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Report on and metadata schemes for eViP virtual patients

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[1]   OJ L 79, 24.3.2005, p. 1.

1 Overview

The goal of this document is to present virtual patient specific metadata recommendations for eViP application profile compliant VP packages. The proposed profile is based on the IEEE LOM [9] standard and its extension MedBiquitous Healthcare LOM [8]. The presented selection of existing fields and new elements added to the specification by an extension mechanism illustrate system properties and workflow stages commonly encountered in the eViP project. This includes virtual patient system and package features, repurposing types, medical terminologies, copyright issues and patient consent. This deliverable extends the work already presented in eViP deliverables D2.2 (VP Profile implementation and conformance testing), D3.2 (Populated referatory of VPs) and D3.3 (Report on set of new repurposed standards compliant VPs, with metadata, and packaged, for multi-lingual access), and will be used in future project deliverables - e.g. D3.6 (Complete referatory of repurposed, standardised and localised VPs for different disciplines, including metadata descriptions).

2 Background

2.1 The definition and role of metadata

The role and importance of metadata in creation and dissemination of e-learning resources has been already thoroughly described in many elaborations [2-4,6]. Metadata, i.e. data about data [3], is a structured description of the content of a learning resource. Created using a formalised descriptive language, it facilitates discovery and exchange of learning objects. Thus, it is also recognised as the backbone for searchable repositories of learning objects [6]. Metadata increases the accessibility of learning resources, helps in documenting legal issues pertaining to the content, provides a method for tracking multiple versions of the same learning resource and describes the object's context and relationship to other learning materials. Metadata fields can be of different categories. The most general division distinguishes between objective (e.g. learning object's author) and subjective (e.g. assigned keywords) fields [4]. In the case of objective metadata it does not matter who enters the description (i.e. "tags" the content), whereas the process of populating subjective fields should be carried out by a metadata specialist. Metadata can be stored separately from the content it describes in a special database called a referatory, or can be embedded or packaged with the content and stored in e-learning repositories. Since each discipline has its own terminology and educational habits there is a demand for many versions of metadata sets.

2.2 Metadata standards

To assure interoperability of metadata it is necessary to use a common data model. One of the first widely acknowledged and accredited metadata standards for e-learning became the IEEE LTSC Learning Object Metadata (LOM) 1484.12.1 data model [9] in 2002. This metadata specification is being used in international e-learning repository efforts like MERLOT or in the ADL SCORM initiative. An alternative metadata standard for e-learning is Dublin Core, published in 2003 [10]. However, since most educational metadata specifications in medical education are currently based on the LOM we will not touch upon this topic in this deliverable.

The IEEE Learning Object Metadata (LOM) standard is based on a specification proposal submitted jointly in 1998 by IMS and ARIADNE [6]. The LOM model identifies 76 data

elements divided into 9 top-level categories, each presenting the learning object from a different angle. All categories have a hierarchical structure in which root elements contain more detailed sub-elements called "branches". Elements that do not contain any sub-elements are called "leaves". An overview of all LOM elements and their hierarchy is presented in fig. 1. The abstract LOM data model (defined in IEEE 1484.12.1) has its implementation defined in XML (IEEE 1484.12.3) and RDF (IEEE 1484.12.4) syntax.
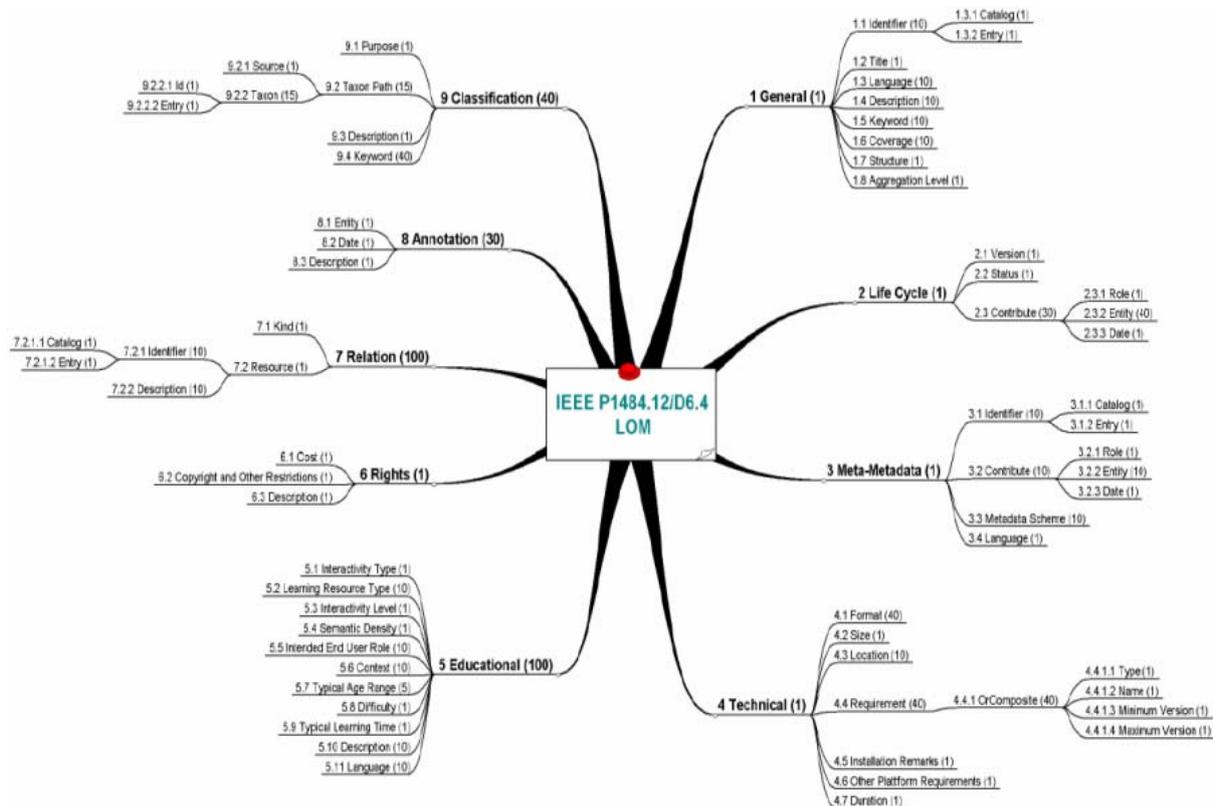
Fig. 1 Overview of LOM (IEEE 1484.12) data model (Source: [11])

