

Connecting the Smithsonian American Art Museum to the Linked Data Cloud

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Highlights



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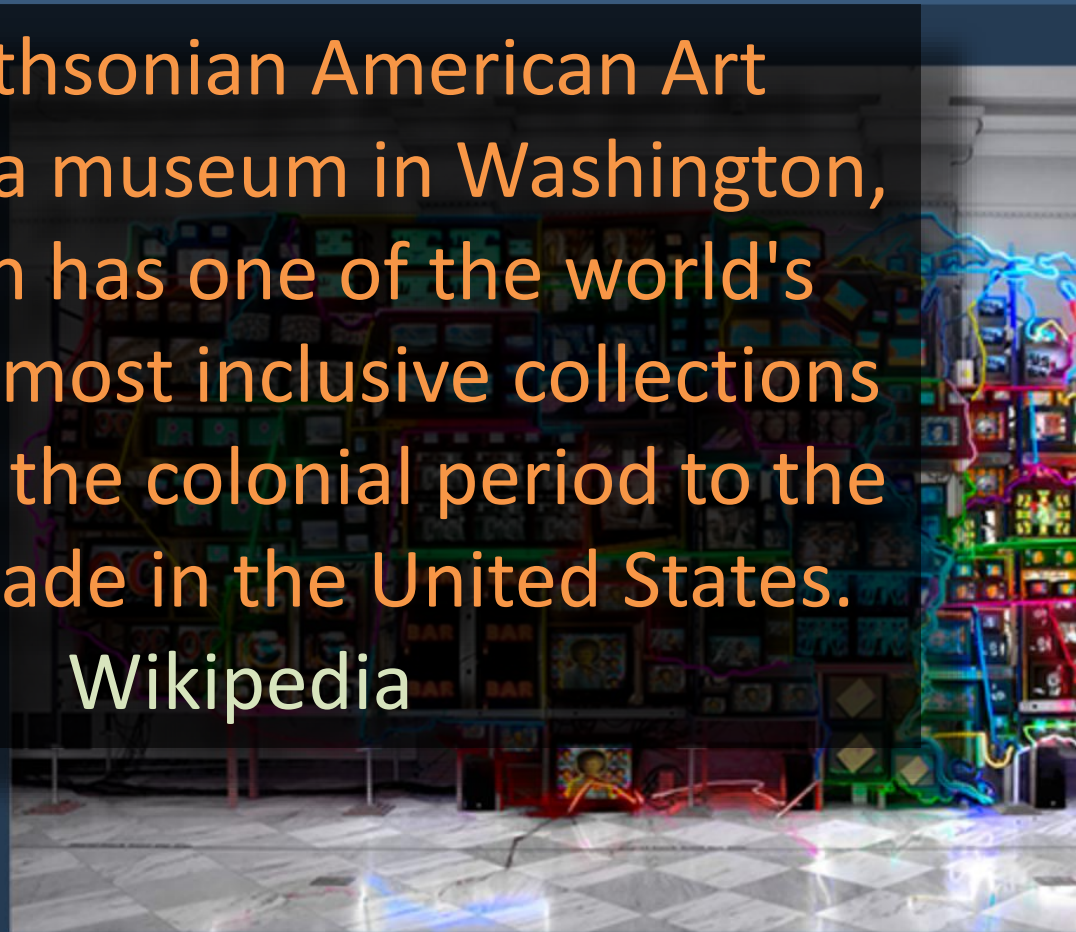
Nam June Paik: Global Visionary
Through August



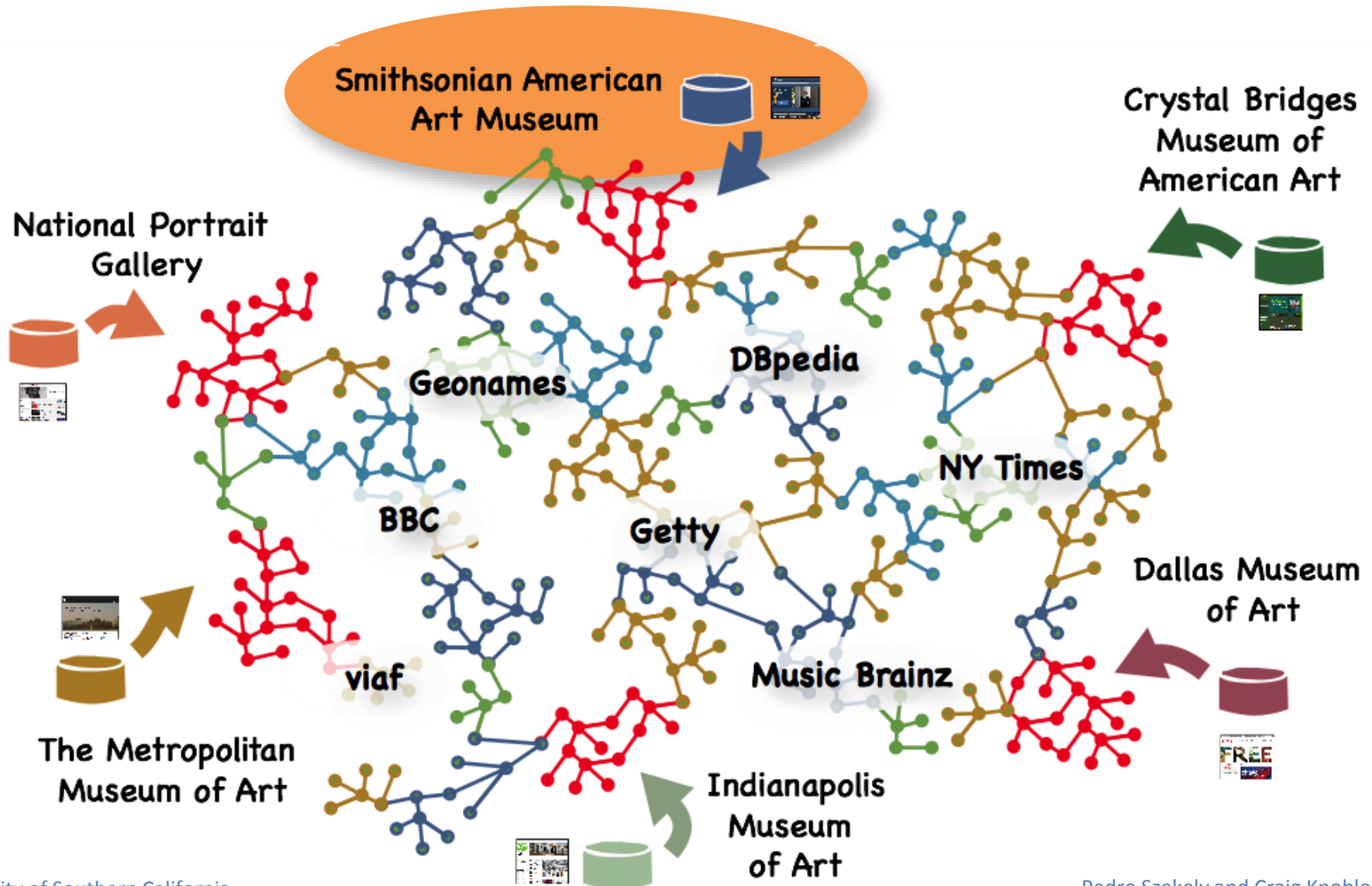
Luce Unplugged Community Showcase
presented with the City Paper
May 31, 6pm

