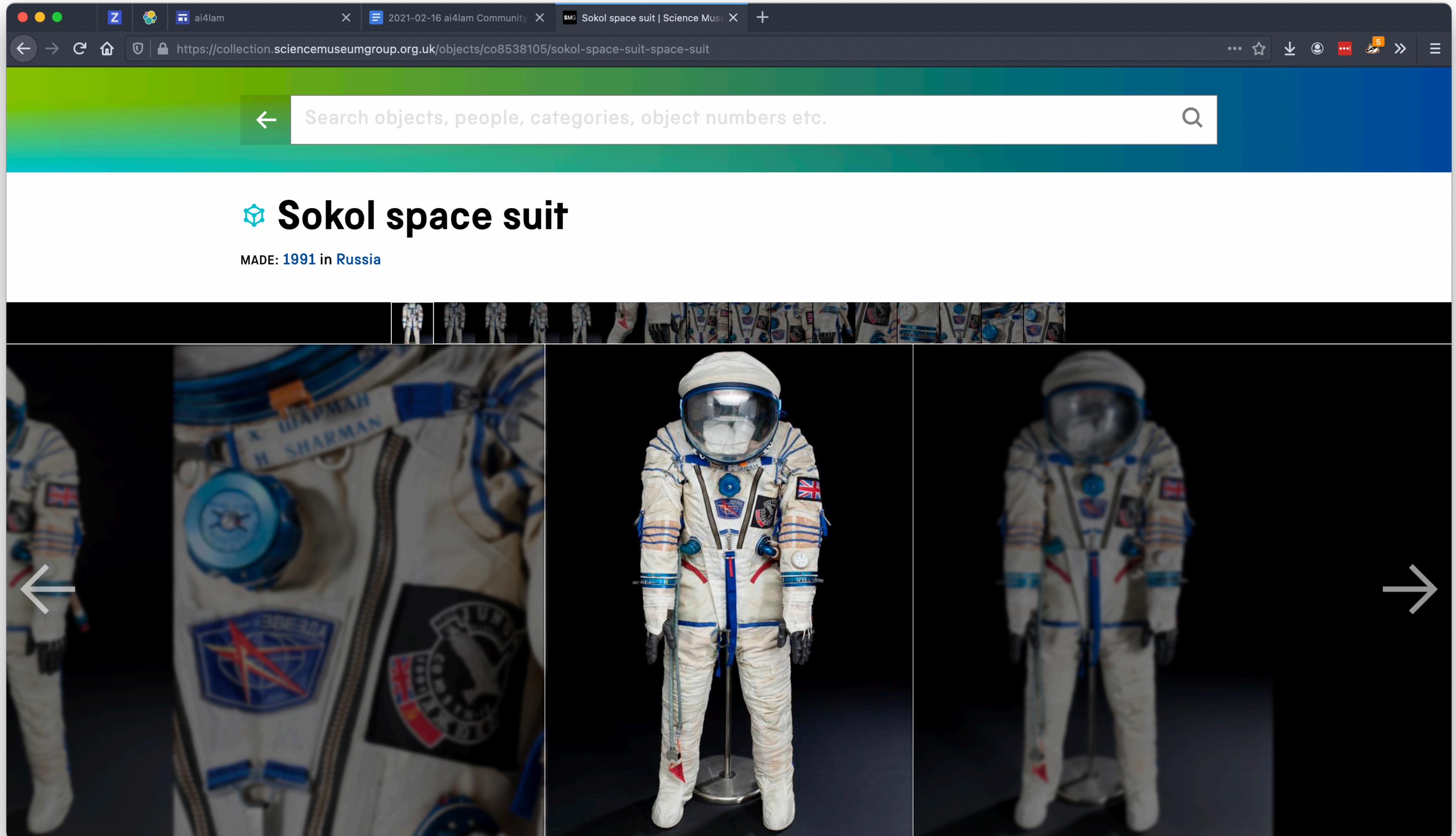


HERITAGE CONNECTOR

TRANSFORMING TEXT INTO DATA TO EXTRACT MEANING AND MAKE CONNECTIONS





ai4lam 2021-02-16 ai4lam Community Sokol space suit | Science Muse 5

<https://collection.science museum group.org.uk/objects/co8538105/sokol-space-suit-space-suit>

British astronaut, Helen Sharman's Sokol spacesuit made by Zvezda. Sharman wore this rescue suit during the space flight on board the SOYUZ-TM-12 and MIR spacecraft in May 1991. Space suit model number KV-2 No. 167.

