https://spdx.org/rdf/v3/Dataset/datasetType>

Name	datasetType
Nature	DataProperty
Range	DatasetType

Referenced

- /Dataset/Dataset

12.2.9 datasetUpdateMechanism

Summary

Describes a mechanism to update the dataset.

Description

~~DatasetUpdateMechanism~~ describes a mechanism to update the dataset.

Metadata

<https://spdx.org/rdf/v3/Dataset/datasetUpdateMechanism>

Name	datasetUpdateMechanism
Nature	DataProperty
Range	xsd:string

Referenced

[/Dataset/Dataset](#)

12.2.10 intendedUse

Summary

Describes what the given dataset should be used for.

Description

A free-form text that

~~intendedUse~~ describes what the given dataset should be used for. Some datasets are collected to be used only for particular purposes. For example, medical data collected from a specific demography might only be applicable for training machine learning models to make predictions for that demography. In such a case, the intendedUse field would capture this information. Similarly, if a dataset is collected for building a facial recognition model, the intendedUse field would specify that.

Metadata

<https://spdx.org/rdf/v3/Dataset/intendedUse>

Name	intendedUse
Nature	DataProperty
Range	xsd:string

Referenced

[/Dataset/Dataset](#)

12.2.11 knownBias

Summary

Records the biases that the dataset is known to encompass.

Description

~~KnownBias~~ is a free form text field that describes the different biases that the dataset encompasses.

Metadata

<https://spdx.org/rdf/v3/Dataset/knownBias>

Name	knownBias
Nature	DataProperty
Range	xsd:string

Referenced

[/Dataset/Dataset](#)

System Package Data Exchange (SPDX)

14.2.10 hasSensitivePersonalInformation

Summary

Describes if any sensitive personal information is present in the dataset.

Description

Indicates the presence of sensitive personal data or information that allows drawing conclusions about a person's identity.

Related: useSensitivePersonalInformation in /AI/AIPackage

Metadata

<https://spdx.org/rdf/3.0.1/terms/Dataset/hasSensitivePersonalInformation>

Name:	hasSensitivePersonalInformation
Nature:	ObjectProperty
Range:	/Core/PresenceType

Referenced

[/Dataset/DatasetPackage](#)

~~12.2.12 sensitivePersonalInformation~~

~~Summary~~

~~Describes if any sensitive personal information is present in the dataset.~~

~~Description~~

~~SensitivePersonalInformation indicates the presence of sensitive personal data or information that allows drawing conclusions about a person's identity.~~

~~Metadata~~

~~<https://spdx.org/rdf/v3/Dataset/sensitivePersonalInformation>~~

Name	sensitivePersonalInformation
Nature	ObjectProperty
Range	/Core/PresenceType

~~Referenced~~

~~/Dataset/Dataset~~

12.2.13 sensor

Summary

Describes a sensor used for collecting the data.

Description

~~Sensor~~ describes a sensor that was used for collecting the data and its calibration value as a key-value pair.

Metadata

<https://spdx.org/rdf/v3/Dataset/sensor>

Name	sensor
Nature	ObjectProperty
Range	/Core/DictionaryEntry

Referenced

/Dataset/Dataset

13 AI Profile

Summary

Additional metadata based on software profile, that is useful for ai applications and models.

Description

The AI profile namespace defines concepts related to AI application and model artifacts. Figure 10 below shows the logical model for the AI profile with its classes and enumerations. These artifacts are the tangible outputs of the AI development process, such as software packages, models, and datasets.

a set of and data elements system

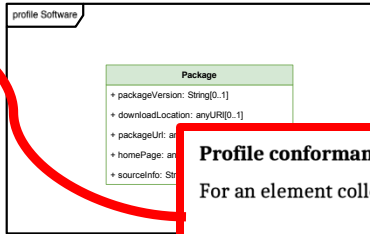
Figure 6 in Annex B

Metadata

Name	AI
------	----

<https://spdx.org/rdf/3.0.1/terms/AI>

see figures to Annex



Profile conformance

For an element collection to be conformant with this profile, the following has to hold:

1. for every /AI/AIPackage there MUST exist exactly one /Core/Relationship of type hasConcludedLicense having that element as its from property and an /SimpleLicensing/AnyLicenseInfo as its to property.
2. for every /AI/AIPackage there MUST exist exactly one /Core/Relationship of type hasDeclaredLicense having that element as its from property and an /SimpleLicensing/AnyLicenseInfo as its to property.