The Smithsonian American Art Museum is a museum in Washington, D.C. which has one of the world's largest and most inclusive collections of art, from the colonial period to the present, made in the United States.

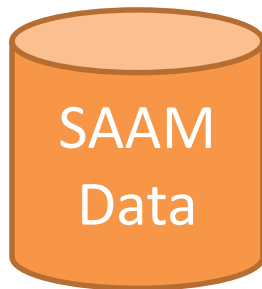
Wikipedia



Big Picture



Problem



What ontology to use?

Data consistency

Structure mismatches

What to link to?

100% precision

How to enable museums to do this themselves?

Steps to Create Linked Data

- Map data to RDF
 - ... select ontologies
 - ... define mappings
- Link to external resources
 - ... identify the links
- Curate the Linked Data
 - ... museums demand 100% correctness

select ontologies



138 pages

Definition of the
CIDOC
Conceptual Reference Model

Produced by the ICOM/CIDOC
Documentation Standards Group,
Continued by the
CIDOC CRM Special Interest Group

Version 5.0.4
November 2011



37 pages

Europeana Data Model
Mapping Guidelines v1.0.1



35 pages

Europeana Data Model Primer



61 pages

Definition of the Europeana Data
Model elements

Version 5.2.3, 24/02/2012

Europeana v1.0



Complicated

138 pages

Many irrelevant classes

Definition of the
CIDOC
Conceptual Reference Model

and properties

Produced by the ICOM/CIDOC
Documentation Standards Group,
Continued by the
CIDOC CRM Special Interest Group