Sokol-KV-2 rescue suit worn by Helen Sharman during the Juno mission to the Mir space station, 1991

СПАСАТЕЛЬНЫЙ СКАФАНДР

Helen Sharman was the first British person in space. Sharman wore this suit for two hours on the ground to check its fit. Lying back, she tried to read but her arms ached from holding the book for so long. Despite the suit's cooling systems she sweated 2 litres during the mission launch. Once she could remove the suit, she dried it thoroughly to ensure it would not go mouldy.

The Sokol suit was developed after three unsuited cosmonauts asphyxiated on the Soyuz 11 mission in 1971 when their descent module depressurised during the return to Earth. Every cosmonaut now wears one during launch and return from space. It will keep the wearer alive for a number of hours in the event of a cabin depressurisation. Each suit is tailor made to the individual cosmonaut and comprises an inner, airtight 'bladder' of rubberised plastic and an outer layer of nylon canvas. There are connecting rings on the lower abdomen for air (cooling) and oxygen supplies and a centrally positioned pressure adjustment valve control on the chest; the pressure gauge is on the left wrist. The helmet and boots are integral with the rest of the suit; the gloves are attached with anodized aluminium bayonet fixings. Today's Sokol design is little changed from the original.

Source: Zvezda

ON DISPLAY

Science Museum: Exploring Space Gallery

If you are visiting to see this object, [please contact us](#) in advance to make sure that it will be on display.

RELATED PEOPLE

[Helen Sharman](#)