2.3 Metadata application profiles

All LOM elements are optional. Developers may choose which of the proposed elements are to be implemented. In addition LOM permits extensions to be defined provided that these extensions do not replace original LOM elements. The description of LOM elements is quite general and allows for different interpretations of a field's content. For that reason, using the LOM metadata in a project requires additional work for the choosing and clarification of the semantics of the selected fields in the particular context.

The above statement is generally true for all metadata specifications. It is widely acknowledged that no single metadata schema will ever meet the functional requirements of all applications [2]. The process of interpreting, simplifying and merging of different metadata specifications results in the creation of metadata application profiles. An application profile represents a "customisation" of a "standard" for the specific needs of "particular communities of implementers with common application requirements" [3]. Examples of metadata application profiles of LOM include: IMS Metadata, SCORM Metadata, ARIADNE Metadata or UK LOM Core [6].

2.4 Metadata in healthcare education

Healthcare LOM [8] is an extension of the IEEE LOM standard (1484.12.3-2005) created by MedBiquitous to facilitate the creation of metadata for healthcare educational resources and activities. MedBiquitous is an ANSI accredited developer of information technology standards for healthcare education and competence assessment [12]. The Healthcare LOM specification includes support for medical terminologies (e.g. ICD, MeSH), medical images, health profession or patient and professional resources. Healthcare LOM may be combined with other MedBiquitous specifications such as Activity reporting, Medical Education Metrics and Virtual Patients. This makes Healthcare LOM a natural choice for the eViP application profile which is based on the Medbiquitous Virtual Patient specification.

In comparison to IEEE LOM, Healthcare LOM adds a new top-level element: "healthcareMetadata". This element branches into two sub-elements: "healthcareEducation", which describes healthcare metadata for educational offerings, and "healthcareAsset", which describes healthcare metadata for images and other types of multimedia files [8]. Fig 2a and 2b present sub-elements of two main branches of "healthcareMetadata" [8].
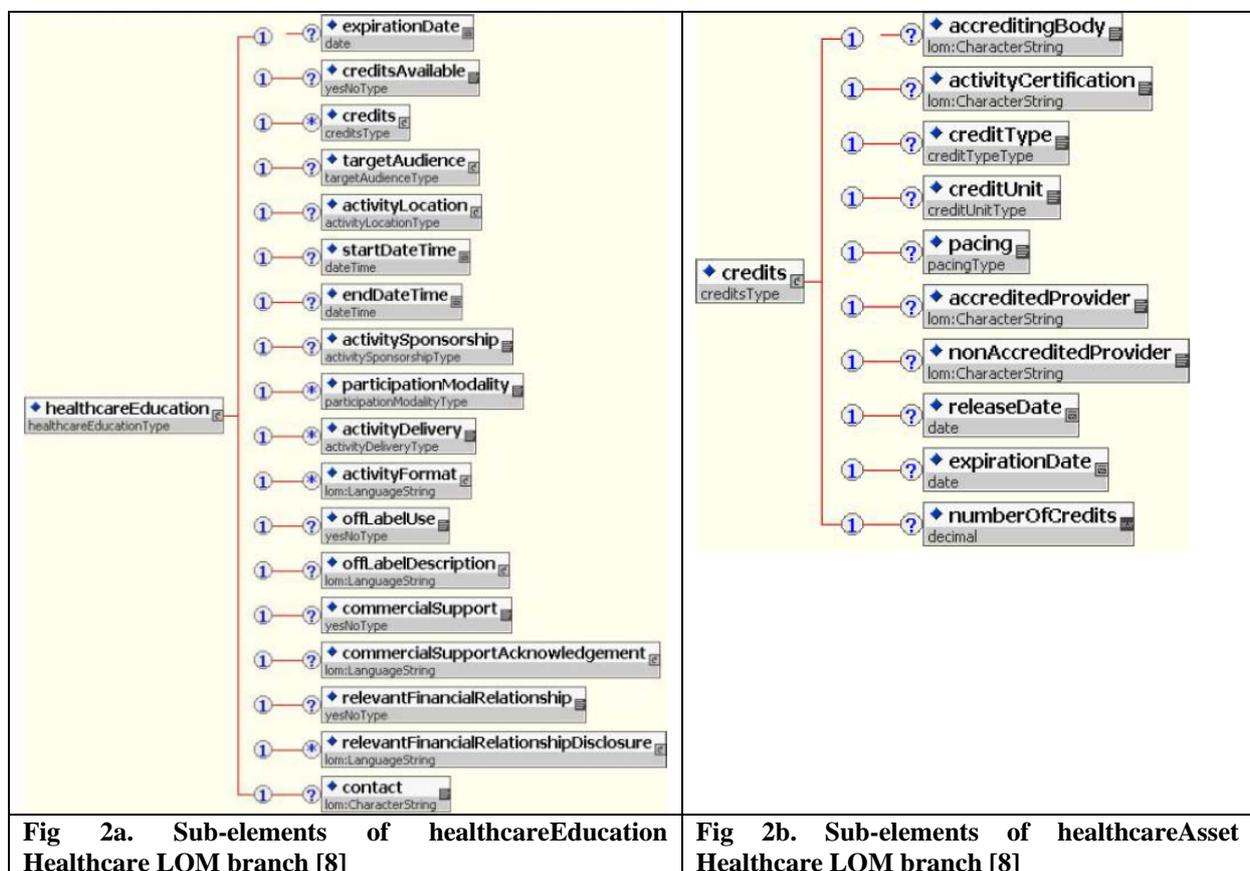
Fig 2a. Sub-elements of healthcareEducation Healthcare LOM branch [8]	Fig 2b. Sub-elements of healthcareAsset Healthcare LOM branch [8]

