

# Introduction to Schema.org and JSON-LD



Jacob Shelby

# Goal of today's session

Learn about two key tools for increasing discoverability of information on the open web

- Schema.org
- Semantic Markup



# Schema.org

# What is it?

Schema.org is a set of vocabularies for describing things in an interoperable and semantic way on the web.

# Historical Context

- Started in 2011 by Google, Yahoo, Bing
- Maintained by members of Google, Yahoo, Bing, Yandex
- Original scope was for businesses
- Community driven

# Purpose

- “[To] create and support a common set of schemas for structured data markup on web pages.”\*
- To make data on the web more meaningful to machines

\* <https://webmasters.googleblog.com/2011/06/introducing-schemaorg-search-engines.html>

## Item information

### Title:

Brothers of the Omega Psi Phi Fraternity in step routine

### Topics:

[Student Life](#)

### Subjects:

[African American fraternal organizations](#)

[College students -- Societies, etc.](#)

[Dance](#)

[Dogs](#)

[Fraternal organizations](#)

[Performances](#)

[Students -- Societies, etc.](#)

### Original Format:

[Black-and-white print \(photograph\)](#)

### Extent:

8 x 10 inches

### Item identifier:

0021721

### Photographer:

[Lodge, Rick](#)

### Created Date:

1981-10-01

### Description:

Information from The Technician newspaper, dated October 7, 1981: Louis Cade [with dog] leads his Omega Psi Phi brothers in a step routine before 400 onlookers in front of the free expression tunnel.

### Genre:

[Photographs](#)

### Names:

[North Carolina State University -- Students](#)

[Omega Psi Phi Fraternity](#)

### Location:

[Raleigh \(N.C\)](#)

### Digital Project:

[University Archives Photographs](#)

