Evaluation of Semantic Web Ontologies for Modelling Art Collections

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Overview

- Motivation & Aims
- SW Ontologies for CH
- Evaluation Methodology
- Evaluation Results
- Conclusion

Motivation & Aim

- Challenges of modelling art collections
  - Diversity, heterogeneity of formats
  - Multi-thematic, multi-cultural, multi-targeted
- Specific needs of art galleries
  - Cataloguing
  - Presentation of metadata
  - Web portals and systems management

Motivation & Aim

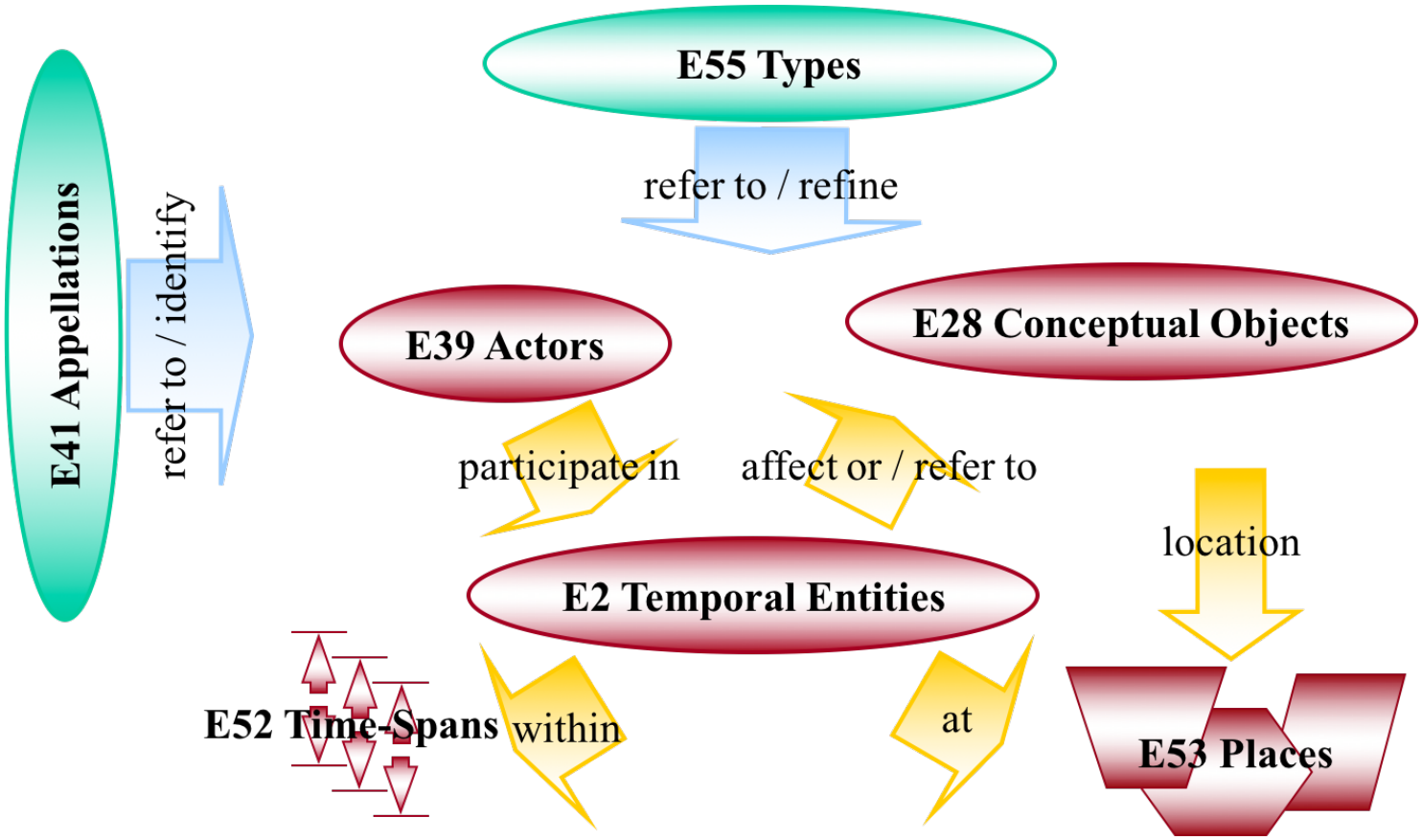
- Semantic Web Ontologies
  - Standard approach for modelling CH information
  - Formality, expressiveness, flexibility and extensibility, variable granularity, reasoning support, interoperability
  - Abundance of available ontologies/data models

Which of the available ontologies/data models for CH meets best such requirements and needs?