Healthcare LOM is designed to be extensible. For that particular reason a special element called customElements was defined. The customElements element may contain any new elements or new categories of elements as long as those elements are qualified by an XML namespace [8].

3 The eViP metadata profile

The goal of the eViP metadata application profile is to facilitate searching and browsing of virtual patient packages in referatories and repositories. Metadata that forms an abstract of the VP content enables the selection of the relevant content from the repository. Virtual patients identified in this manner may be exported from the eViP repository into the target VP system in MVP format (eViP Application Profile).

This deliverable describes the eViP metadata profile 2.0 - a refined and extended version of the eViP metadata profile 1.0 already presented in D.2.2. The reason for considering metadata a year before the deliverable was to give the project partners time to analyse the proposed schema. The process of implementing the MVP specification presented in D2.2 also provided valuable input regarding the required metadata fields. The eViP metadata profile 2.0 is planned to be part of the eViP Application Profile version 3.0, which is to be implemented by all systems by August 25th, 2010.

The metadata profile was informed by a process consisting of several steps, including relevant literature review (e.g. [5]), analysis of existing prototypes of eViP technical infrastructure (e.g. eViP referatory) and questionnaires (e.g. eViP effort sheets, evaluation tools), previous deliverables (D2.2 [1]) and discussions in eViP Technical Reference Group Meetings.

The aim was to maximise the reuse of existing metadata specifications and profiles.

In the case that a field for the metadata was proposed, the following steps were taken:

1. An attempt was made to identify the existence of a corresponding field in the IEEE LOM specification

2. If failed, a search was conducted for a corresponding field in the MedBiquitous Healthcare LOM specification

3. If failed, a new attribute for the eViP metadata schema was proposed

If the scope of existing fields was too broad it was attempted to constrain it in the eViP metadata profile. The semantics of the fields were also very carefully analysed and in cases when a perfect match between the proposed and existing field was not possible a new field was proposed.

The following table presents eViP metadata 1.0 – a selection of fields from existing metadata specifications (IEEE LOM and Healthcare LOM) recommended for eViP virtual patient packages. The only change in this proposal in comparison to the version presented in D2.2 is a change in the way keywords/medical terminologies are handled. In eViP metadata 1.0 the use of LOM 9.x Classification was recommended. The new version, following the Healthcare LOM recommendations, uses the LOM.1.5 keyword element extended by an additional attribute `hx:source`.

Field	Description	XML Binding	Content type	Example
LOM 1.1 repository id	Unique ID generated for the package by the repository. Can be replaced by local id if eViP repository id is not available.	/lom/general/identifier	lom:identifier	<entry>evip:vp:1000263</entry>
LOM 1.2 title	Title of the virtual patient (in English, if available)	/lom/general/title	lom:LangString	<string>Infant with fever</string>
LOM 1.3 language of resource	Language of the narratives in the virtual patient package in the format: required language code followed by multiple, optional, hyphen-prefixed subcodes (ISO 639–1, ISO 3166–1) (e.g en-gb, en-us etc)	/lom/general/language	lom:CharacterString (eViP recommendation [AISO 639–1]-[AISO 3166–1])	de-DE
LOM 1.4 description	Brief description of the virtual patient (in English, if available)	/lom/general/description	lom:LangString	<string>5-month-old Katrin is brought to the pediatric outpatient clinic, she has been having fever for 2 days is increasingly floppy.</string>
LOM 2.3.1 role of contributor	Author of VP, owner, etc - not the same as the person creating the inventory record	/lom/lifeCycle/contribute/role	lom:Vocabulary	<value>author</value>
LOM 2.3.2 author	Name of VP author or owner. Recommended (but not mandatory) is vCard-format.	/lom/lifeCycle/contribute/entity	lom:CharacterString (recommended vCard)	BEGIN:VCARD VERSION:4.0 FN: Benjamin Hanebeck ORG: University of Heidelberg EMAIL;PREF;INTERNET: benjamin.hanebeck@med.uni-heidelberg.de END:VCARD
LOM 2.3.3 date	Date of contribution (when was the VP content finally signed off)	/lom/lifeCycle/contribute/date	lom:DateTime	<dateTime>2007-09-01</dateTime>
LOM 3.2.1 role of metadata contributor	e.g creator or validator (of metadata record – not the VP!)	/lom/metaMetadata/contribute/role	lom:Vocabulary	<value>creator</value>
LOM 3.2.2 author	Name of metadata creator. Recommended (but not mandatory) is vCard-format.	/lom/metaMetadata/contribute/entity	lom:CharacterString (recommended vCard)	BEGIN:VCARD VERSION:4.0 FN: Soeren Huwendiek ORG: University of Heidelberg