Photograph

Person

Place

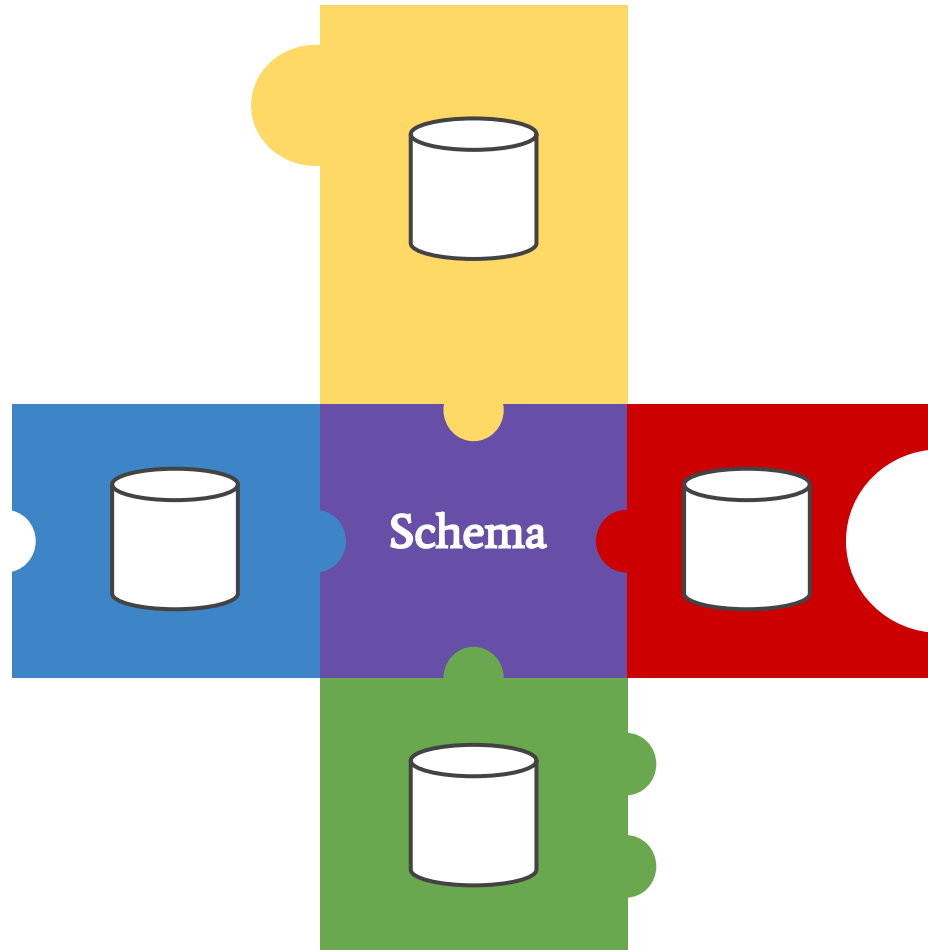


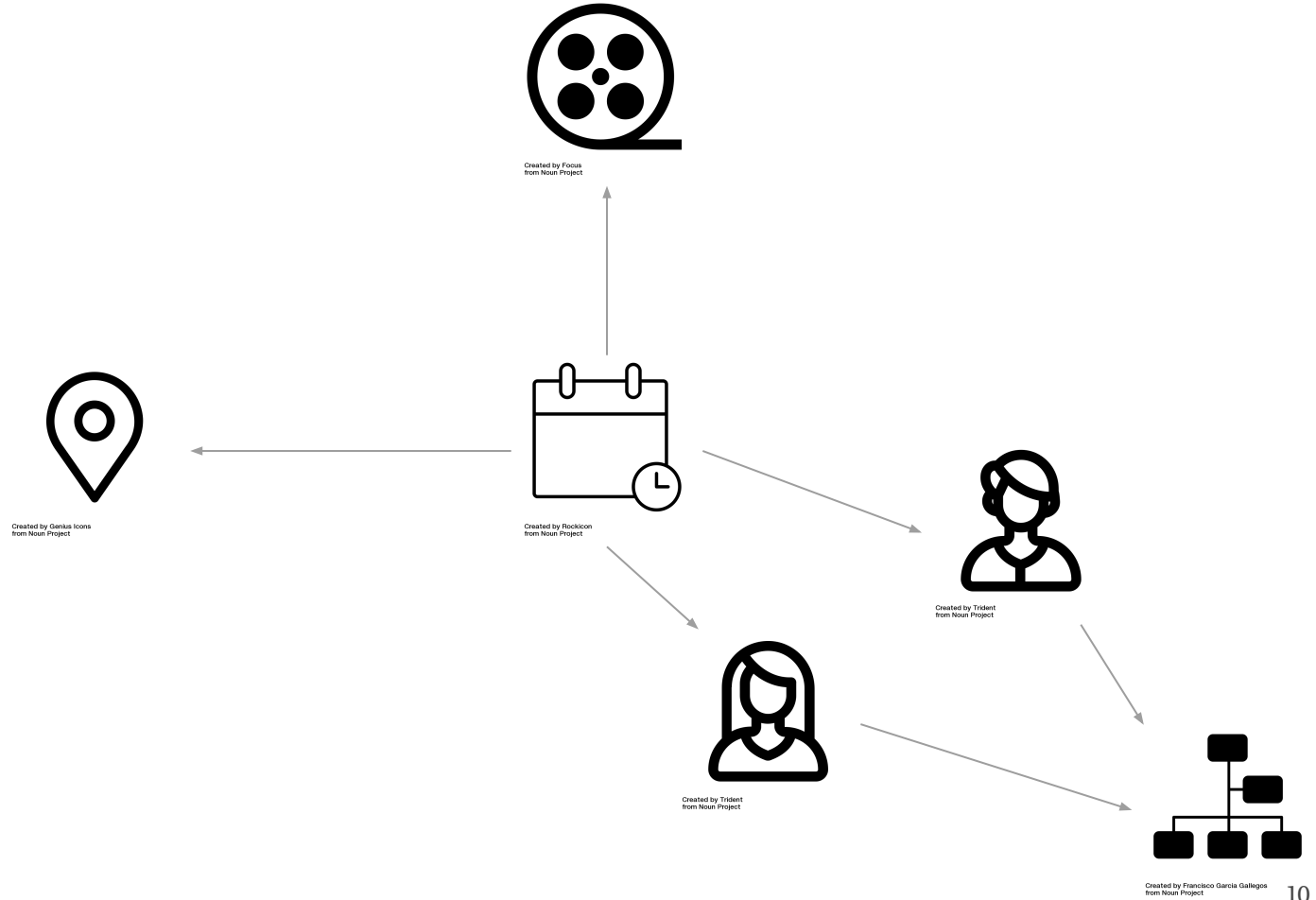
Image

**Schema.org**

**follows linked  
data principles**







Schema.org

what makes a supercomputer so super



All

News

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Images

Shopping

More

Settings

Tools

About 2,180,000 results (0.41 seconds)

### What makes a supercomputer so super? - Server Hardware ...

<https://community.spiceworks.com/.../1071051-what-makes-a-supercomputer-so-supe...>

Jul 16, 2015 - 25 posts - 21 authors

A **supercomputer** is just what its name suggests – a computer with ... Newegg reports that Tianhe-2 is "so powerful that it's able to perform ...