Version 5.0.4
November 2011

Incomplete



37 pages

Europeana Data Model
Mapping Guidelines v1.0.1



35 pages

Europeana Data Model Primer

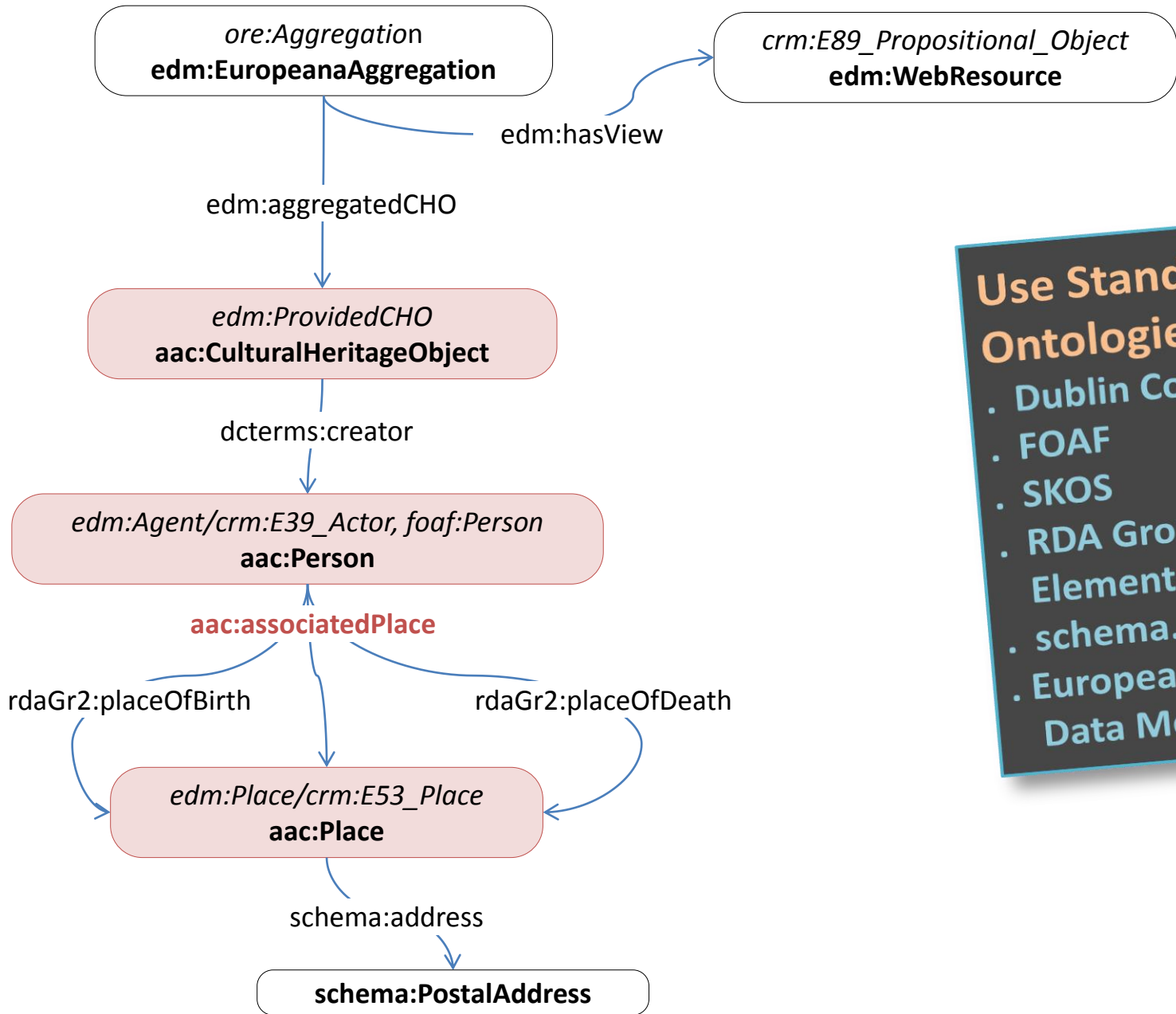


61 pages

Definition of the Europeana Data
Model elements

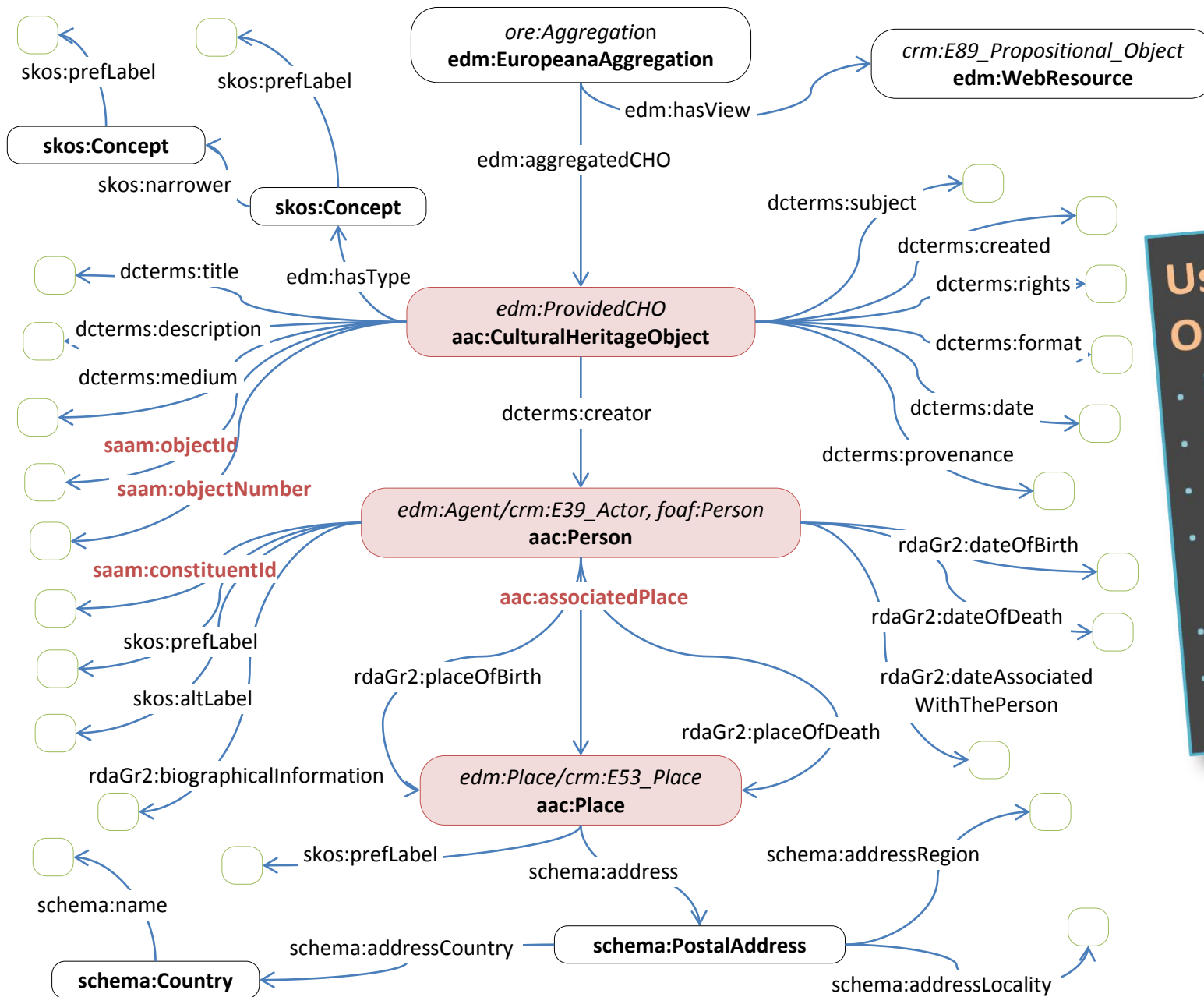
Version 5.2.3, 24/02/2012

Europeana v1.0



Use Standard Ontologies

- Dublin Core
- FOAF
- SKOS
- RDA Group Elements
- schema.org
- Europeana Data Model