				EMAIL;PREF;INTERNET: soeren.huwendiek@med.uni-heidelberg.de END:VCARD
LOM 3.2.3 date	Date of metadata record creation	`/lom/metaMetadata/contribute/date/dateTime`	`lom:DateTime`	`<dateTime>2008-10-01</dateTime>`
LOM 4.1 technical format	MIME type value of the VP content package in accordance with RFC 2048. Recommended value is `application/zip`	`/lom/technical/format`	`lom:CharacterString` (MIME type)	`application/zip`
LOM 4.2 object size in bytes	Size of the virtual patients in bytes Estimate if not known exactly. The value has to be a non-negative integer. Insert 0 if no estimation is possible.	`/lom/technical/size`	`xs:nonNegativeInteger`	`3902842`
LOM 4.3 location of object	URL/URI to the VP in original system or repository (if available) - may be constant for all VPs.	`/lom/technical/location`	`xs:anyURI`	`http://galaxy.mi.hs-heilbronn.de:3333/myzms`
LOM 5.2 type of resource	Defines type of the resource in the VP package: Defaults to 'Virtual Patient'	`/lom/educational/learningResourceType`	`hx:Vocabulary` (Healthcare LOM Vocabulary) Constant for eViP profiles: `virtual patient`	`<value>virtual patient</value>`
LOM 6.1 payment required	Is payment for this virtual patient required? yes/no only answers only	`/lom/rights/cost`	`lom:Vocabulary` (yes/no)	`<value>no</value>`
LOM 6.2 subject to copyright	Is virtual patient cleared of copyright? yes/no only	`/lom/rights/copyrightAndOtherRestrictions`	`lom:Vocabulary` (yes/no)	`<value>no</value>`
LOM 6.3 statement of copyright	Free text describing copyright statement (in English). Can be replaced by a static reference to general eViP licence.	`/lom/rights/copyrightAndOtherRestrictions`	`lom:LangString`	`<string>VP content approved for use with following Creative Common restrictions: attribution, noncommercial and share alike. Patient consent obtained from parents in written form.</string>`
LOM.1.5 keyword + Helathcare LOM	Common keywords (important concepts or topics) that describe the educational offering. Recommended by eViP are two terminologies ICD-10 and MeSH.	`/lom/keyword`	`lom:LangString`	`<keyword hx:source = •ICD-10• hx:id = •G00.9•> <string language = •en•> Bacterial meningitis</string> </keyword>`

Metadata 1.0 reused existing metadata schemas only, metadata 2.0 introduces eViP/VP specific fields using the Healthcare LOM extension mechanism.

The newly included topics were:

- Topic 1: Identification of the originating virtual patient system

- Topic 2: Description of the repurposing history

- Topic 3: Patient consent

- Topic 4: eViP educational purposes

Fig.3 presents an overview of new eViP LOM specific metadata fields.
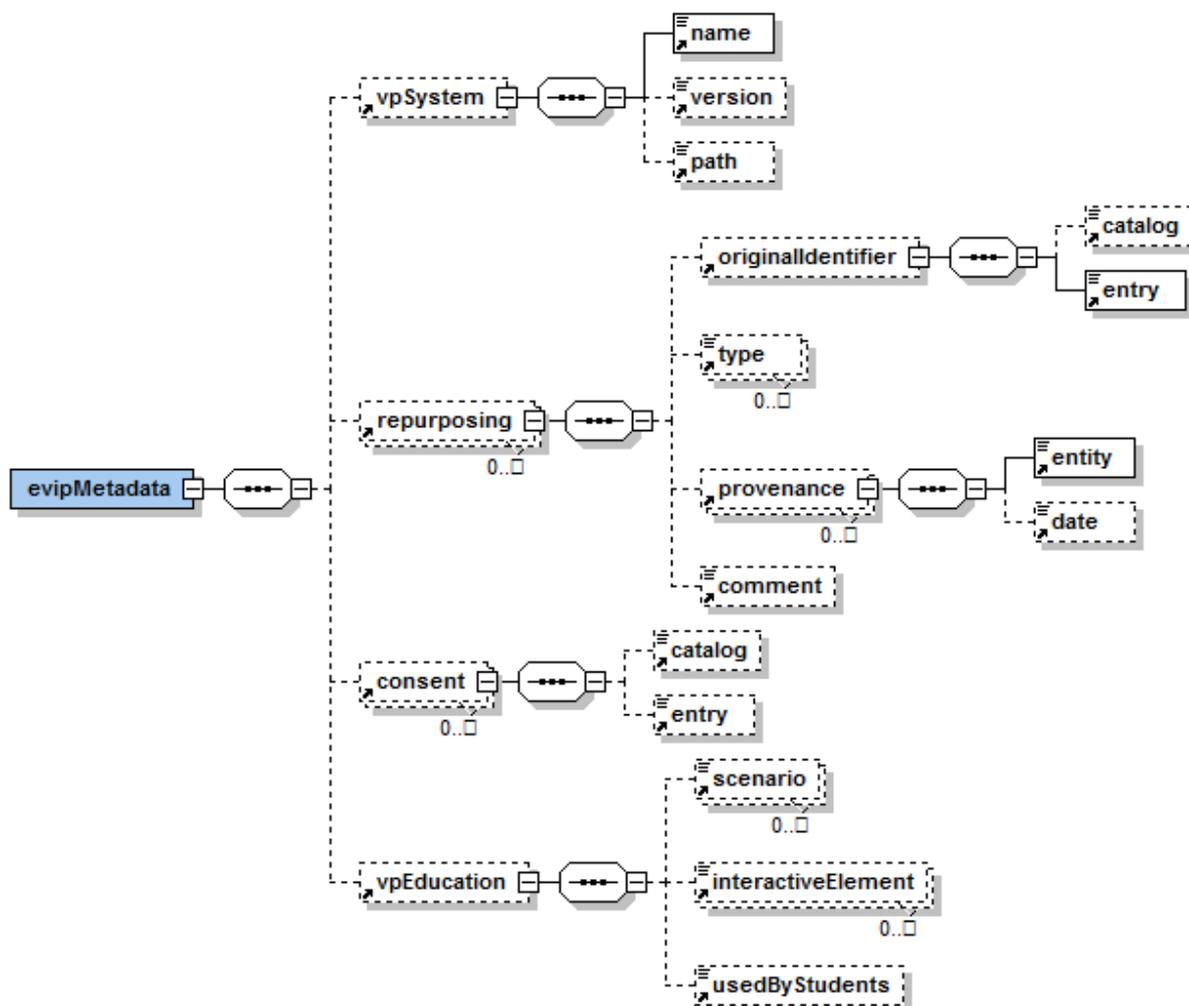
Fig.3 Schema of new metadata fields added in eViP metadata 2.0