### People also ask

What is a super computer?



How much does it cost to build a supercomputer?



How does a super computer work?



What is the use of a supercomputer?



*Feedback*

### What Makes a Supercomputer so Super? | NCSU Libraries

<https://www.lib.ncsu.edu/events/what-makes-a-supercomputer-so-super>

**Supercomputers** play an important role in the field of computational science and are used for a wide range of computationally intensive tasks in various fields ranging from basic science to finance.

### Upcoming Events | What Makes a Supercomputer So Super? | College ...

<https://sciences.ncsu.edu/event/what-makes-a-supercomputer-so-super/>

**Supercomputers** play an important role in the field of computational science and are used for a wide range of computationally intensive tasks in various fields ranging from basic science to finance.

Tue, Nov 7 D.H. Hill Library, Multimedia Seminar Center

<https://www.google.com/search?q=what+makes+a+supercomputer+so+super>

# Montana State University Databases

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## American West: Sources from the Everett D. Graff Collection



### American West: Sources from the Everett D. Graff Collection

What is it? The Graff Collection from the Newberry Library in Chicago is a unique resource which will allow maps, ephemeral material and rare printed sources, this collection will act as a dynamic teaching and re

Why use it? To find primary documents relating to the history of the American West

Coverage: 1700s-mid 1900s

Access: Unlimited users. Available on networked computers on the MSU campus and via the proxy serve

Vendor: Adam Matthew

Learn more: Adam Matthew Digital

Subjects: Agriculture, History, Native American Studies

Liaison(s):

Linked Data Topics:

Agriculture  
History  
Primary source

RdFa POSH

Statement Collection #5

Entity [product](#)

Attributes

[rdf:type](#) [schema:Product](#)

[Name](#) "American West: Sources from the Everett D. Graff Collection"@en-US

[schema:image](#)

[schema:description](#) "The Graff Collection from the Newberry Library in Chicago is a unique resource which will allow scholars to explore many areas of history in the American West. Through a mixture of original manuscripts, maps, ephemeral material and rare printed sources, this collection will act as a dynamic teaching and research resource."@en-US

[schema:brand](#) "Adam Matthew"@en-US

[schema:manufacturer](#) "Adam Matthew"@en-US

[schema:category](#) "Agriculture, History, Native American Studies"@en-US

[schema:category](#) "Agriculture"@en-US

[schema:category](#) "History"@en-US

[schema:category](#) "Primary source"@en-US

[schema:additionalType](#) [dbpedia:Agriculture](#)

[schema:additionalType](#) <https://en.wikipedia.org/wiki/Agriculture>

[schema:additionalType](#) [dbpedia:History](#)

[schema:additionalType](#) <https://en.wikipedia.org/wiki/History>

[schema:additionalType](#) [dbpedia:Primary\\_source](#)

ver: 2.15.2 [OpenLink Structured Data Sniffer](#) Copyright © 2015-2017 [OpenLink Software](#)

<http://www.lib.montana.edu/resources/about/482>



American West: Sources from the Everett D. Graff Collection



All

Images

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News

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More

Settings

Tools

About 17,900 results (1.21 seconds)


## American West: Sources from the Everett D. Graff Collection : Montana ...

[www.lib.montana.edu](http://www.lib.montana.edu) > Resources ▼

★★★★★ Rating: 3.5 - 4,380 votes


Aug 1, 2017 - The **Graff Collection** from the Newberry Library in Chicago is a unique resource which will allow scholars to explore many areas of history in the ...

# Montana State University People



**MONTANA**  
STATE UNIVERSITY

Jason Clark - People



JSON-LD   RDFa   POSH

Statement Collection #1

Entity <http://www.lib.montana.edu/people/23#address>

Attributes

[rdf:type](#) [schema:PostalAddress](#)

[schema:addressLocality](#) Bozeman

[schema:addressRegion](#) MT

[schema:postalCode](#) 59717-3320

[schema:streetAddress](#) P.O. Box 173320

Statement Collection #2

Entity <http://www.lib.montana.edu/people/23#member>

Attributes

[rdf:type](#) [schema:OrganizationRole](#)