RELATED ARTICLES

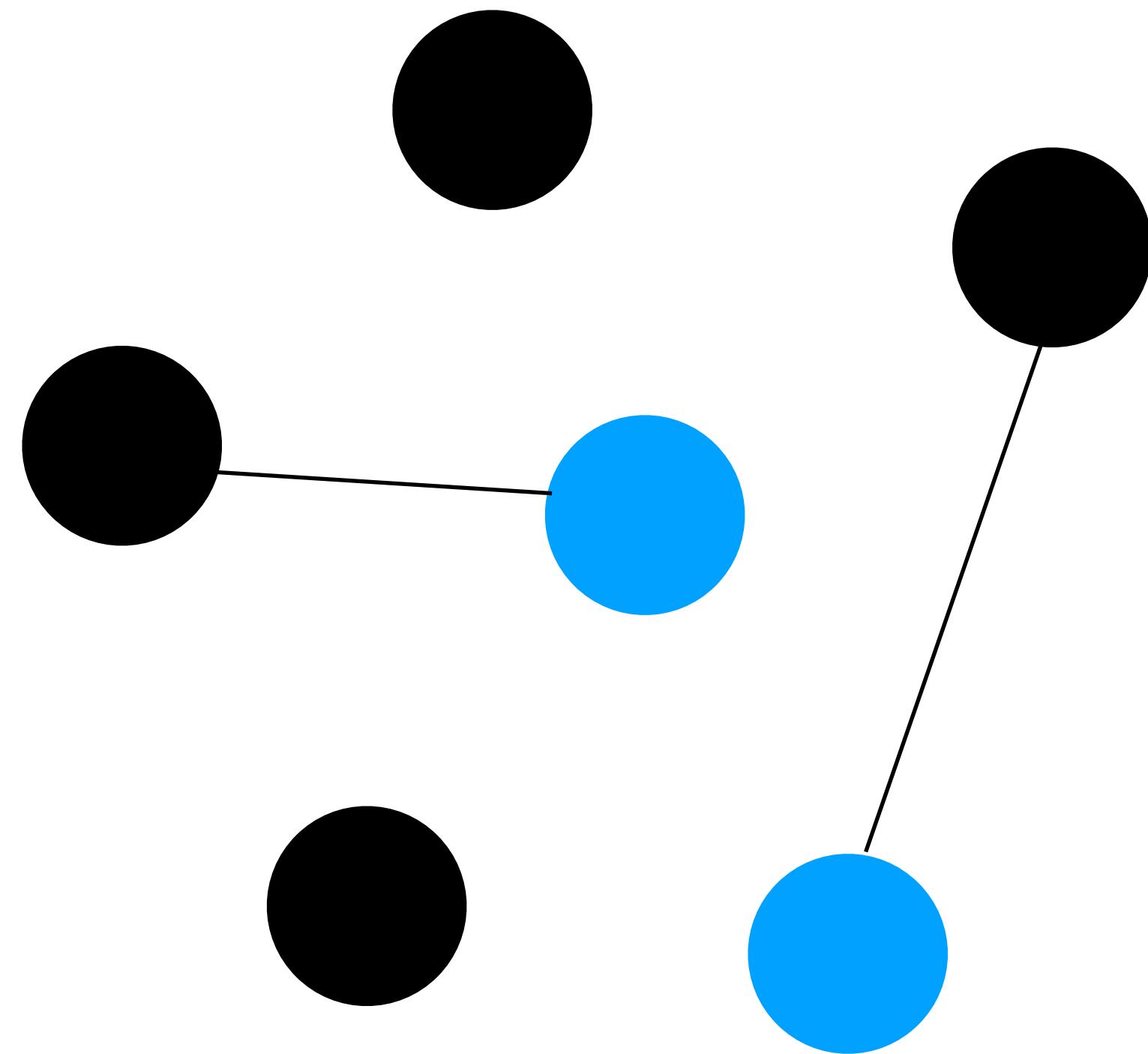
National Science and Media Museum

- [Bring the National Science and Media Museum collection home in Animal Crossing](#)
- [Science Museum](#)
- [Highlights on display](#)
- [Science Museum announces National Lottery ticket sales trial as Helen Sharman spacesuit goes back on display](#)
- [UK tour of Tim Peake's spacecraft attracts 1.3 million visitors as Science Museum marks Apollo anniversaries with Summer of Space](#)

 **LOOK CLOSER**

[Helen Sharman on her Sokol space suit](#)

**Our collection is small
islands of thin data**



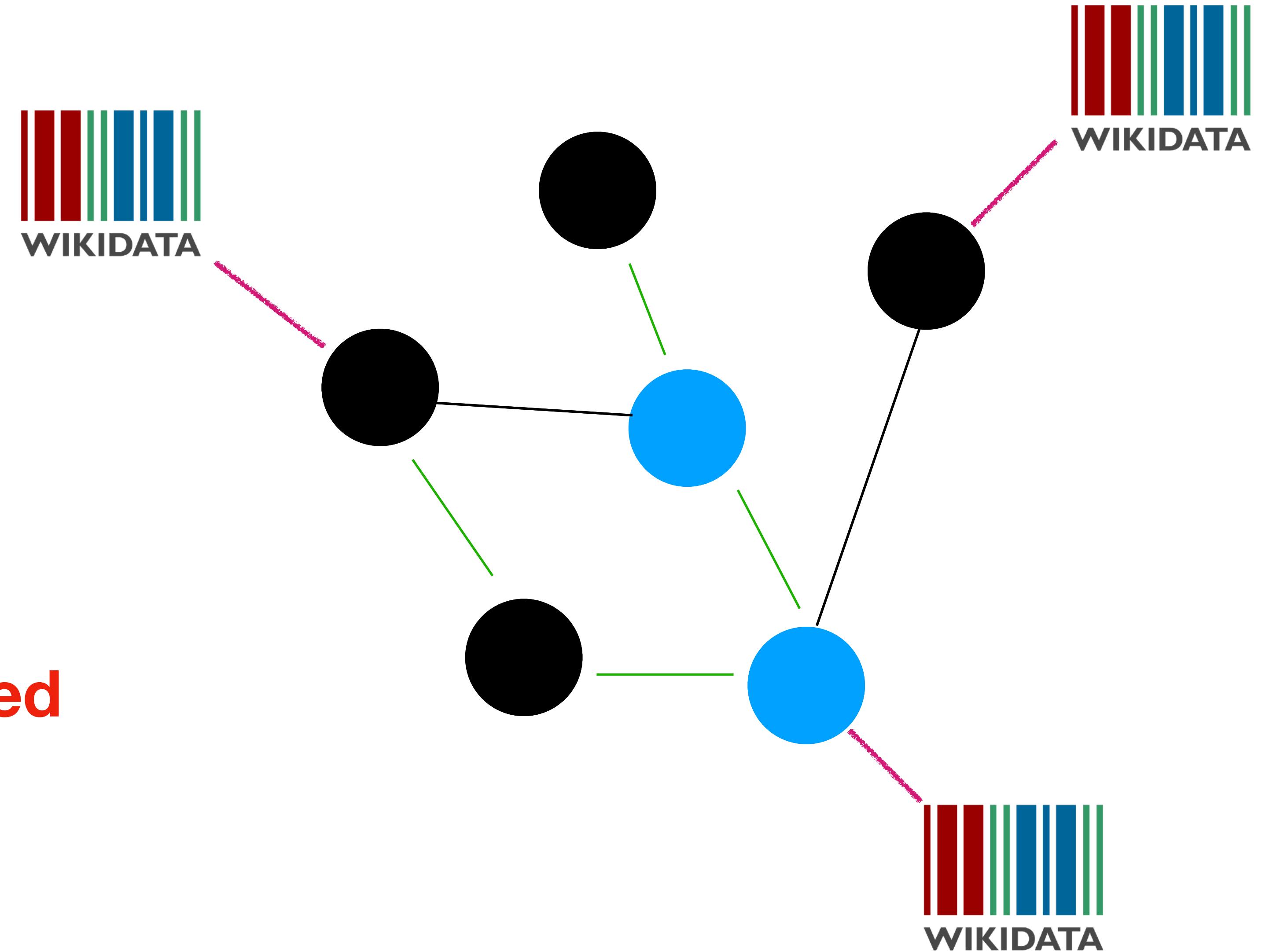
How can existing digital tools and methods be used to **build relationships at scale** between poorly and inconsistently catalogued digitised collection objects and other content sources?