Use Standard Ontologies

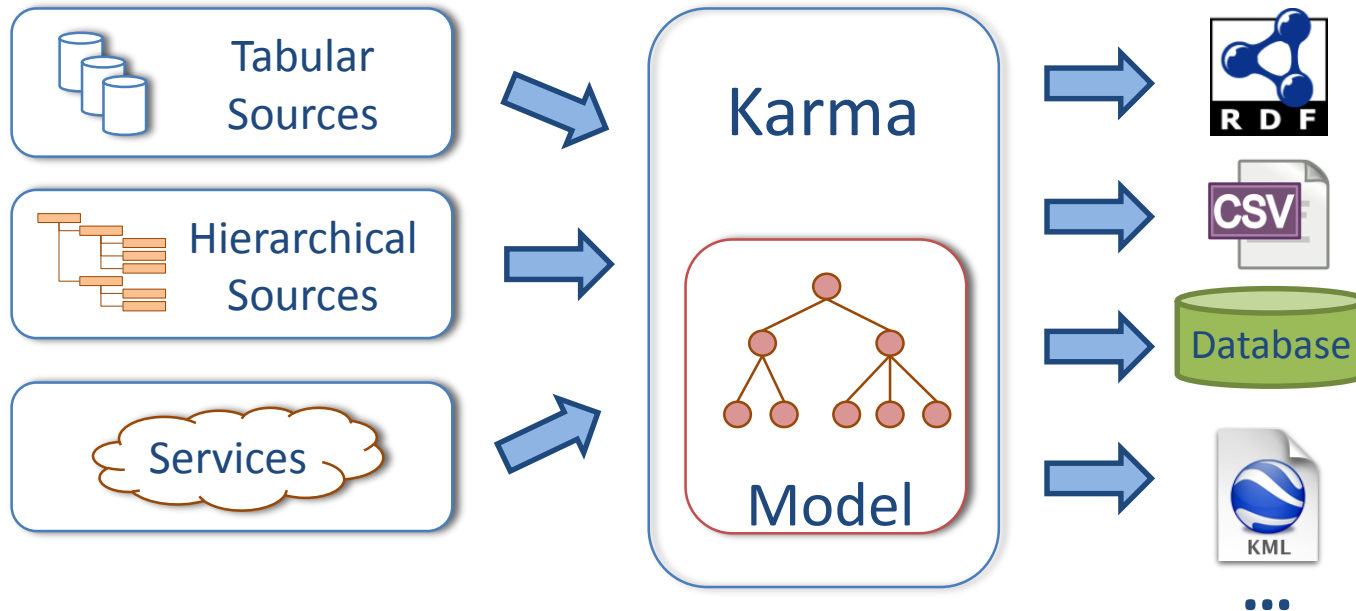
- Dublin Core
- FOAF
- SKOS
- RDA Group Elements
- schema.org
- Europeana Data Model

mapping the data to the ontologies

how to enable museums to do this themselves?

Karma

Interactive tool for rapidly extracting, cleaning, transforming, integrating, and publishing data



[Knoblock, Szekely, et al. Semi-automatically mapping structured sources into the semantic web. ISWC 2012]

specifying transformations and mapping to properties with Karma

ConstituentId	DisplayName	NameType
2	George M. Aarons	Variant Name
3	E. A. Abbey	Variant Name
6	Mary Lee Abbott	Variant Name
7	Sigmund M. Abeles	Variant Name
13	Maurice Victor Achener	Variant Name
15	Alice Stanley Acheson	Married Name
15	Dean Acheson	Married Name
15	Alice S. Acheson	Married Name
17	William B. Adair	Variant Name

aac-ont:Person

saam:person/15

saam:person/2

"Alice Stanley Archeson"

"George M. Aarons"

rdf:type

aac-ont:marriedName

rdf:type

aac-ont:variantName

Import Database Table

Import from Service

+ Import File...

Reset

Command History

Import CSV File: WebConAltNames

ConstituentId	DisplayName	NameType
2	George M. Aarons	Variant Name
3	E. A. Abbey	Variant Name
6	Mary Lee Abbott	Variant Name
7	Sigmund M. Abeles	Variant Name
13	Maurice Victor Achener	Variant Name
15	Alice Stanley Acheson	Married Name
15	Dean Acheson	Married Name
15	Alice S. Acheson	Married Name
17	William B. Adair	Variant Name
18	Adal Maldonado	Variant Name
18	Adal Alberto Maldonado	Variant Name
19	Julius Adam, the Younger	Variant Name
20	Ansel Easton Adams	Variant Name

<http://isi.edu/integration/karma>

mapping to object properties using Karma

om Service

+ Import File...

Reset

WebObjCaption_WebMakers.csv

Objectid	Constituentid	ObjectNumber	Title	Dated	CreditLine	Dimensions	CreditLineRepro	Medium	Classification	SubClassification	descri
1	2692	1984.124.1	Iran, from the United Nations Series	1944	Gift of Container Corporation of America	sheet: 11 x 9 in. (28.0 x 22.7 cm)		gouache and metallic gouache on paper	Painting		
2	3	1973.28.2	Harvest Home	1887	Gift of Sen. Stuart Symington and Rep. James W. Symington	sheet: 21 x 14 1/4 in. (53.3 x 36.2 cm)		pen and ink on paperboard	Drawing		
7	5	1975.83.10	Brooklyn Bridge, Water and Dock Streets, Brooklyn, from the series Changing New ...	1936	Transfer from the Evander Childs High School, Bronx, New York through the Genera ...	sheet: 18 x 14 3/8 in. (45.7 x 36.6 cm.)		gelatin silver print mounted on paperboard	Photography	Photoprint	
8	5	1975.83.18	Central Park Plaza, from Fifth Avenue at 58th Street, from the series Changing N ...	1937	Transfer from the Evander Childs High School, Bronx, New York through the Genera ...	sheet: 17 3/4 x 14 1/4 in. (45.2 x 36.0 cm.)		gelatin silver print mounted on paperboard	Photography	Photoprint	
			Downtown Skvoort. Foot of		Transfer from the Evander	sheet: 18 x					