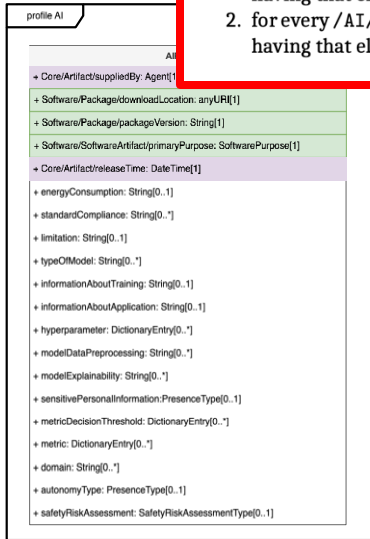


Figure 14 – AI Model profile and enumerations

Figure 6

13.1 AI Classes

13.1.1 AIPackage

Summary

Specifies an AI package and its associated information.

~~Provides information about the fields in the AI package profile.~~

Description

Metadata information that can be added to a package to describe an AI application or trained AI model.

Metadata

<https://spdx.org/rdf/v3/AI/AIPackage>

Name	AIPackage
Instantiability	Concrete
SubclassOf	/Software/Package

Properties

Property	Type	minCount	maxCount
autonomyType	/Core/PresenceType	0	1
domain	xsd:string	0	*
energyConsumption	xsd:string	0	1
hyperparameter	/Core/DictionaryEntry	0	*
informationAboutApplication	xsd:string	0	1
informationAboutTraining	xsd:string	0	1
limitation	xsd:string	0	1
metric	/Core/DictionaryEntry	0	*
metricDecisionThreshold	/Core/DictionaryEntry	0	*
modelDataPreprocessing	xsd:string	0	*
modelExplainability	xsd:string	0	*
safetyRiskAssessment	SafetyRiskAssessmentType	0	1
sensitivePersonalInformation	/Core/PresenceType	0	1
standardCompliance	xsd:string	0	*
typeOfModel	xsd:string	0	*

Add new All Properties section with details of all inherited properties from classes and super-classes

13.1.2 autonomyType

Summary

States if a human is involved in the decisions of the AI software.

Description

AutonomyType indicates if a human is involved in any of the decisions of the AI software or if that software is fully automatic.

13.1 AI Classes

13.1.1 AIPackage

Summary

Provides information about the fields in the AI package pr

Description

Metadata information that can be added to a package to de

Metadata

https://spdx.org/rdf/v3/AI/AIPackage

Name	AIPackage
Instantiability	Concrete
SubclassOf	/Software/Packag

Properties

Property	Type
autonomyType	/Core/PresenceType
domain	xsd:string
energyConsumption	xsd:string
hyperparameter	/Core/DictionaryEntry
informationAboutApplication	xsd:string
informationAboutTraining	xsd:string
limitation	xsd:string
metric	/Core/DictionaryEntry
metricDecisionThreshold	/Core/DictionaryEntry
modelDataPreprocessing	xsd:string
modelExplainability	xsd:string
safetyRiskAssessment	SafetyRiskAssessment
sensitivePersonalInformation	/Core/PresenceType
standardCompliance	xsd:string
typeOfModel	xsd:string

Add new All Properties section with details of all int

13.1.2 autonomyType

Summary

States if a human is involved in the decisions of the AI sof

Description

AutonomyType indicates if a human is involved in any of automatic

15.1.2 EnergyConsumption

Summary

A class for describing the energy consumption incurred by an AI model in different stages of its lifecycle.

Description

A class to denote the known or estimated energy consumption of an AI model during its training, fine-tuning, and inference stages.