SW Ontologies for CH

- **CIDOC-CRM**
  - ISO Standard since 2016
  - Primary goal
    - information exchange and integration between heterogeneous sources of cultural heritage information.
  - Event-centric ontology
    - Relationships between *people*, *things*, *places* and *timespans* through *events*
  - Available encodings in RDFS and OWL

CIDOC-CRM Top-level Classes

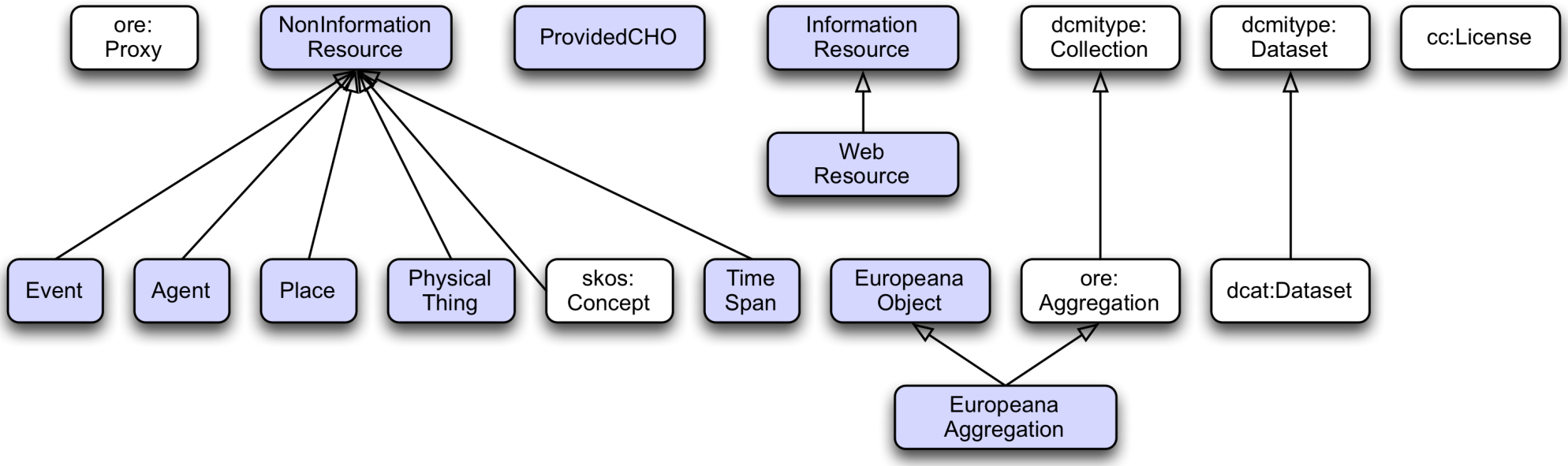


Source: http://old.cidoc-crm.org/cidoc_tutorial/index.html

SW Ontologies for CH

- **Europeana Data Model (EDM)**
  - Data Model for the publication, data structure and management for the Europeana.org
  - Primary goal
    - To represent “cross-domain collection metadata in museums, libraries and archives”
  - Re-uses elements of other SW vocabularies
    - RDF, ORE, SKOS, DC, DCAT
  - Introduces 11 new classes and 30 properties