<http://isi.edu/integration/karma>

Evaluation of Data Mapping Using Karma

SAAM database

8 tables

29 columns

Ontologies

407 classes

105 data properties

229 object properties

	# of times Karma's top 4 suggestions contain the correct semantic type	# of times Karma correctly assigns object properties	Time (minutes)
Run 1: no training data	7 out of 29 (24%)	30 out of 35 (85%)	18
Run 2: using Run 1 as training	27 out of 29 (93%)	32 out of 35 (91%)	8

identifying and curating links

Multiple “John Singer Sargent”

cb:Person_John_Singer_Sargent

```
a aac-ont:Person ;
ont0:dateOfBirth "1879", "1885" ;
ont0:dateOfDeath "1925" ;
foaf:name "John Singer Sargent" .
```

ima:Person_John_Singer_Sargent

```
a aac-ont:Person ;
dct:date "1856-1925" ;
foaf:name "John Singer Sargent"
```

dallas:Person_John_Singer_Sargent

```
a aac-ont:Person ;
ont0:dateOfBirth "1856" ;
ont0:dateOfDeath "1925" ;
foaf:name "John Singer Sargent" .
```

saam:Person_4253

```
a aac-ont:Person ;
aac-ont:associatedPlace
  saam:SaamPlace_1357324439768t1r13950_0,
  saam:SaamPlace_1357324439768t1r13951_0 ;
saam:constituentId "4253" ;
rdaGr2:biographicalInformation
  "Painter. Sargent traveled ..." ;
rdaGr2:dateAssociatedWithThePerson "1990-10-1", "1995-5-8" ;
rdaGr2:dateOfBirth "1856-1-12" ;
rdaGr2:dateOfDeath "1925-4-15" ;
rdaGr2:placeOfBirth saam:SaamPlace_1357324439768t1r13952_0 ;
rdaGr2:placeOfDeath saam:SaamPlace_1357324439768t1r13953_0 ;
foaf:name "John S. Sargent" ;
skos:altLabel "John S. Sargent" ;
skos:prefLabel "John Singer Sargent" .
```

met:Person_John_Singer_Sargent

```
a aac-ont:Person ;
ont0:placeOfResidence
  "North and Central America",
  "United States" ;
foaf:name "John Singer Sargent" .
```


Linking “John Singer Sargent”

saam:Person_4253

```
owl:sameAs cb:Person_John_Singer_Sargent ;  
owl:sameAs dallas:Person_John_Singer_Sargent ;  
owl:sameAs ima:Person_John_Singer_Sargent ;  
owl:sameAs met:Person_John_Singer_Sargent ;  
owl:sameAs dbpedia:John_Singer_Sargent ;  
owl:sameAs nytimes:N49129220686803623753 ;  
owl:sameAs w-flick:John_Singer_Sargent ;  
...  
.
```

Intuition

Estimate discrimination power of properties,
e.g., of name, birth and death dates

every combination of dates

birth date	death date	# of people
...
1800	1820	147
1800	1821	284
1800	1822	213
...

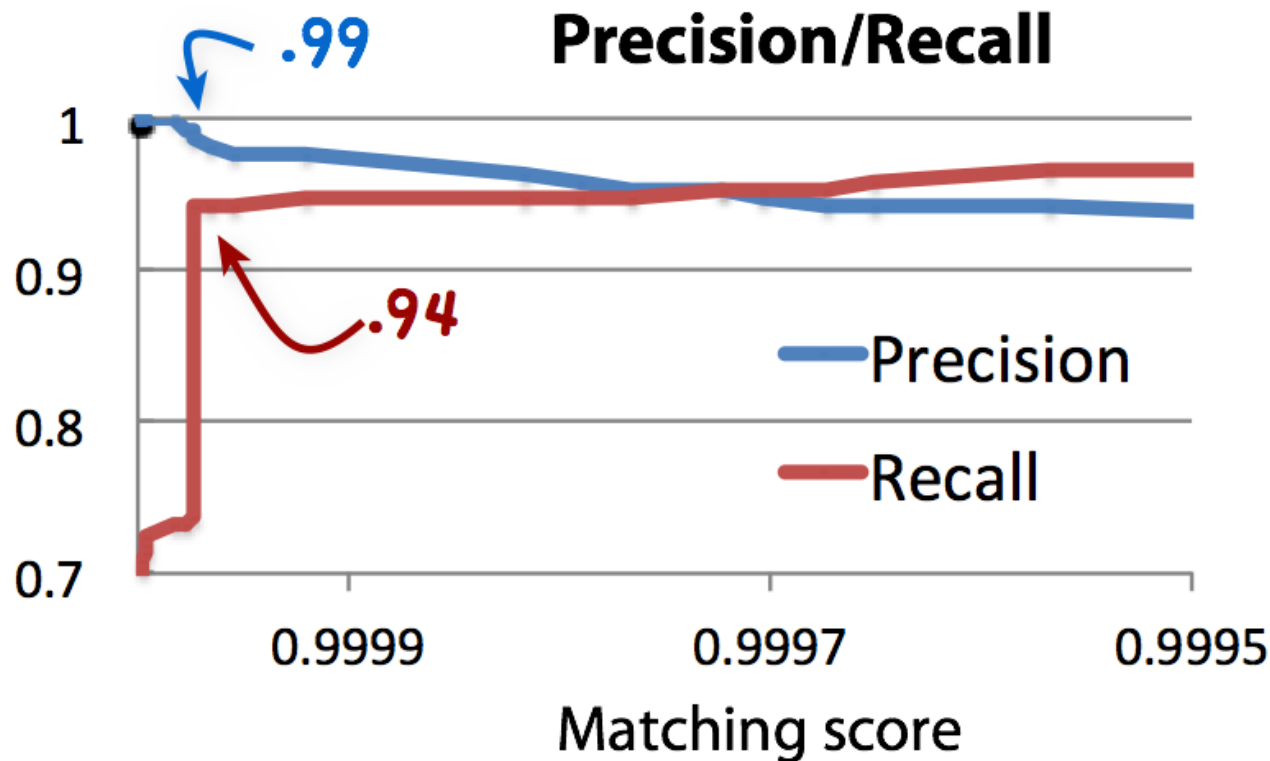
similar idea to

Song, D., Heflin, J.: Domain-independent entity coreference for linking ontology instances. ACM Journal of Data and Information Quality (ACM JDIQ) (2012)