Example

```
{
  "type": "ai_EnergyConsumption",
  "ai_trainingEnergyConsumption": [
    {
      "type": "ai_EnergyConsumptionDescription",
      "ai_energyQuantity": "36.5",
      "ai_energyUnit": "kilowattHour"
    }
  ],
  "ai_inferenceEnergyConsumption": [
    {
      "type": "ai_EnergyConsumptionDescription",
      "ai_energyQuantity": "0.042",
      "ai_energyUnit": "kilowattHour"
    }
  ]
}
```

Metadata

https://spdx.org/rdf/3.0.1/terms/AI/EnergyConsumption

Name:	EnergyConsumption
Instantiability:	Concrete

Properties

Property	Type	minCount	maxCount
finetuningEnergyConsumption	EnergyConsumptionDescription	0	*
inferenceEnergyConsumption	EnergyConsumptionDescription	0	*
trainingEnergyConsumption	EnergyConsumptionDescription	0	*

All properties (informative)

Property	Type	minCount	maxCount
finetuningEnergyConsumption	EnergyConsumptionDescription	0	*
inferenceEnergyConsumption	EnergyConsumptionDescription	0	*
trainingEnergyConsumption	EnergyConsumptionDescription	0	*

15.1.3 EnergyConsumptionDescription

Summary

The class that helps note down the quantity of energy consumption and the unit used for measurement.

Description

This class is designed to store energy consumption data, including the quantity and the unit of measurement.

The energyQuantity property stores the amount of energy consumed, and the energyUnit property stores the unit used for measurement.

For example, 0.0042 kilowatt-hour of energy will have 0.042 as a value for property energyQuantity, and "kilowattHour" as a value for property energyUnit.

Example

```
{
  "type": "ai_EnergyConsumptionDescription",
  "ai_energyQuantity": "0.042",
  "ai_energyUnit": "kilowattHour"
}
```

Metadata

https://spdx.org/rdf/3.0.1/terms/AI/EnergyConsumptionDescription

Name:	EnergyConsumptionDescription
Instantiability:	Concrete

Properties

Property	Type	minCount	maxCount
energyQuantity	xsd:decimal	1	1
energyUnit	EnergyUnitType	1	1

All properties (informative)

Property	Type	minCount	maxCount
energyQuantity	xsd:decimal	1	1
energyUnit	EnergyUnitType	1	1

Metadata

~~https://spdx.org/rdf/v3/AI/autonomyType~~

Name	autonomyType
Nature	ObjectProperty
Range	/Core/PresenceType

Referenced

- ~~□ /AI/AIPackage~~

13.2 AI Properties

13.2.1 domain

Summary

Captures the domain in which the AI package can be used.

Description

A free-form text that where

~~Domain~~ describes the domain in ~~which~~ the AI model contained in the AI software can be expected to operate successfully. Examples include computer vision, natural language etc.

Metadata

https://spdx.org/rdf/v3/AI/domain

Name	domain
Nature	DataProperty
Range	xsd:string

Referenced

- /AI/AIPackage

13.2.2 energyConsumption

Summary

The class that helps note down the quantity of energy consumption and the unit used for measurement.

~~indicates the amount of energy consumed to build the AI package.~~

Description

~~EnergyConsumption captures the amount of energy needed to train and operate the AI model. This value is also known as training energy consumption or inference energy consumption.~~

Metadata

Description

A class to denote the known or estimated energy consumption of an AI model during its training, fine-tuning, and inference stages.

Example

```
{
  "type": "ai_EnergyConsumption",
  "ai_trainingEnergyConsumption": [
    {
      "type": "ai_EnergyConsumptionDescription",
      "ai_energyQuantity": "36.5",
      "ai_energyUnit": "kilowattHour"
    }
  ],
  "ai_inferenceEnergyConsumption": [
    {
      "type": "ai_EnergyConsumptionDescription",
      "ai_energyQuantity": "0.042",
      "ai_energyUnit": "kilowattHour"
    }
  ]
}
```

Metadata

https://spdx.org/rdf/3.0.1/terms/AI/EnergyConsumption

Name:	EnergyConsumption
Instantiability:	Concrete

Properties

Property	Type	minCount	maxCount
finetuningEnergyConsumption	EnergyConsumptionDescription	0	*
inferenceEnergyConsumption	EnergyConsumptionDescription	0	*
trainingEnergyConsumption	EnergyConsumptionDescription	0	*

processing

<https://spdx.org/rdf/v3/AI/energyConsumption>

Name	energyConsumption
Nature	DataProperty
Range	xsd:string

Referenced

- /AI/AIPackage

13.2.3 hyperparameter

Summary

Records a hyperparameter used to build the AI system.

Description

This field records a hyperparameter value. Hyperparameters are used to control the learning process, for example the learning rate.