[schema:member](#) <http://www.lib.montana.edu/people/23#person>

Statement Collection #3

Entity <http://www.lib.montana.edu/people/23#organization>

Attributes

[rdf:type](#) [schema:EducationalOrganization](#)

[schema:member](#) <http://www.lib.montana.edu/people/23#member>

[Name](#) Montana State University (MSU) Library

[schema:sameAs](#) <http://www.freebase.com/m/0j3y9r1>

[schema:sameAs](#) [https://dbpedia.org/resource/Montana\\_State\\_University\\_Library](https://dbpedia.org/resource/Montana_State_University_Library)

[schema:sameAs](#) <https://www.wikidata.org/entity/Q15255419>

[schema:sameAs](#) <https://www.worldcat.org/wcr/organization/data/56245>

Statement Collection #4

Entity <http://www.lib.montana.edu/people/23#person>

Attributes

ver: 2.16.4   [OpenLink Structured Data Sniffer](#)

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<http://www.lib.montana.edu/people/about/23>

# Impact on Library SEO

*The Open SESMO (Search Engine & Social Media Optimization) Project: Linked and Structured Data for Library Subscription Databases to Enable Web-scale Discovery in Search Engines*

*Linked Data is People: Building a Knowledge Graph to Reshape the Library Staff Directory*



# Usage by Big Engines

*[Schema.org: Evolution of Structured Data on the Web](#)*

*[Google - Introduction to Structured Data](#)*

# Semantic Markup



# Person Example: Without Markup

<p>George Bush, the 41st President of the United States is the father of George W. Bush, the 43rd President of the United States.</p>

<http://schema.org/Person>

# Person Example: JSON-LD Syntax

Example 4

Without Markup

Microdata

RDFa

**JSON-LD**

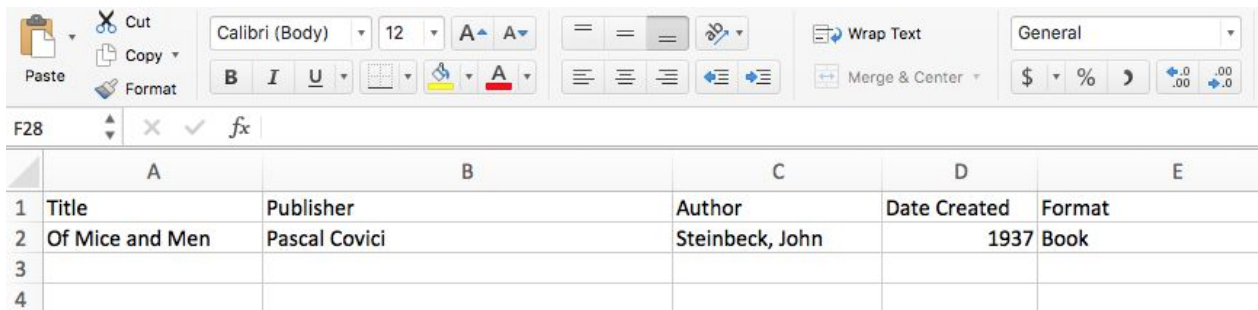
```
<script type="application/ld+json">
{
  "@context": "http://schema.org",
  "@type": "Person",
  "name": "George Bush",
  "disambiguatingDescription": "41st President of the United States",
  "children": {
    "@type": "Person",
    "name": "George W. Bush",
    "disambiguatingDescription": "43rd President of the United States"
  }
}
</script>
```

<http://schema.org/Person>

# JSON Basics

- JavaScript Object Notation is a data format
- Based on a subset of the JavaScript Programming Language
- Text based and language independent

# JSON Example



The screenshot shows the Microsoft Excel interface. The ribbon at the top includes the 'Formulas' tab, with options for Paste, Cut, Copy, and Format. The font settings are Calibri (Body), size 12. The table below has five columns: A (Title), B (Publisher), C (Author), D (Date Created), and E (Format). The data for the first row is: Title: Of Mice and Men, Publisher: Pascal Covici, Author: Steinbeck, John, Date Created: 1937, Format: Book.