Similar to the LOM specification, all newly added metadata sub-branches (i.e. vpSystem, repurposing, consent, vpEducation) are optional. This provides a great deal of freedom to the implementers of the VP packages. The following sections present in detail all of the eViP specific metadata branches from fig. 3.

3.1   Identification of the originating virtual patient system

Field	Description	XML Binding	Content type	Controlled Vocabulary	Example
eViP 1 VP system	(optional, 0-1) Describes details of the tool or system that was used to create the virtual patient	`/lom/hx:customElements/evip:evipMetadata/` `evip:vpSystem`	`Container`	-	-

eViP 1.1
Originating VP system
	(mandatory, 1) Name of the tool or system used to create the virtual patient [5]	`/lom/hx:customElements/evip:evipMetadata/`
		`evip:vpSystem/evip:name`
			`lom:CharacterString`	constant for individual VP systems:
				e.g. `CASUS, CAMPUS classic,`
				`OpenLabyrinth, Web-SP built-in`
				`authoring tool`
					`CASUS`

eViP 1.2 VP System Version	(optional, 0-1) Version of the tool or system used to create the virtual patient	`/lom/hx:customElements/evip:evipMetadata/` `evip:vpSystem/evip:version`	`lom:CharacterString`	-	`6.0.0b2`
eViP 1.3 Path type	(optional, 0-1) Way in which a user may navigate the case [5]	`/lom/hx:customElements/evip:evipMetadata/` `evip:vpSystem/evip:path`	`evip:vocabulary`	`Linear, Branching, Global,` `Virtual world`	`Linear`

Full example:

```
<lom>
  <hx:customElements>
    <evip:vpSystem>
      <evip:name>CASUS</evip:name>
      <evip:version>6.0.0b2</evip:version>
      <evip:path>linear</evip:path>
    </evip:vpSystem>
  <hx:customElements>
<lom>
```

An alternative solution was to use LOM 4.4 (Technical.Requirement). However, this method would not provide information on the path type. Additionally, the source VP system of the packages is also not necessarily required to run the package since the MVP standard's role is to provide interoperability between different VP systems. This results in a semantic difference in the field's meaning, as having the source system is not a technical requirement to make use of the package.

3.2 Description of the repurposing history

Field	Description	XML Binding	Content type	Controlled Vocabulary	Example
eViP 2 Repurposing	(optional, 0-n) Container element for repurposing history	/lom/hx:customElements/ evip:evipMetadata/evip:repurposing	Container	-	-
eViP 2.1 Original vp id	(optional, 0-1) Identifier of the previous virtual patient case	/lom/hx:customElements/ evip:evipMetadata/evip:repurposing/ evip:originalIdentifier	Container	-	-
eViP 2.1.1 Original vp id catalog	(optional, 0-1) Identifier of vp id catalogue	/lom/hx:customElements/ evip:evipMetadata/evip:repurposing/ evip:originalIdentifier/evip:catalog	lom:CharacterString	-	-
eViP 2.1.2 Original vp id entry	(mandatory, 1) Identifier of vp id catalogue	/lom/hx:customElements/ evip:evipMetadata/evip:repurposing/ evip:originalIdentifier/evip:entry	lom:CharacterString	-	-
eViP 2.2 Repurposing type	(optional, 0-n) Type of repurposing according to eViP repurposing definitions	/lom/hx:customElements/evip:evipMetadata/ evip:repurposing/evip:type	evip:Vocabulary	Different cultures, Different educational levels, Different educational scenarios, Different VP structures, Different VP systems, Content enrichment	Different cultures
eViP 2.3 Provenance	(optional, 0-n) Information about the institution of the original case	/lom/hx:customElements/evip:evipMetadata/ evip:provenance	Container	-	-
eViP 2.3.1 Provenance.Entity	(mandatory, 1) The identification of and information about entities (i.e., people, organizations) being responsible for the original case before repurposing.	/lom/hx:customElements/evip:evipMetadata/ evip:provenance/evip:entity	lom:CharacterString	Recommended vCard	BEGIN:VCARD \n VERSION:4.0 \n FN: Andrzej Kononowicz \n ORG: Jagiellonian University Medical College \n EMAIL;PREF;INTERNET: \n a.kononowicz@cyfronet.pl
eViP 2.3.2 Provenance.Date	(optional, 0-1) Date when the repurposing has been finished	/lom/hx:customElements/evip:evipMetadata/ evip:provenance/evip:date	xsd:date	-	"2010-08-23"
eViP 2.4	(optional, 0-n) More	/lom/hx:customElements/evip:evipMetadata/	lom:CharacterString	-	Repurposing from Polish