Is such an approach scalable to larger volumes of content and different types of collections?

Where is the best use of human input in supporting such an approach?
What expertise and skills are required for this input?

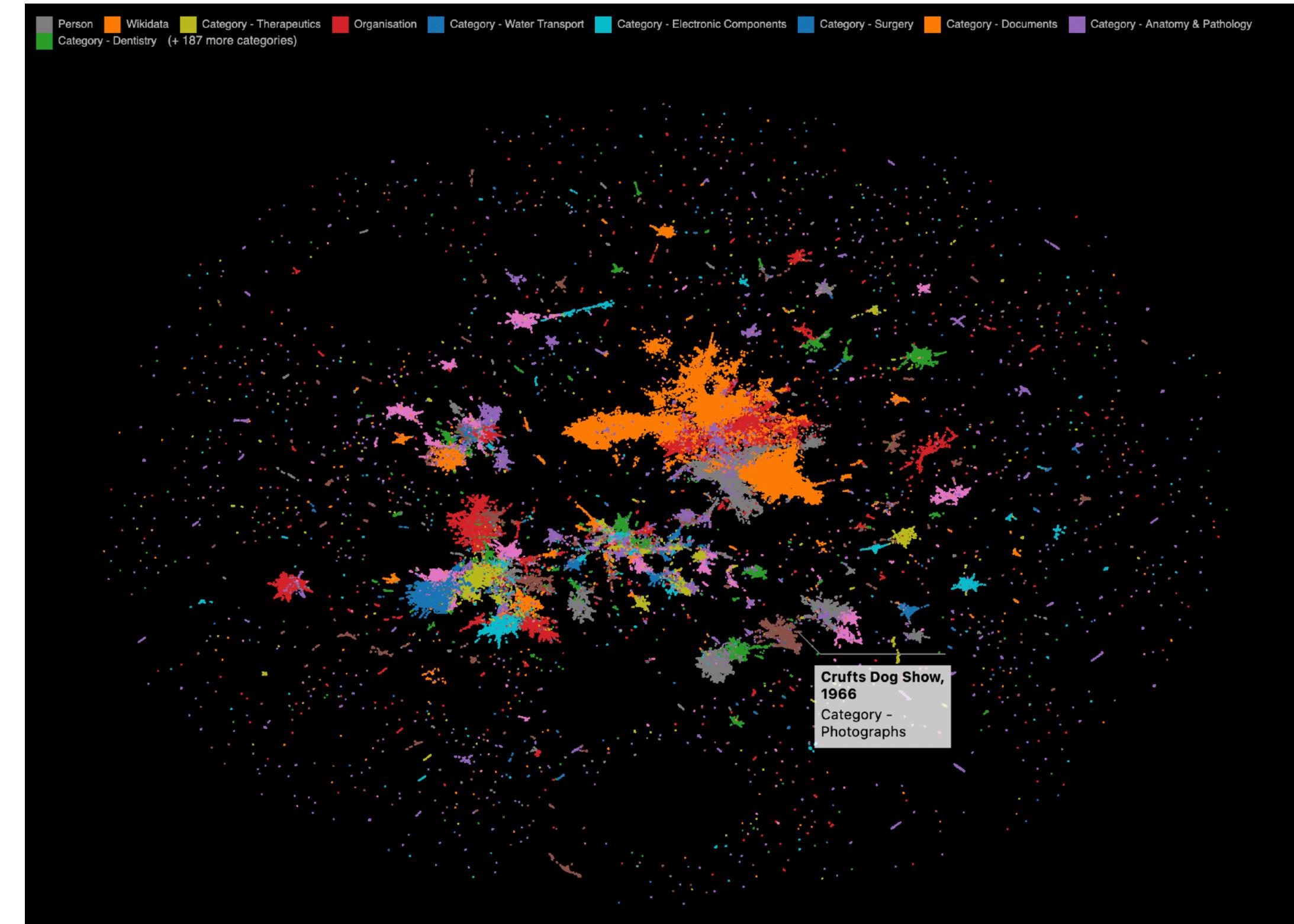
**This is our collection
interlinked via
information retrieval
techniques**