	A	B	C	D	E
1	Title	Publisher	Author	Date Created	Format
2	Of Mice and Men	Pascal Covici	Steinbeck, John	1937	Book
3					
4					

```
1  {  
2    "Title": "Of Mice and Men",  
3    "Publisher": "Pascal Covici",  
4    "Author": "Steinbeck, John",  
5    "DateCreated": "1937",  
6    "Format": "Book"  
7  }
```

# JSON-LD Extension

- Lightweight linked data format
- Extends JSON
- [JSON-LD homepage](#)



# Describing a Painting

with [schema.org](https://schema.org) in JSON-LD

# JSON

{ }

# JSON-LD

```
{  
  "@context": "http://schema.org",  
  "@type": "Painting"  
}
```

<http://schema.org/docs/jsonldcontext.json>

# JSON-LD with Properties

```
{  
  "@context": "http://schema.org",  
  "@type": "Painting",  
  "name": "The Scream",  
  "url": "https://en.wikipedia.org/wiki/The_Scream",  
  "creator":  
}
```

# Nested Properties

creator

Organization or  
Person

The **creator**/author of this CreativeWork. This is the same as the Author property for CreativeWork.

# JSON-LD with Nesting

```
{
  "@context": "http://schema.org",
  "@type": "Painting",
  "name": "The_Scream",
  "url": "https://en.wikipedia.org/wiki/The_Scream",
  "creator": {
    "@type": "Person",
    "name": "Edvard Munch",
    "sameAs": "https://en.wikipedia.org/wiki/Edvard_Munch"
  }
}
```

# NCSU Schema.org Digital Collections Project



## Attribution

Student life. African American students (UA023.025.012).  
Special Collections Research Center at NCSU Libraries



Contact us about this resource

## Item information

### Title:

Going Places: Students walking by the Bell Tower

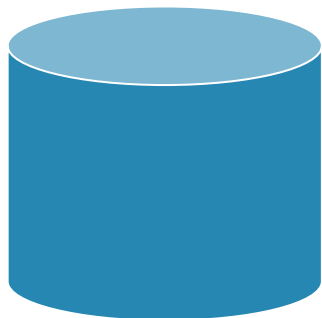
```
Elements Console Sources Network Performance Memory Application Security Audits
<!DOCTYPE html>
<html lang="en" class="js flexbox flexboxlegacy canvas canvastext webgl no-touch geolocation postmessage websqlindex indexeddb hashchange history draganddrop websockets rgba hsla multiplebgs backgroundsize borderimage borderradius boxshadow textshadow opacity cssanimations csscolumns cssgradients cssreflections csstransforms csstransforms3d csstransitions fontface generatedcontent video audio localstorage sessionstorage webworkers applicationcache svg inlinesvg smil svgclippaths no-ipad no-ios no-ipod no-appleios">
<head>
</head>
<body class="blacklight-catalog blacklight-catalog-show home-text asset_type_still-image">
<div id="top-header">
</div>
<div id="main-container" class="container">
<div class="row">
<div class="row">
<div id="content" class="col-xs-12 show-document">
<script type="application/ld+json">
{
  "@context": "http://schema.org",
  "@type": "CreativeWork",
  "id": "https://d.lib.ncsu.edu/collections/catalog/0227879",
  "url": "https://d.lib.ncsu.edu/collections/catalog/0227879",
  "name": "Going Places: Students walking by the Bell Tower",
  "thumbnailUrl": "https://iiif.lib.ncsu.edu/iiif/0227879/full/350,0/default.jpg",
  "dateCreated": "1970",
  "about": [
    {
      "@type": "Thing",
      "name": "Universities and colleges",
      "type": "Thing",
      "name": "Students",
      "type": "Thing",
      "name": "African American students",
      "type": "Thing",
      "name": "African Americans -- History",
      "type": "Thing",
      "name": "Student Life",
      "type": "Thing",
      "name": "People",
      "name": "North Carolina State University",
      "description": "Established by the N.C. General Assembly in 1887 as a Land Grant college in Raleigh, NC, the University now has the largest student body of the 17 campuses comprising the University of North Carolina system and is the largest institution of higher learning in the state.",
      "type": "Organization",
      "name": "North Carolina State University -- Students",
      "type": "Organization",
      "keywords": [
        "Universities and colleges",
        "Students",
        "African American students",
        "African Americans -- History",
        "Student Life",
        "People",
        "genre": [
          "Photographs",
          "inLanguage": "eng",
          "isPartOf": "https://d.lib.ncsu.edu/collections/catalog/0227879",
          "isPartOf": "https://d.lib.ncsu.edu/collections/catalog/0227879",
          "contentLocation": [
            {
              "@type": "Place",
              "name": "North Carolina State University, Memorial Belltower -- Memorial Tower (Raleigh, Wake County, North Carolina)",
              "alternateName": "NCSU Memorial Belltower (Raleigh, N.C.)",
              "description": null,
              "address": {
                "@type": "PostalAddress",
                "addressLocality": "2701 Sullivan Drive",
                "addressRegion": "North Carolina",
                "postalCode": "27687",
                "geo": {
                  "@type": "GeoCoordinates",
                  "latitude": "35.786098",
                  "longitude": "-78.663498",
                  "type": "Place",
                  "name": "Raleigh (N.C.)",
                  "geo": {
                    "@type": "GeoCoordinates",
                    "latitude": "35.7719",
                    "longitude": "-78.6389"
                  }
                }
              }
            }
          ]
        }
      ]
    }
  ]
}
</script>
</div>
</div>
</div>
<div id="contentinfo">
</div>
</div>
```