Comments	detailed description of repurposing if needed	`evip:repurposing/evip:comment`			culture and language to German and between Surgery and Nursing disciplines. Added 5 new images (Chest X-Rays) and one movie presenting history taking in Germany

Full example:

```
<lom>
  <hx:customElements>
    <evip:repurposing>
      <evip:originalIdentifier>
        <evip:catalog>eViP Repository</evip:catalog>
        <evip:entry>evip:vp:1000133</evip:entry>
      </evip:originalIdentifier>
      <evip:type>Different cultures</evip:type>
      <evip:type>Content enrichment</evip:type>
      <evip:provenance>
        <evip:entity>
          BEGIN:VCARD
          VERSION:4.0
          FN: Andrzej Kononowicz
          ORG: Jagiellonian University Medical College
          EMAIL;PREF;INTERNET:
          a.kononowicz@cyfronet.pl
        </evip:entity>
        <evip:date>2010-08-23</evip:date>
      </evip:provenance>
      <evip:comment>
        Repurposing from Polish culture and language to German and
        between Surgery and Nursing disciplines. Added 5 new images
        (Chest X-Rays) and one movie presenting history taking in Germany
      <evip:comment>
    </evip:repurposing>
  <hx:customElements>
<lom>
```

An alternative solution was to use LOM 7.1 Relation/Kind or LOM 2 Life Cycle. However this would not provide full provenance or repurposing type. The semantics of those fields also do not match completely with the information associated with the eViP repurposing process.

3.3 Patient consent

Photographs present in virtual patients may sometimes enable the identification of the real patient (e.g. facial images, in some cases X-rays, etc). In such cases written permission to use the images is required before the materials can be presented in teaching. Consent forms should be kept at the originating institution. Identifiers of the documents can be stored in the virtual patient's metadata as proposed below.

Field	Description	XML Binding	Content type	Controlled Vocabulary	Example
eViP 3 Consent	(optional, 0-n) Container for patient consent	`/lom/hx:customElements/evip:evipMetadata/evip:consent`	`Container`	-	-
eViP 3.1 Consent.catalog	(optional, 0-1) Name of the document catalogue at the institution keeping the original of patient consent	`/lom/hx:customElements/evip:evipMetadata/evip:consent/evip:catalog`	`lom:CharacterString`	-	`Jagiellonian University Medical College Consent Forms`
eViP 3.2 Consent.entry	(optional, 0-1) Local identifier of the patient consent document	`/lom/hx:customElements/evip:evipMetadata/evip:consent/evip:entry`	`lom:CharacterString`	-	`2010.132`

Full example:

```
<lom>
  <hx:customElements>
    <evip:consent>
      <evip:catalog>Jagiellonian University Medical College Consent Forms</evip:catalog>
      <evip:entry>2010.13212</evip:entry>
    </evip:consent>
  <hx:customElements>
<lom>
```

An alternative solution was to reuse LOM 6.2 (Rights.Copyright and Other Restrictions) but this field does not have the same semantics.

3.4 Educational purposes

Some of the fields proposed for this category by the TRG group can be implemented by re-using existing specifications: IEEE LOM, Healthcare LOM (similar to its description in metadata 1.0) . See the table below for details of these fields.

Field	Description	XML Binding	Content type	Controlled Vocabulary	Example
Healthcare LOM Audience Category	Audience Category	`/lom/hx:healthcareMetadata/ hx:targetAudience/hx:audienceCategory`	`hx:Vocabulary recommendations`	`Constant: professional`	`professional`
Healthcare LOM Profession	Topic area(s) covered [5] - Discipline	`/lom/hx:healthcareMetadata/ hx:targetAudience/hx:profession`	`hx:Vocabulary recommendations`	`See Healthcare LOM`	`physician`
Healthcare LOM Speciality	Topic area(s) covered [5] - Speciality	`/lom/hx:healthcareMetadata/ hx:targetAudience/hx:speciality`	`hx:Vocabulary recommendations`	`See Healthcare LOM`	`internal medicine`
Healthcare LOM Reading Level	Target learner level [5]	`/lom/hx:healthcareMetadata/ hx:targetAudience/hx:readingLevel`	`hx:Vocabulary recommendations extended by eViP`	`Added by eViP: Preclincial Medical Student, Clinical Medical Student, Resident, Continuing Medical Education (CME)`	`Preclincial Medical Student`
LOM 5.9 Typical Learning Time	Typical study time [5]	`/lom/educational/typicalLearningTime`	`Duration`	-	`"PT1H30M"`
LOM9.1&9.3 Objectives	(optional, 0-n) Objectives of the activity and any outcomes they address [5]	`/lom/classification/puropose='educational objective' /lom/classification/description`	`lom:LangString`	-	`Rapid diagnosis of acute haemorrhages. Reasons of internal and external bleedings. Diagnosis and Therapy of the Factor VIII inhibitor dependent Immunogenic Coagulopathy`

Other fields, however, needed to be newly defined. See the table below for details of these elements.