**Small islands of connected
and interlinked data**

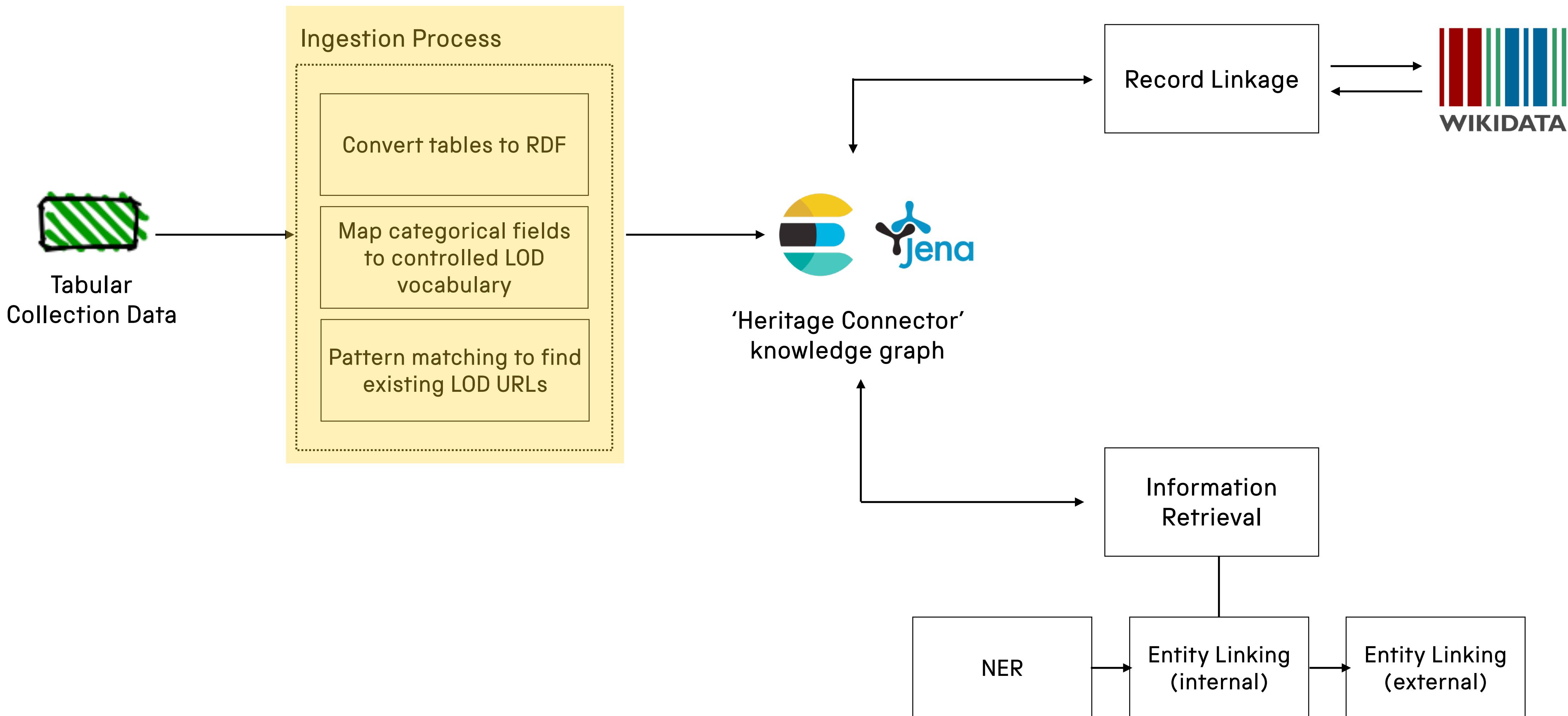


Affordances of this new dataset

- **serendipitous discovery**, through linking of previously isolated records
- **new entry points** into the collection from Wikipedia & Wikidata (events, bands, locations, ???)
- **macro-views** of the entire collection (plus the blog and journal)
- **new forms of interface**, to provide an alternative to keyword search



Building the knowledge graph - technical summary



Converting tabular museum collections to RDF

1. Convert CSV to JSON-LD (RDF triples)

```
{
  "@hc:database" : {
    "@value" : "mimsy"
  },
  "@id" : "https://collection.science museumgroup.org.uk/objects/co193289",
  "@rdfs:label" : {
    "@value" : "1 x 50 plastic container of kest laxative tablets,"
  },
  "@sdo:dateCreated" : 1978.0,
  "@sdo:isPartOf" : {
    "@value" : "Materia Medica & Pharmacology"
  },
  "@skos:hasTopConcept" : {
    "@value" : "OBJECT"
  },
  "@xsd:additionalType" : {
    "@value" : "kest"
  },
  "@foaf:maker" : [
    {
      "@id" : "https://collection.science museumgroup.org.uk/people/cp110658"
    }
  ],
  "@hc:entityDATE" : [
    {
      "@value" : "1984"
    }
  ],
  "@hc:entityORG" : [
    {
      "@value" : "Berk Pharmaceuticals"
    }
  ]
}
```