Evaluation of Automatic Linking

SAAM names starting with "A" matched by hand

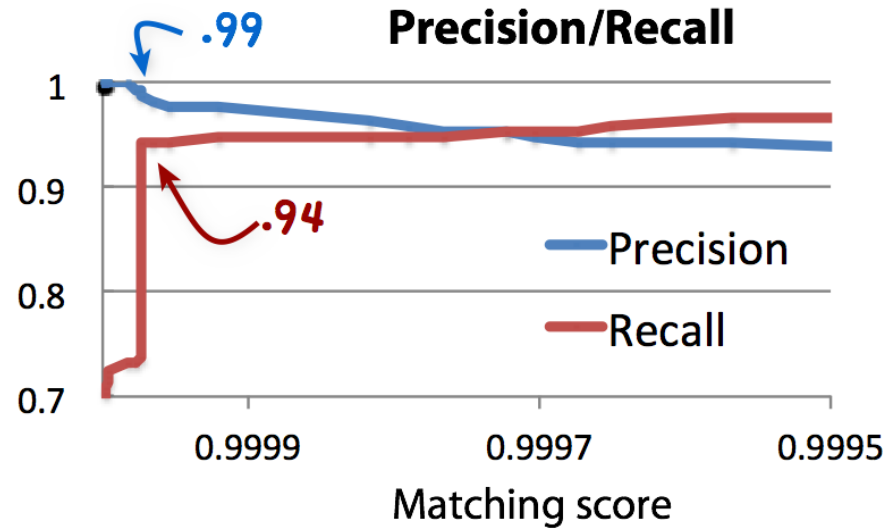
- 535 people
- 176 matches



Most links users verify are correct

Very few links are missing

Results of Automatic Linking



SAAM verified

DBpedia	2,194	Getty ULAN®	2,110
New York Times	70	Rijksmuseum	551
		Geonames	3,068

estimate \approx 30 missing links to DBpedia

Curating Links with Karma

Karma proposes links

Person_7024	1923	2004	Anthony Hecht	Verified by Human	<input type="button" value="Match"/> <input type="button" value="Not Match"/> <input type="button" value="Unsure"/>
	1923	2004	Anthony Hecht	[2012-11-08 12:24:10] History	
Person_1483	1607	1656	Aniello Falcone	Exact match (0.99999704)	<input type="button" value="Match"/> <input type="button" value="Not Match"/> <input type="button" value="Unsure"/>
	1600	1665	Aniello Falcone	[2012-11-21 15:54:22] History	
Person_3946	1895	1978	Abraham Rattner	Verified by Human	<input type="button" value="Match"/> <input type="button" value="Not Match"/> <input type="button" value="Unsure"/>
	1893	1978	Abraham Rattner	[2012-11-08 12:24:07] History	
Person_70	1905	1978	Arturo Pacheco A	Verified by Human	<input type="button" value="Match"/> <input type="button" value="Not Match"/> <input type="button" value="Unsure"/>
	1903	1978	Arturo Pacheco A	[2012-11-08 12:24:10] History	
Person_18387	1948	----	Abelardo Morell	Verified by Human	<input type="button" value="Match"/> <input type="button" value="Not Match"/> <input type="button" value="Unsure"/>
	1948	----	Abelardo Morell	[2012-11-08 12:24:06] History	
Person_1724	1914	----	Abram Games	Verified by Human	<input type="button" value="Match"/> <input type="button" value="Not Match"/> <input type="button" value="Unsure"/>
	1914	----	Abram Games	[2012-11-08 12:24:05] History	
Person_6274	1933	----	Adela Akers	Verified by Human	<input type="button" value="Match"/> <input type="button" value="Not Match"/> <input type="button" value="Unsure"/>
	1933	----	Adela Akers	[2012-11-08 12:24:09] History	
Person_27474	1605	1638	Adriaen Brouwer	Verified by Human	<input type="button" value="Match"/> <input type="button" value="Not Match"/> <input type="button" value="Unsure"/>
	1605	----	Adriaen Brouwer	[2012-11-08 12:24:06] History	

Human verifies them

comment here

Linking with Karma

The image illustrates a workflow for linking data. On the left, a list of person identifiers (e.g., Person_7024, Person_5502) is shown. An orange arrow points from the first identifier to a Wikipedia article for Andrew Wyeth. A purple arrow points from the second identifier to the same Wikipedia article. A red arrow points from the third identifier to a Linked Open Data (LOD) page for Andrew Wyeth from The New York Times. The LOD page displays various metadata fields such as associated article count, first use, latest use, and search API query.