EDM Class Hierarchy

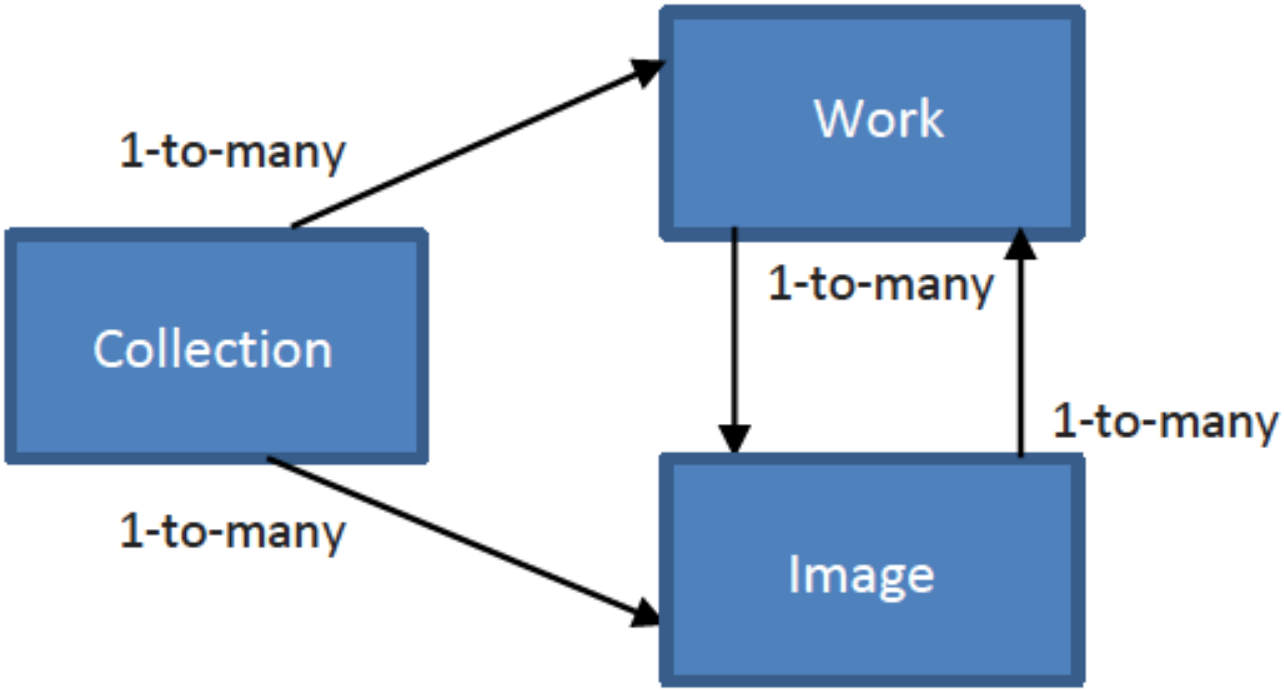


Source: Definition of the Europeana Data Model v5.2.7

SW Ontologies for CH

- **VRA Core**
  - Set of metadata elements for the description and documentation of visual culture works and images
  - Uses Dublin Core as its basis
  - VRA Core 4.0 consists of 19 elements
    - Primary Entities: *Work*, *Image*, *Collection*
  - Formats
    - Originally developed as an XML Schema
    - Now also available in RDFS

VRA Core Primary Entities



Source: http://www.loc.gov/standards/vracore/VRA_Core4_Intro.pdf

Evaluation Methodology

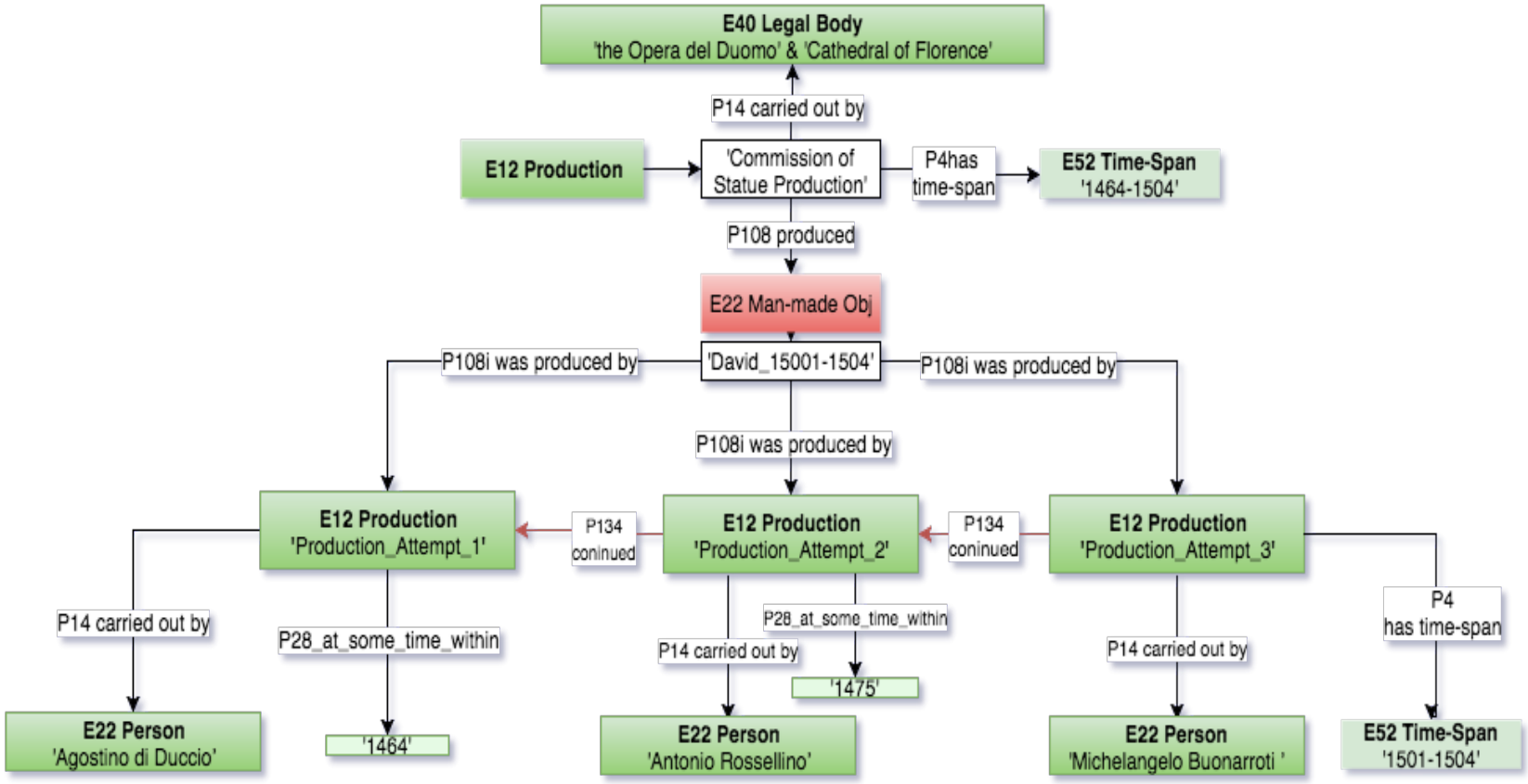
- Overview of evaluation approach
  - **Select** an appropriate sample of artworks with rich available descriptions from different art collections
  - **Describe** the sample using the three ontologies
  - **Assess** the data modelling capabilities of the ontologies using appropriate evaluation criteria