Converting tabular museum collections to RDF

2. Creating controlled vocabularies using Wikidata

Noel Hypher 1907 - 1990

NATIONALITY: British

BORN IN: Simla, Himachal Pradesh, India

1907-1990, physician, British

DETAILS

CATEGORY: King George III

OBJECT NUMBER: 1927-1220

MATERIALS: brass (copper, zinc alloy), iron and steel (metal)

TYPE: pendulum

TAXONOMY: furnishing and equipment
 ↳ tools & equipment

CREDIT: King's College, London

	count	qid
poster artist	9	[Q739437]
photographer	8	[Q7187777, Q33231]
artist	7	[Q483501, Q706364, Q1320883, Q3391743, Q1797162, Q13381572, Q1630100]
inventor	6	[Q205375]
scientist	5	[Q901]
...
apprentice	1	[Q11353322, Q742585, Q253567]
captain	1	[Q163500, Q715772, Q5036514, Q1146304, Q849424]
railway manager	1	[]
biologist	1	[Q864503]
conjoined twin	1	[]

Converting tabular museum collections to RDF

3. Finding references to existing LOD entities in record descriptions

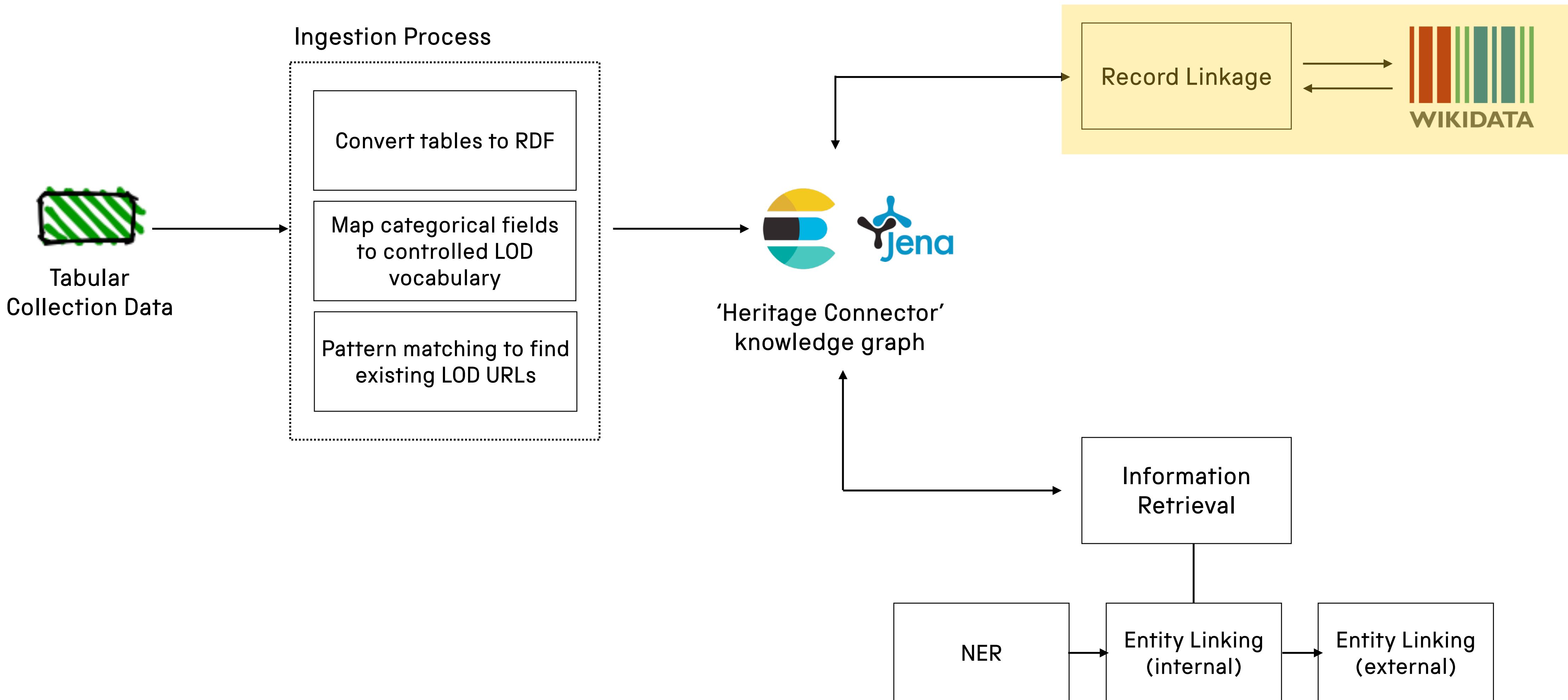
Description and notes fields

(not all URLs directly refer to the object/person/organisation!)