Smithsonian American Art Museum and the Renwick Gallery

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Person_7024
Person_5502
Person_1483
Person_3946
Person_70
Person_1838
Person_1724
Person_6274
Person_27474

WIKIPEDIA The Free Encyclopedia

Andrew Wyeth

The New York Times Linked Open Data ^{BETA}

Wyeth, Andrew

<http://data.nytimes.com/65521524276539244133>

nyt:associated_article_count	6
nyt:first_use	2006-04-18
nyt:latest_use	2009-06-07
nyt:number_of_variants	1
nyt:search_api_query	<a +nytd_per_facet%3a%5bwyeth%2c+andrew%5d&rank='ne&fields=abstract,author,body,byline,classifiers_facet,column_facet,date,day_of_week_facet,des_facet,desk_facet,geo_facet,lead_paragraph,material_type_facet,multimedia,nytd_byline,nytd_des_facet,nytd_geo_facet,nytd_lead_paragraph,nytd_org_facet,nytd_per_facet,nytd_section_facet,nytd_title,nytd_works_mentioned_facet,org_facet,page_facet,per_facet,publishation_day,publishation_month,publishation_year,section_page_facet,small_image_height,small_image_url,small_image_width,source_facet,title,url,word_count,works_mentioned_facet"' href="http://api.nytimes.com/svc/search/v1/article?query=">http://api.nytimes.com/svc/search/v1/article?query="+nytd_per_facet%3A%5BWyeth%2C+Andrew%5D&rank=ne&fields=abstract,author,body,byline,classifiers_facet,column_facet,date,day_of_week_facet,des_facet,desk_facet,geo_facet,lead_paragraph,material_type_facet,multimedia,nytd_byline,nytd_des_facet,nytd_geo_facet,nytd_lead_paragraph,nytd_org_facet,nytd_per_facet,nytd_section_facet,nytd_title,nytd_works_mentioned_facet,org_facet,page_facet,per_facet,publishation_day,publishation_month,publishation_year,section_page_facet,small_image_height,small_image_url,small_image_width,source_facet,title,url,word_count,works_mentioned_facet
nyt:topicPage	http://topics.nytimes.com/top/reference/timestopics/people/w/andrew_wyeth/index.html
owl:sameAs	http://data.nytimes.com/wyeth_andrew_per
owl:sameAs	http://dbpedia.org/resource/Andrew_Wyeth
owl:sameAs	http://rdf.freebase.com/ns/en.andrew_wyeth
rdf:type	http://www.w3.org/2004/02/skos/core#Concept
skos:definition - en	Andrew Wyeth, one of the most popular and also most lambasted artists in the history of American art, died Jan. 2009, at his home in Chadds Ford, Pa. He was 91. He was a reclusive linchpin in a colorful family dynasty of artists whose precise realist views of hardscrabble rural

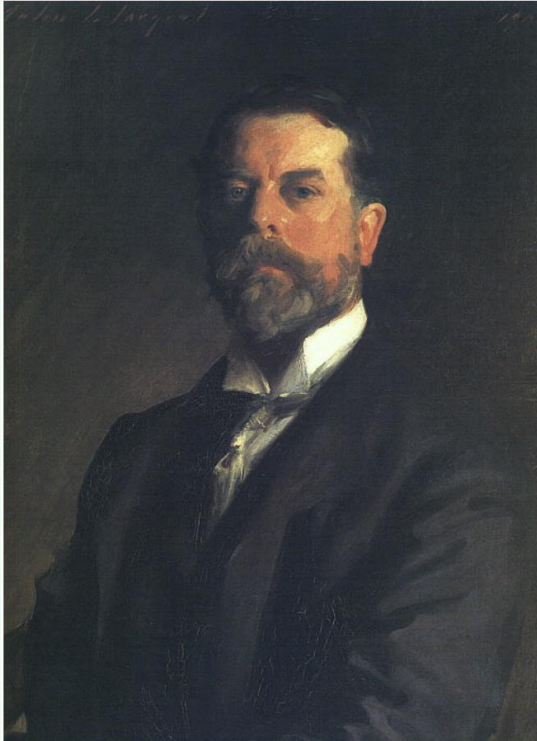
results of automated linking and
interactive curation recorded using
PROV

owl:sameAs statements constructed
using SPARQL CONSTRUCT queries
over PROV records

deployment

John Singer Sargent at Smithsonian American Art Museum

<http://lod.isi.edu/resource/person/4253>



public SPARQL
endpoint

Property	Value
aac-ont:associatedPlace	<ul style="list-style-type: none"> aac:place/01e03f4e75bd99edafbbf4c4d121646e aac:place/3acced0ccdd4b82ff3dce2e12899609 aac:place/3c2f5fc3870423287905df8210a6c708 aac:place/db4d6d43295c0cbd5be61cd2730f3a3e
ElementsGr2:biographicalInformation	<ul style="list-style-type: none"> Painter. Sargent traveled in a circle of socially prominent people and is known for his loosely painted portraits done in a style reminiscent of Edgar Degas and James Abbott McNeill Whistler. <i>Madame X</i> caused a minor scandal at the Salon of 1884 and was rejected by Sargent's client because Sargent depicted her as vain. He devoted his later career to impressionistic watercolor scenes. <p>Joan Stahl <i>American Artists in Photographic Portraits from the Peter A. Juley & Son Collection</i> (Washington, D.C. and Mineola, New York: National Museum of American Art and Dover Publications, Inc., 1995)</p> Sargent, born in Italy to American parents and educated in Germany and France, possessed a keen eye for regional social conventions. As the premier society portrait painter of his day, Sargent instinctively knew what pose, attire, and mood to suggest in London, New York, or Boston. His English subjects have an air of pomp and splendor. New