Sample

id	Artwork	Artist	Institution
PA	Self-Portrait (1659)	Rembrandt	National Gallery of Art, Washington
PB	Queen Elizabeth I (1879)	Unknown	National Portrait Gallery, London
SA	David (1501-1504)	Michelangelo	Galleria dell' Accademia, Florence
SB	David (casted 1857)	Unknown	V&A, London

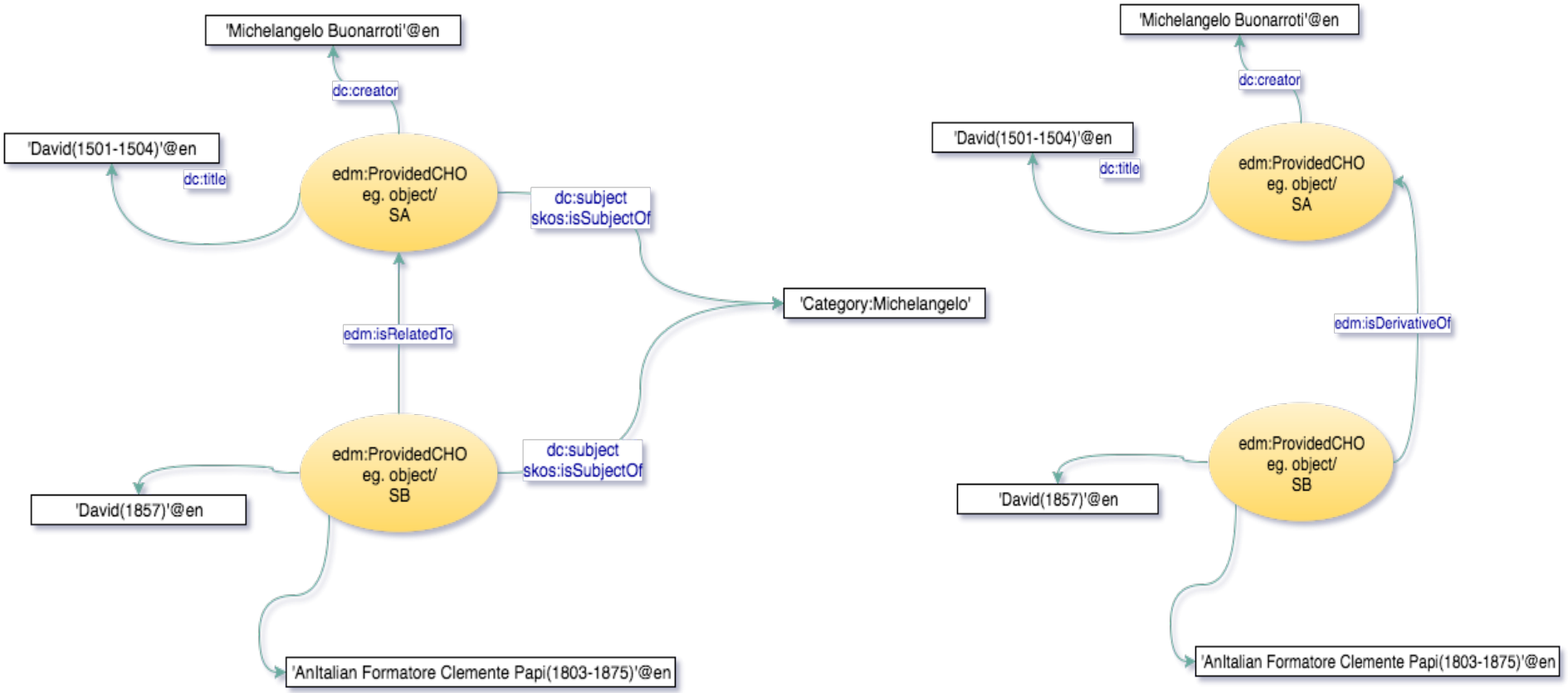
- Available Information
  - Technical descriptions
  - Provenance
  - Exhibition History
  - Relevant bibliography
  - X-radiographs
  - Relationships (e.g. SB is the plaster cast of SA)