Field	Description	XML Binding	Content type	Controlled Vocabulary	Example
eViP 4 vpEducation	(optional, 0-1) eViP extension to educational scenario description	`/lom/hx:customElements/evip:evipMetadata/evip:vpEducation`	Container	-	-
eViP 4.1 Educational scenario	(optional, 0-n) Educational scenario type: Teaching, learning or assessment ? [5]	`/lom/hx:customElements/evip:evipMetadata/evip:vpEducation/evip:scenario`	evip:Vocabulary	Self-Directed, PBL, Assessment	Self-Directed
eViP 4.2 Interactive elements	(optional, 0-n) Kinds of questions, task and challenges faced [5]	`/lom/hx:customElements/evip:evipMetadata/evip:vpEducation/evip:interactiveElement`	evip:Vocabulary	interactive media, knowledge questions	knowledge questions
eViP 4.3 Used by students	(optional, 0-1) Indicates whether VP has been already used by students [A8]	`/lom/hx:customElements/evip:evipMetadata/evip:vpEducation/evip:usedByStudents`	hx:yesNoType	yes,no	yes

Full example:

```
<lom>
  <hx:customElements>
    <evip:vpEducation>
      <evip:scenario>Assessment</evip:scenario>
      <evip:interactiveElement>MCQ</evip:interactiveElement>
      <evip:usedByStudents>yes</evip:usedByStudents>
    </evip:vpEducation>
  <hx:customElements>
<lom>
```

4 Applications of the profile

This section describes the implementation of the eViP metadata profile and its future applications.

The eViP metadata profile was implemented as an XSD file (Appendix 1). The schema file was created using the Altova XML Spy 2008 editor [7]. Appendix 2 presents a sample metadata file following the proposed schema containing newly defined fields only. The namespace **http://virtualpatients.eu/xsd/evipLOM/v1** was selected to identify the extension.

The defined metadata is important for VP package export function and the project repository.

4.1 VP packages

In order to add eViP metadata to VP profile compliant packages an `eviplom.xsd` schema definition file (see Appendix 1) must be added to the root directory of the VP package. The `eviplom.xsd` file contains references to the Healthcare LOM schema located in the same directory. The `metadata.xml` must be validated against `eviplom.xsd`. The code snippet below shows the validation reference from `metadata.xml`:

```
<lom
    xmlns="http://ltsc.ieee.org/xsd/LOM"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns:hx="http://ns.medbiq.org/lom/extend/v1/"
    xmlns:evip="http://virtualpatients.eu/xsd/evipLOM/v1"
    xsi:schemaLocation="http://ltsc.ieee.org/xsd/LOM eviplom.xsd">
```


4.2 Referatory/Repository

Fig 4. shows a screenshot from the current version of the evip referatory (D3.2). All fields from the current version of the repository record may be mapped onto elements from the eViP metadata profile or the eViP metadata extension. The metadata schema contains a greater number of fields than those in the repository record. These additional fields could potentially be used in future versions of the referatory. Final implementation of the virtual patient repository is due later in the course of the project (D3.6)

Fig.4 Mapping of fields from the eViP repository prototype record to individual metadata fields

5   Conclusions

This deliverable presented the eViP metadata schema. It is based on two e-learning standards: LOM and Healthcare LOM. The eViP metadata reuses these specifications and extends them with four new metadata sub-branches: VP System, Repurposing History, Patient Consent and (eViP specific) educational properties. The proposed metadata schema covers the current version of the referatory (D.3.2) and will be considered in the development of the final eViP repository (D.3.6). Fields added in this deliverable may also help in the preparation of new versions of the existing schemas (e.g. Healthcare LOM).

The results reported in this deliverable are significant for the whole international virtual patient user and research community since it is the first reported effort to provide a systematic technical description of virtual patients. This deliverable enables a consistent description of virtual patients across referatories and repositories which will contribute to the main goal of the eViP project of sharing virtual patients over Europe.

6   References

[1]   Campbell, G.; Miller, A. & Balasubramaniam, C. (2009), 'The role of intellectual property in creating, sharing and repurposing virtual patients.', Med Teach 31(8), 709–712.