saam-ont:constituentId	<ul style="list-style-type: none"> 4253
is dcterms:creator of	<ul style="list-style-type: none"> aac:object/21033 aac:object/21621 aac:object/21622 aac:object/21623 aac:object/21624 aac:object/28009 aac:object/5151
aac-ont:creatorOf	<ul style="list-style-type: none"> aac:object/21033 aac:object/21621 aac:object/21622 aac:object/21623 aac:object/21624 aac:object/28009 aac:object/5151
ElementsGr2:dateAssociatedWithThePerson	<ul style="list-style-type: none"> 1990-01 1995-05-08
ElementsGr2:dateOfBirth	<ul style="list-style-type: none"> 1856-01-12
ElementsGr2:dateOfDeath	<ul style="list-style-type: none"> 1925-04-15
foaf:depiction	<ul style="list-style-type: none"> <http://upload.wikimedia.org/wikipedia/commons/6/6b/John_Singer_Sargent_-_autoportrait_1906.jpg>
dc:identifier	<ul style="list-style-type: none"> 4253
rdfs:label	<ul style="list-style-type: none"> John Singer Sargent
foaf:name	<ul style="list-style-type: none"> John Singer Sargent
ElementsGr2:placeOfBirth	<ul style="list-style-type: none"> aac:place/3acced0ccdd4b82ff3dce2e12899609
ElementsGr2:placeOfDeath	<ul style="list-style-type: none"> aac:place/3c2f5fc3870423287905df8210a6c708
skos:prefLabel	<ul style="list-style-type: none"> John Singer Sargent
owl:sameAs	<ul style="list-style-type: none"> <http://data.nytimes.com/N49129220686803623753> <http://dbpedia.org/resource/John_Singer_Sargent> :person/4253 <http://rdf.freebase.com/ns/en.john_singer_sargent>
rdfs:seeAlso	<ul style="list-style-type: none"> <http://data.nytimes.com/N49129220686803623753> <http://en.wikipedia.org/wiki/John_Singer_Sargent>
saam-ont:seeAlsoNytimes	<ul style="list-style-type: none"> <http://data.nytimes.com/N49129220686803623753>
saam-ont:seeAlsoWikipedia	<ul style="list-style-type: none"> <http://en.wikipedia.org/wiki/John_Singer_Sargent>
rdf:type	<ul style="list-style-type: none"> frbr:Person aac-ont:Person edm:Agent owl:Thing skos:Concept foaf:Person
aac-ont:variantName	<ul style="list-style-type: none"> John S. Sargent

This page shows information obtained from the SPARQL endpoint at <http://localhost/openrdf-sesame/repositories/saam-lod>.
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New search



John Singer Sargent

Also Known as: John S. Sargent

Born: Florence, Italy 1856
Died: London, England 1925

Active in: Boston, Massachusetts
Paris, France

Photo Caption: John Singer Sargent, Peter A. Juley & Son Collection, Smithsonian American Art Museum J0002143.

SPARQL queries to our endpoint



Social Media @ American Art

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Biography

Painter. Sargent traveled in a circle of socially prominent people and is known for his loosely painted portraits done in a style reminiscent of Edgar Degas and James Abbott McNeill Whistler. *Madame X* caused a minor scandal at the Salon of 1884 and was rejected by Sargent's client because

Works in the Collection

More in Wikipedia

More in the New York Times

Online Exhibitions

collections

John Singer Sargent

Also Known As

Born: Florence

Died: London

Active: 1878-1925

Photo: John Singer Sargent Collection, Museum of Modern Art

SPARQL queries to our endpoint

traveled in a circle of socially

and is known for his loosely

done in a style reminiscent of

James Abbott McNeill Whistler

ed a minor scandal at the Salon of

ected by Sargent's client because

University of Southern California

- [Works in the Collection](#)
- [More in Wikipedia](#)
- [More in the New York Times](#)
- [Online Exhibitions](#)

John Singer Sargent - Wikipedia, the free encyclopedia

en.wikipedia.org/wiki/John_Singer_Sargent

Article Talk

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John Singer Sargent

From Wikipedia, the free encyclopedia

John Singer Sargent (January 12, 1856 – April 14, 1925) was an American artist, considered the "leading portrait painter of his generation" for his evocations of Edwardian era luxury.^{[1][2]} During his career, he created roughly 900 oil paintings and

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John Singer Sargent News - The New York Times

topics.nytimes.com/top/reference/timestopics/people/s/john

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The New York Times

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John Singer Sargent

John Singer Sargent Navigator

A list of resources from around the Web about John Singer Sargent as selected by researchers and editors of The New York Times.

- National Gallery of Art
- The Metropolitan Museum of Art
- Worcester Art Museum
- Boston Public Library
- Corcoran Gallery of Art
- Museum of Fine Arts, Boston
- The Tate Collection
- The Boston Athenaeum
- The Brooklyn Museum
- The Louvre Museum

WHAT'S POPULAR

Breeding the Nutrition Out of Our Food

"A Street in Venice" by Sargent. Reed Saxon/Associated Press

From the 1880's nearly until the start of World War I, by which point he had pretty much given up portraiture, John Singer Sargent was the most skillful society painter on either side of the Atlantic.

Although Americans claim him as part of the national heritage, Sargent was hardly an American, having been born and reared in Europe. His father was a doctor who gave up his comfortable Philadelphia practice to accommodate his wife's wanderlust. They moved around Europe, from one hotel or rented villa to another. Sargent lived everywhere and nowhere until settling in Paris and then, ultimately, in London. He didn't even visit America until he was 21.

Partly this may explain why the artist has always seemed to be observing a world he neither occupied nor chose to judge. His pictures are, in a sense,

Related Work

- Europeana
 - 17 million items, 1,500 institutions
 - Require exports in “Europeana” format
- Amsterdam Museum, Museum Finland
 - Rich ontology, RDF to RDF mapping rules
- LODAC museums in Japan
 - 114 museums, simple ontology
- Research Space, British Museum
 - CIDOC CRM ontologies, complex mappings

We focused significantly on Linking identification and curation

Next Steps

- Applications leveraging linked data
 - Virtual museum
 - Tools to create multimedia stories about art
 - Tools to find inconsistencies
 - Feed data to wikidata
- American Art Collective: a linked data consortium of museums



Merci