Data Modelling Examples



CIDOC-CRM: Creation of *David* through a series of production events

Data Modelling Examples



EDM: Relationship between SA and SB

Data Modelling Examples

```
<!-- http://www.vraweb.org/vracore/vracore3.owl#PaintingA-Image2 -->
<owl:NamedIndividual rdf:about="http://www.vraweb.org/vracore/vracore3.owl#PaintingA-Image2">
    <rdf:type rdf:resource="http://www.vraweb.org/vracore/vracore3.owl#Image"/>
    <recordType rdf:resource="http://www.vraweb.org/vracore/vracore3.owl#image"/>
    <type rdf:resource="http://www.vraweb.org/vracore/vracore3.owl#X-radiography"/>
    <description xml:lang="en">the x-radiograph plate of the head of Self_Portrait 1659 Rembrandt, BW</description>
    <idNumber.currentRepository>Self-Portrait(1659)byRembrandt2.jpeg</idNumber.currentRepository>
    <rights>The National Gallery of Art, Washington, DC</rights>
    <creator.corporateName>National Gallery of Art, Washington DC</creator.corporateName>
    <creator.role>national gallery</creator.role>
    <measurements.format>JPEG</measurements.format>
    <technique>X-Radiography</technique>
</owl:NamedIndividual>
```

VRA Core 4.0: Representation of an X-Radiograph of PA

Evaluation Criteria

Criterion	Related Purpose / Need
Accuracy	Institutional Usage for Cataloguing
Clarity	
Completeness	
Conciseness	
Interoperability	Portal & Systems Management
Ease of Use	Metadata Presentation and Use
Learnability	
Indexing and Linking	
Inference	
Consistent Research and Query	

Evaluation Results

Criterion	CRM	EDM	VRA
Accuracy	★	★	★
Clarity	✓	✗	★
Completeness	★	✗	✓
Conciseness	✓	★	★
Interoperability	★	★	✓
Ease of Use	✓	✗	★
Learnability	★	✗	★
Indexing and Linking	✓	★	✓
Inference	★	✗	✓
Consistent Research and Query	★	✓	✓

★ : excellent performance ✓ : good performance ✗ : bad performance

Evaluation Results

- **CIDOC-CRM**
  - Able to capture all aspects of the artwork descriptions
    - Including information about custody, production, etc.
  - Some descriptions are rather verbose (e.g. dimensions)
  - Useful inferences
  - Allows alternative representations
  - Very good documentation
  - Supports specialisation and mapping to other vocabularies

Evaluation Results

- **EDM**
  - Simple in its use
  - Too Generic
  - Could not capture all aspects of the available descriptions
    - production process, technical descriptions, etc.
  - Focused on the description of web resources
  - Good interoperability support
  - Not very clear documentation, lack of examples

Evaluation Results

- **VRA Core**
  - Simple in its use
  - Clear and concise
  - Captures most concepts related to artwork
    - artistic style, provenance
    - relationship between a work and its image
  - Scope not as broad as CIDOC-CRM

Evaluation Summary

Purpose	CRM	EDM	VRA
Institutional Usage for Cataloguing	✓	✗	★
Portals & Systems Management	★	★	✓
Presentation of Metadata	★	✗	★

★ : excellent performance ✓ : good performance ✗ : bad performance

Summing Up

- Evaluation of three ontologies for modelling artwork
  - Four artwork descriptions
  - Ten criteria related to three different purposes
- Selection of ontology depends on the specific application needs
- Conclusions are not definitive
- Further evaluation is required

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Thank You!

Questions/Comments?

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