Metadata

<https://spdx.org/rdf/v3/AI/hyperparameter>

Name	hyperparameter
Nature	ObjectProperty
Range	/Core/DictionaryEntry

Referenced

- /AI/AIPackage

13.2.4 informationAboutApplication

Summary

Provides relevant information about the AI system.

Description

InformationAboutApplication describes any relevant information about the software, as well as any relevant pre-processing steps.

Metadata

<https://spdx.org/rdf/v3/AI/informationAboutApplication>

Name	informationAboutApplication
Nature	DataProperty
Range	xsd:string

15.2.4 energyQuantity

Summary

Represents the energy quantity.

Description

Provides the quantity information of the energy.

Metadata

<https://spdx.org/rdf/3.0.1/terms/AI/energyQuantity>

Name:	energyQuantity
Nature:	DataProperty
Range:	xsd:decimal

Referenced

- /AI/EnergyConsumptionDescription

15.2.5 energyUnit

Summary

Specifies the unit in which energy is measured.

Description

Provides the unit information of the energy.

Metadata

<https://spdx.org/rdf/3.0.1/terms/AI/energyUnit>

Name:	energyUnit
Nature:	ObjectProperty
Range:	EnergyUnitType

Referenced

- /AI/EnergyConsumptionDescription

15.2.6 finetuningEnergyConsumption

Summary

Specifies the amount of energy consumed when finetuning the AI model that is being used in the AI system.

Description

The field specifies the amount of energy consumed when finetuning the AI model that is being used in the AI system.

Metadata

<https://spdx.org/rdf/3.0.1/terms/AI/finetuningEnergyConsumption>

Name:	finetuningEnergyConsumption
Nature:	ObjectProperty
Range:	EnergyConsumptionDescription

Referenced

- /AI/EnergyConsumption

https://spdx.org/rdf

Name	energyConsumpti
Nature	DataProperty
Range	xsd:string

Referenced

- /AI/AIPackage

13.2.3 hyperpara

Summary

Records a hyperparameter use

Description

This field records a hyperpara to control the learning proces

Metadata

https://spdx.org/rdf

Name	hyperpara
Nature	ObjectProperty
Range	/Core/DictionaryEntry

Referenced

- /AI/AIPackage

13.2.4 informationAboutApplication

Summary

~~Provides relevant information about the AI software, not including the model description.~~

Description

~~Information About Application describes any relevant information in free form text about how the AI model is used inside the software, as well as any relevant pre-processing steps, third-party APIs etc.~~

Metadata

https://spdx.org/rdf/v3/AI/informationAboutApplication

Name	informationAboutApplication
Nature	DataProperty
Range	xsd:string

15.2.8 inferenceEnergyConsumption

Summary

Specifies the amount of energy consumed during inference time by an AI model that is being used in the AI system.

Description

The field specifies the amount of energy consumed during inference time by an AI model that is being used in the AI system.

Metadata

https://spdx.org/rdf/3.0.1/terms/AI/inferenceEnergyConsumption

Name:	inferenceEnergyConsumption
Nature:	ObjectProperty
Range:	EnergyConsumptionDescription

Referenced

- /AI/EnergyConsumption

Description

A free-form text description of how the AI model is used within the software.

It should include any relevant information, such as pre-processing steps, third-party APIs, and other pertinent details.

It can also include:

- Functionality provided by the AI model within the software application, including: any specific tasks or decisions it is designed to perform; any pre-processing steps that are applied to the input data before it is fed into the AI model for inference, such as data cleaning, normalization, or feature extraction; and any third-party APIs or services that are used in conjunction with the AI model, such as data sources, cloud services, or other AI models.
- Description of any dependencies or requirements needed to run the AI model within the software application, including: specific hardware, software libraries, and operating systems.

Referenced

- /AI/AIPackage

13.2.5 informationAboutTraining

Summary

~~Describes relevant information about different steps of the training process.~~

Description

~~InformationAboutTraining describes the specific steps involved in the training of the AI model. For example, it can be specified whether supervised fine-tuning or active learning is used as part of training the model.~~

Metadata

https://spdx.org/rdf/v3/AI/

Name	informationAboutTraining
Nature	DataProperty
Range	xsd:string

Referenced

- /AI/AIPackage

13.2.6 limitation

Summary

Captures a limitation of the AI software

Description

A free-form text that
~~Limitation~~ captures a limitation of the AI software. Note that this is not guaranteed to be used on datasets from a certain domain.