Image from <https://d.lib.ncsu.edu/collections/catalog/0227879>

# Publishing Workflow

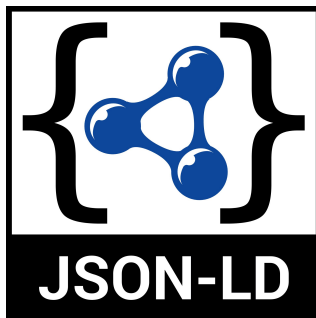
## Extract

- Data from source



## Transform

- Data into schema.org  
+ semantic markup



## Load

- Transformed data  
into HTML  
documents





# Key Components for ETL Process

```

1 {
2   "@context": "http://schema.org",
3   "@type": "CreativeWork",
4   "@id": "https://d.lib.ncsu.edu/collections/catalog/0227879",
5   "url": "https://d.lib.ncsu.edu/collections/catalog/0227879",
6   "name": "Going Places: Students walking by the Bell Tower",
7   "thumbnailUrl": "https://iiif.lib.ncsu.edu/iiif/0227879/full/350,
8   "image": "https://iiif.lib.ncsu.edu/iiif/0227879/full/350,
9   "dateCreated": "1970",
10  "about": [
11    {
12      "@type": "Thing",
13      "name": "People"
14    },
15    {
16      "@type": "Thing",
17      "name": "Student Life"
18    },
19    {
20      "@type": "Thing",
21      "name": "African American students",
22      "sameAs": "http://id.loc.gov/authorities/subjects/sh850
23    },
24    {
25      "@type": "Thing",
26      "name": "African Americans -- History",
27      "sameAs": "http://id.loc.gov/authorities/subjects/sh850
28    },
29    {
30      "@type": "Thing",
31      "name": "Students",

```

A	B	D	E
SCAMS Term	Schema Term	Expected Value	Comment
1 Title	name		
2 Date Field	dateCreated		
3 Creators	creator	Person or Organization object	Person/Organization object will be nested as the value, taken from (
4 Contributors	contributor	Person or Organization object	Person/Organization object will be nested as the value, taken from (
5 Subjects	about; keywords		For schema:keywords add a string as the value. For schema:about
6 Topics	about; keywords		For schema:keywords add a string as the value. For schema:about
7 Description	description		
8 Names (EACs)	about	Person or Organization object	Person/Organization object will be nested as the value, taken from (
9 Works	contentLocation	Place object	Place object will be nested as the value, taken from the Works men
10 Geographic Locations	contentLocation	Place object whose schema:name is the textual value.	Place object whose schema:name is the textual value.
11 Genres	genre		
12 Language	inLanguage	two-letter or three-letter code (ISO 639-1 or ISO 639-2)	
13	thumbnailUrl	the first image of the resource	
14	@type	CreativeWork	
15	Is Part Of	isPartOf	link to public URL for IsPartOf
16	image	image	the first image of the resource
17	Classification	isPartOf	link to public URL for Classification
18			
19			
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31			
32			
33			
34			

**Now to apply what we've learned**

# Activity Instructions

1. Download materials from GitHub
  - a. <https://github.com/eightBitter/lita-schema>
2. Open metadataFlattened.xlsx
3. Look up the schema.org CreativeWork and Person
  - a. CreativeWork: <http://schema.org/CreativeWork>
  - b. Person: <http://schema.org/Person>
4. Open sourceToSchema\_mapping.xlsx
5. Using the schema.org pages, create a metadata map from the source metadata to Schema.org
6. Open schemaCreativeWork\_template.json
7. Using the source metadata and the map you just created, create a JSON-LD template
8. You can validate the using the Google Structured Data Testing Tool:
  - a. <https://search.google.com/structured-data/testing-tool>

# Questions?

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