Webster database – JECKER FRERES [http://historydb.adlerplanetarium.org/signatures/]	Traded at 32, rue de Bondy, Paris. Consisted of Jecker frères; François-Antoine Jecker and his brothers, Laurenz J. Jecker and perhaps A. Jecker. Thought to have been active up to 1847 as Jecker but traded as Jecker Freres in 1820s.
REF: http://fm.iowa.uiowa.edu/fmi/xsl/hardin/heirs /record_detail.xsl?-db=heirs&-lay=weblayout&HeirsNo=1977&-find WIKI: http://en.wikipedia.org/wiki/Eduard_J%C3%A4ger_von_Jaxthal REF: http://www.aeiou.at/aeiou.encyclo.j /j072115.htm;internal&action=_setlanguage.action?LANGUAGE=en REF: http://beckerexhibits.wustl.edu/becker/records250.htm	professor at the university of Vienna; used the ophthalmoscope for the determination of refractivity; made improvements to eye chart test types that were developed by Heinrich Kuechler; Ritter von Jaxthal; published from 1844,
WIKI: http://en.wikipedia.org/wiki/Robert_Alexander_Hillingford VIAF: https://viaf.org/viaf/54100158/	specialized in historical pictures, often military scenes
REF: http://holtzapffel.org/register-of-lathes.html	1928 - firm closed; see Holtzapffel and Company record

	No. connections created	% of records with connection
People	2,925	28.3%
Organisations	697	9.0%
Objects	0	0.0%

Building the knowledge graph - technical summary

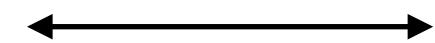
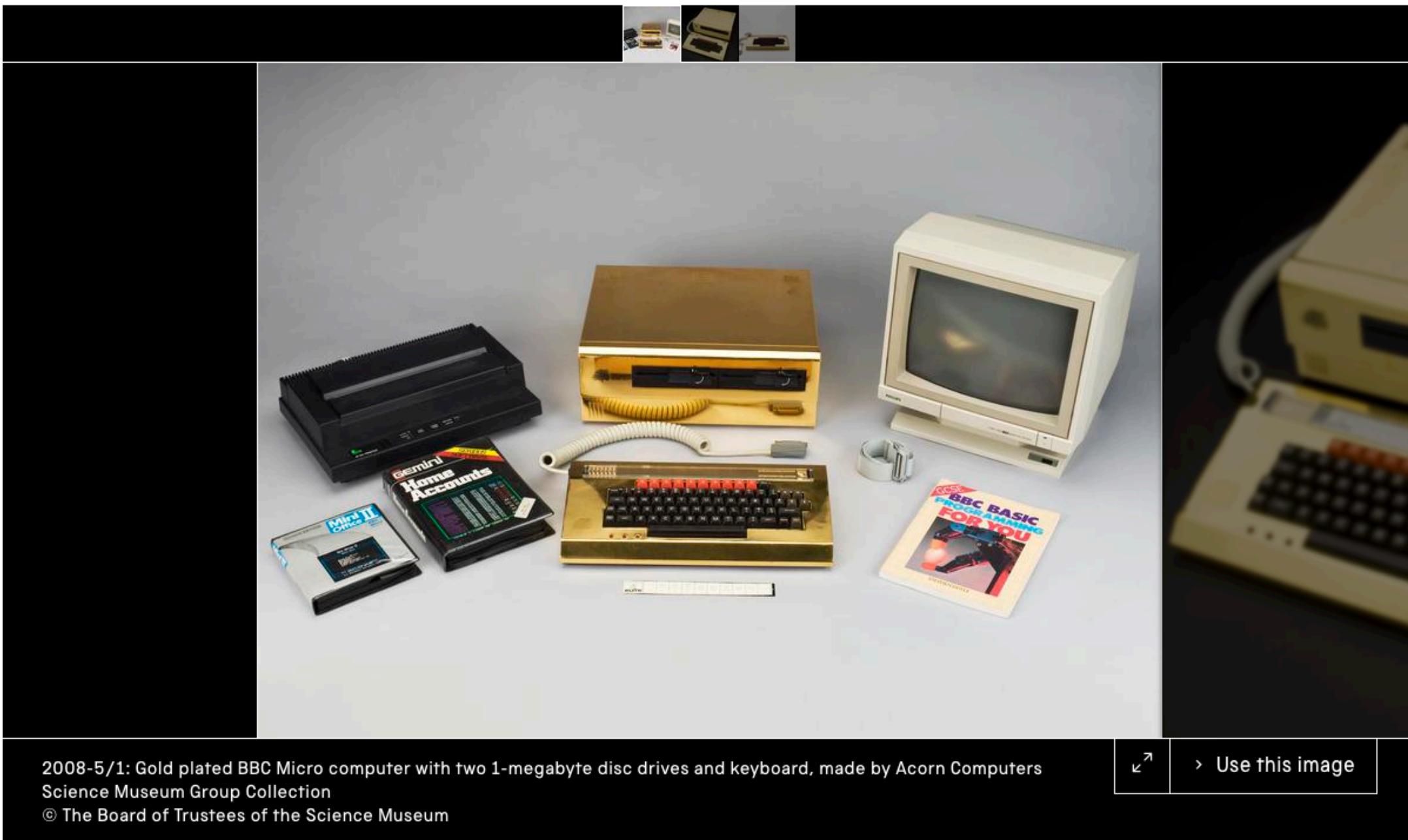