Metadata

https://spdx.org/rdf/v3/AI/limitation

Name	limitation
Nature	DataProperty
Range	xsd:string

Referenced

- /AI/AIPackage

Summary

Describes relevant information about different steps of the training process.

Description

A detailed explanation of the training process, including the specific techniques, algorithms, and methods employed.

Examples include:

- training data used to train the AI model, along with any relevant details about its source, quality, and pre-processing steps;
- specific training algorithms employed, including stochastic gradient descent, backpropagation, and reinforcement learning;
- specific training techniques used to improve the performance or accuracy of the AI model, such as transfer learning, fine-tuning, or active learning; and
- any evaluation metrics used to assess the performance of the AI model during the training process, including accuracy, precision, recall, and F1 score.

13.2.7 metric

Summary

Records the measurement of prediction quality of the AI model.

Description

~~Metric~~ records the measurement with which the AI model was evaluated. This makes statements about the prediction quality including uncertainty, accuracy, characteristics of the tested population, quality, fairness, explainability, robustness etc.

Metadata

<https://spdx.org/rdf/v3/AI/metric>

Name	metric
Nature	ObjectProperty
Range	/Core/DictionaryEntry

Referenced

- /AI/AIPackage

13.2.8 metricDecisionThreshold

Summary

Captures the threshold that was used for computation of a metric described in the metric field.

Description

Each metric might be computed based on a decision threshold. For instance, precision or recall is typically computed by checking if the probability of the outcome is larger than 0.5. Each decision threshold should match with a metric field defined in the AI Package.

Metadata

<https://spdx.org/rdf/v3/AI/metricDecisionThreshold>

Name	metricDecisionThreshold
Nature	ObjectProperty
Range	/Core/DictionaryEntry

Referenced

- /AI/AIPackage

13.2.9 modelDataPreprocessing

Summary

Describes all the preprocessing steps applied to the training data before the model training.

Description

~~ModelDataPreprocessing~~ is a free form text that describes the preprocessing steps applied to the training data before training of the model(s) contained in the AI software.

Metadata

<https://spdx.org/rdf/v3/AI/modelDataPreprocessing>

Name	modelDataPreprocessing
Nature	DataProperty
Range	xsd:string

Referenced

- /AI/AIPackage

13.2.10 modelExplainability

Summary

results from the AI

Describes methods that can be used to explain the model.

Description

~~ModelExplainability~~ is a free form text that lists the different explainability mechanisms (such as SHAP, or other model specific explainability mechanisms) that can be used to explain the model.

Metadata

<https://spdx.org/rdf/v3/AI/modelExplainability>

Name	modelExplainability
Nature	DataProperty
Range	xsd:string

Referenced

- /AI/AIPackage

13.2.13 standardCompliance

Summary

Captures a standard that is being complied with.

Description

StandardCompliance captures a standard that the AI software complies with. This includes both published and unpublished standards, ~~for example~~ ISO, IEEE, ~~ETSI~~ etc. The standard ~~could~~ ^{and ETSI.} (but not necessarily ~~have to~~ ^{may}) be used to satisfy a legal or regulatory requirement.

Metadata

such as those developed by

required

<https://spdx.org/rdf/v3/AI/standardCompliance>

Name	standardCompliance
Nature	DataProperty
Range	xsd:string

Referenced

- /AI/AIPackage

13.2.14 typeOfModel

Summary

Records the type of the model used in

Description

A free-form text that ~~TypeOfModel~~ records the type of the unsupervised model, reinforcement le

Metadata

<https://spdx.org/rdf/v3/AI/typeOfModel>

Name	typeOfModel
Nature	DataProperty
Range	xsd:string

Referenced

- /AI/AIPackage

System Package Data Exchange (SPD

15.2.18 trainingEnergyConsumption

Summary

Specifies the amount of energy consumed when training the AI model that is being used in the AI system.

Description

The field specifies the amount of energy consumed when training the AI model that is being used in the AI system.