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7 Annex 1 eViP metadata XSD

```xml
<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema xmlns="http://virtualpatients.eu/xsd/evipLOM/v1"
xmlns:lom="http://ltsc.ieee.org/xsd/LOM" xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:hx="http://ns.medbiq.org/lom/extend/v1/" xmlns:hv="http://ns.medbiq.org/lom/vocab/v1/"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://virtualpatients.eu/xsd/evipLOM/v1" elementFormDefault="qualified">
        <xsd:import namespace="http://ltsc.ieee.org/xsd/LOM"
schemaLocation="healthcarelom.xsd"/>
        <xsd:import namespace="http://ns.medbiq.org/lom/extend/v1/"
schemaLocation="healthcare/healthcaremetadata.xsd"/>
        <xsd:element name="vpSystem">
                <xsd:complexType>
                        <xsd:sequence>
                                <xsd:element ref="name"/>
                                <xsd:element ref="version" minOccurs="0"/>
                                <xsd:element ref="path" minOccurs="0"/>
                        </xsd:sequence>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name="vpEducation">
                <xsd:complexType>
                        <xsd:sequence>
                                <xsd:element ref="scenario" minOccurs="0"
maxOccurs="unbounded"/>
                                <xsd:element ref="interactiveElement" minOccurs="0"
maxOccurs="unbounded"/>
                                <xsd:element ref="usedByStudents" minOccurs="0"/>
                        </xsd:sequence>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name="version" type="lom:CharacterString"/>
        <xsd:element name="usedByStudents" type="hx:yesNoType"/>
        <xsd:element name="type">
                <xsd:simpleType>
                        <xsd:restriction base="xs:string">
                                <xsd:enumeration value="Different cultures"/>
                                <xsd:enumeration value="Different educational levels"/>
                                <xsd:enumeration value="Different educational scenarios"/>
                                <xsd:enumeration value="Different VP structures"/>
                                <xsd:enumeration value="Different VP systems"/>
                                <xsd:enumeration value="Content enrichment"/>
                        </xsd:restriction>
                </xsd:simpleType>
        </xsd:element>
        <xsd:element name="scenario">
                <xsd:simpleType>
                        <xsd:restriction base="xs:string">
                                <xsd:enumeration value="Self-Directed"/>
                                <xsd:enumeration value="PBL"/>
                                <xsd:enumeration value="Assessment"/>
                        </xsd:restriction>
                </xsd:simpleType>
        </xsd:element>
        <xsd:element name="repurposing">
                <xsd:complexType>
                        <xsd:sequence>
                                <xsd:element ref="originalIdentifier" minOccurs="0"/>
                                <xsd:element ref="type" minOccurs="0" maxOccurs="unbounded"/>
                                <xsd:element ref="provenance" minOccurs="0"
maxOccurs="unbounded"/>
                                <xsd:element ref="comment" minOccurs="0"/>
                        </xsd:sequence>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name="provenance">
                <xsd:complexType>
                        <xsd:sequence>
                                <xsd:element ref="entity"/>
                                <xsd:element ref="date" minOccurs="0"/>
                        </xsd:sequence>
                </xsd:complexType>
        </xsd:element>
```

```xsd
        <xsd:element name="path">
                <xsd:simpleType>
                        <xsd:restriction base="xs:string">
                                <xsd:enumeration value="linear"/>
                                <xsd:enumeration value="branched"/>
                                <xsd:enumeration value="global"/>
                                <xsd:enumeration value="virtual world"/>
                        </xsd:restriction>
                </xsd:simpleType>
        </xsd:element>
        <xsd:element name="originalIdentifier">
                <xsd:complexType>
                        <xsd:sequence>
                                <xsd:element ref="catalog" minOccurs="0"/>
                                <xsd:element ref="entry"/>
                        </xsd:sequence>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name="name" type="lom:CharacterString"/>
        <xsd:element name="interactiveElement">
                <xsd:simpleType>
                        <xsd:restriction base="xs:string">,
                                <xsd:enumeration value="interactive media"/>
                                <xsd:enumeration value="knowledge questions"/>
                        </xsd:restriction>
                </xsd:simpleType>
        </xsd:element>
        <xsd:element name="evipMetadata">
                <xsd:complexType>
                        <xsd:sequence>
                                <xsd:element ref="vpSystem" minOccurs="0"/>
                                <xsd:element ref="repurposing" minOccurs="0"
maxOccurs="unbounded"/>
                                <xsd:element ref="consent" minOccurs="0" maxOccurs="unbounded"/>
                                <xsd:element ref="vpEducation" minOccurs="0"/>
                        </xsd:sequence>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name="entry" type="lom:CharacterString"/>
        <xsd:element name="entity" type="xs:string"/>
        <xsd:element name="date" type="xs:date"/>
        <xsd:element name="consent">
                <xsd:complexType>
                        <xsd:sequence>
                                <xsd:element ref="catalog" minOccurs="0"/>
                                <xsd:element ref="entry" minOccurs="0"/>
                        </xsd:sequence>
                </xsd:complexType>
        </xsd:element>
        <xsd:element name="comment" type="xs:string"/>
        <xsd:element name="catalog" type="xs:string"/>
</xsd:schema>
```

8 Annex 2 eViP specific metadata sample

```xml
<?xml version="1.0" encoding="UTF-8"?>
<lom xmlns="http://ltsc.ieee.org/xsd/LOM" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xmlns:hx="http://ns.medbiq.org/lom/extend/v1/"
xmlns:evip="http://virtualpatients.eu/xsd/evipLOM/v1"
xsi:schemaLocation="http://virtualpatients.eu/xsd/evipLOM/v1 eviplom.xsd">
        <hx:customElements>
                <evip:evipMetadata>
                <evip:vpSystem>
                        <evip:name>CASUS</evip:name>
                        <evip:version>6.0.0b2</evip:version>
                        <evip:path>linear</evip:path>
                </evip:vpSystem>
                <evip:repurposing>
                        <evip:originalIdentifier>
                                <evip:catalog>eViP Repository</evip:catalog>
                                <evip:entry>evip:vp:1000133</evip:entry>
                        </evip:originalIdentifier>
                        <evip:type>Different cultures</evip:type>
                        <evip:type>Content enrichment</evip:type>
                        <evip:provenance>
                                <evip:entity>
                                        BEGIN:VCARD
                                        VERSION:4.0
                                        FN: Andrzej Kononowicz
                                        ORG: Jagiellonian University Medical College
                                        EMAIL;PREF;INTERNET:
                                        a.kononowicz@cyfronet.pl
                                </evip:entity>
                                <evip:date>2010-08-23</evip:date>
                        </evip:provenance>
                        <evip:comment>
                        Repurposing from Polish culture and language to German and
                        between Surgery and Nursing disciplines. Added 5 new images
                        (Chest X-Rays) and one movie presenting history taking in Germany
                        </evip:comment>
                </evip:repurposing>
                <evip:consent>
                        <evip:catalog>Jagiellonian University Medical College Consent
Forms</evip:catalog>
                        <evip:entry>2010.13212</evip:entry>
                </evip:consent>
                <evip:vpEducation>
                        <evip:scenario>Assessment</evip:scenario>
                        <evip:interactiveElement>knowledge questions</evip:interactiveElement>
                        <evip:usedByStudents>yes</evip:usedByStudents>
                </evip:vpEducation>
                </evip:evipMetadata>
        </hx:customElements>
</lom>
```