Metadata

<https://spdx.org/rdf/3.0.1/terms/AI/trainingEnergyConsumption>

Name:	trainingEnergyConsumption
Nature:	ObjectProperty
Range:	EnergyConsumptionDescription

Referenced

- /AI/EnergyConsumption

15.2.20 useSensitivePersonalInformation

Summary

Records if sensitive personal information is used during model training or could be used during the inference.

Description

Notes if sensitive personal information is used in the training or inference of the AI models.

This might include biometric data, addresses or other data that can be used to infer a person's identity.

Related: hasSensitivePersonalInformation in /Dataset/DatasetPackage

Metadata

<https://spdx.org/rdf/3.0.1/terms/AI/useSensitivePersonalInformation>

Name:	useSensitivePersonalInformation
Nature:	ObjectProperty
Range:	/Core/PresenceType

Referenced

- /AI/AIPackage

13.3 AI Vocabularies

13.3.1 SafetyRiskAssessmentType

Summary

Categories of safety risk impact of the application.

Description

Lists the different safety risk type values that can be used to describe the safety risk of AI software according to Article 20 of Regulation 765/2008/EC.

Metadata

<https://spdx.org/rdf/v3/AI/SafetyRiskAssessmentType>

Name	SafetyRiskAssessmentType
------	--------------------------

Entries

- high**: The second-highest level of risk posed by an AI software.
- low**: Low/no risk is posed by the AI software.
- medium**: The third-highest level of risk posed by an AI software.
- serious**: The highest level of risk posed by an AI software.

15.3.1 EnergyUnitType

Summary

Specifies the unit of energy consumption.

Description

List the different acceptable units for measuring energy consumption.

If the unit in which the energy consumption has been recorded is not listed here, please select "other".

Metadata

<https://spdx.org/rdf/3.0.1/terms/AI/EnergyUnitType>

Name:	EnergyUnitType
-------	----------------

Entries

kilowattHour Kilowatt-hour.

megajoule Megajoule.

other Any other units of energy measurement.

15 Lite Profile

Summary

The SPDX Lite profile defines a subset of the ~~SPDX specification~~, from the point of view of use cases in some industries. ~~SPDX Lite aims at the balance between the SPDX standard and actual workflows in some industries.~~

Description

The SPDX Lite profile consists of mandatory ~~fields from the Document Creation and Package Information sections and other basic~~ information.

recommended

The mandatory ~~part of the Package information~~ ^{data} in SPDX Lite is basic but useful for complying with licenses. It is easy to understand licensing information by reading an SPDX Lite file. ~~It is easy to create manually an SPDX Lite file by anyone who does not have enough knowledge about licensing information, so that tools are not necessarily required to create an SPDX Lite file.~~

~~SPDX Lite has affinity with SPDX tools due to its containing the mandatory part of the Document Creation and Package Information in the SPDX Lite definition.~~

~~An SPDX Lite document can be used in parallel with SPDX documents in software supply chains.~~

Metadata

Name	Lite
------	------

SPDX Lite aims at a balance between the full SPDX data model and actual workflows in some industries. An SPDX Lite document can also be used in parallel with other SPDX documents in software supply chains.

Add details of Properties inherited from classes and super-classes

Profile conformance

In addition to the following mandatory requirements, please refer to the corresponding Annex for elements that should be included as part of a document conforming to the Lite profile.

For a /Software/Package to be conformant with this profile, the following has to hold:

1. The mincount for copyrightText is 1
2. The mincount for packageVersion is 1
3. The mincount for suppliedBy is 1
4. At least one of downloadLocation or packageUrl must be present

Additionally:

1. for every /Software/Package there MUST exist exactly one /Core/Relationship of type hasConcludedLicense having that element as its from property and an /SimpleLicensing/AnyLicenseInfo as its to property.
2. for every /Software/Package there MUST exist exactly one /Core/Relationship of type hasDeclaredLicense having that element as its from property and an /SimpleLicensing/AnyLicenseInfo as its to property.

For a /Core/SpdxDocument to be conformant with this profile, the following has to hold: 1. The mincount for element is 1 1. The mincount for rootElement is 1

For a /Software/Sbom to be conformant with this profile, the following has to hold: 1. The mincount for element is 1 1. The mincount for rootElement is 1

Finally, for a /Core/Agent to be conformant with this profile, the following has to hold:

1. The mincount for name is 1