Record Linkage

Gold plated BBC Micro personal computer

MADE: 1985 in Cambridge

MAKER: Acorn Computers Limited



Item Discussion

BBC Micro (Q749976)

series of microcomputers by Acorn
BBC Microcomputer System | BBC Microcomputer

[edit](#)

In more languages

Configure

Language	Label	Description	Also known as
English	BBC Micro	series of microcomputers by Acorn	BBC Microcomputer System BBC Microcomputer
British English	No label defined	No description defined	
French	BBC Micro	famille d'ordinateurs personnels d'Acorn	BBC Microcomputer
German	BBC Micro	Heimcomputer von Acorn	BBC Microcomputer

All entered languages

Statements

instance of	series of computer model	edit
	+ 0 references	+ add reference + add value

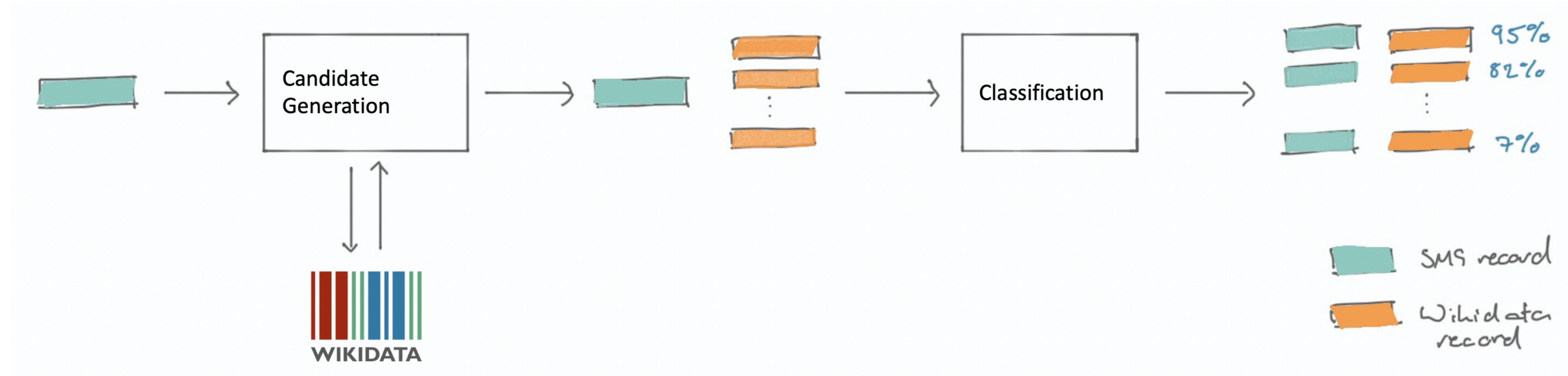
subclass of	home computer	edit
	+ 0 references	+ add reference + add value

logo image		edit
	BBC Micro owl.jpg 172 x 52; 25 KB	+ add reference + add value

image		edit
	BBC Micro Front Restored.jpg 1,024 x 730; 282 KB	+ add reference + add value

inception	1 December 1981	edit
	+ 0 references	+ add reference + add value

Record Linkage



Custom approach:

- Classifier trained on features created by comparing each SMG attribute with the corresponding Wikidata attribute
 - Decision tree classifier (although any scikit-learn classifier can be used)
 - Elasticsearch index replacing Wikidata search ([elastic-wikidata](#))

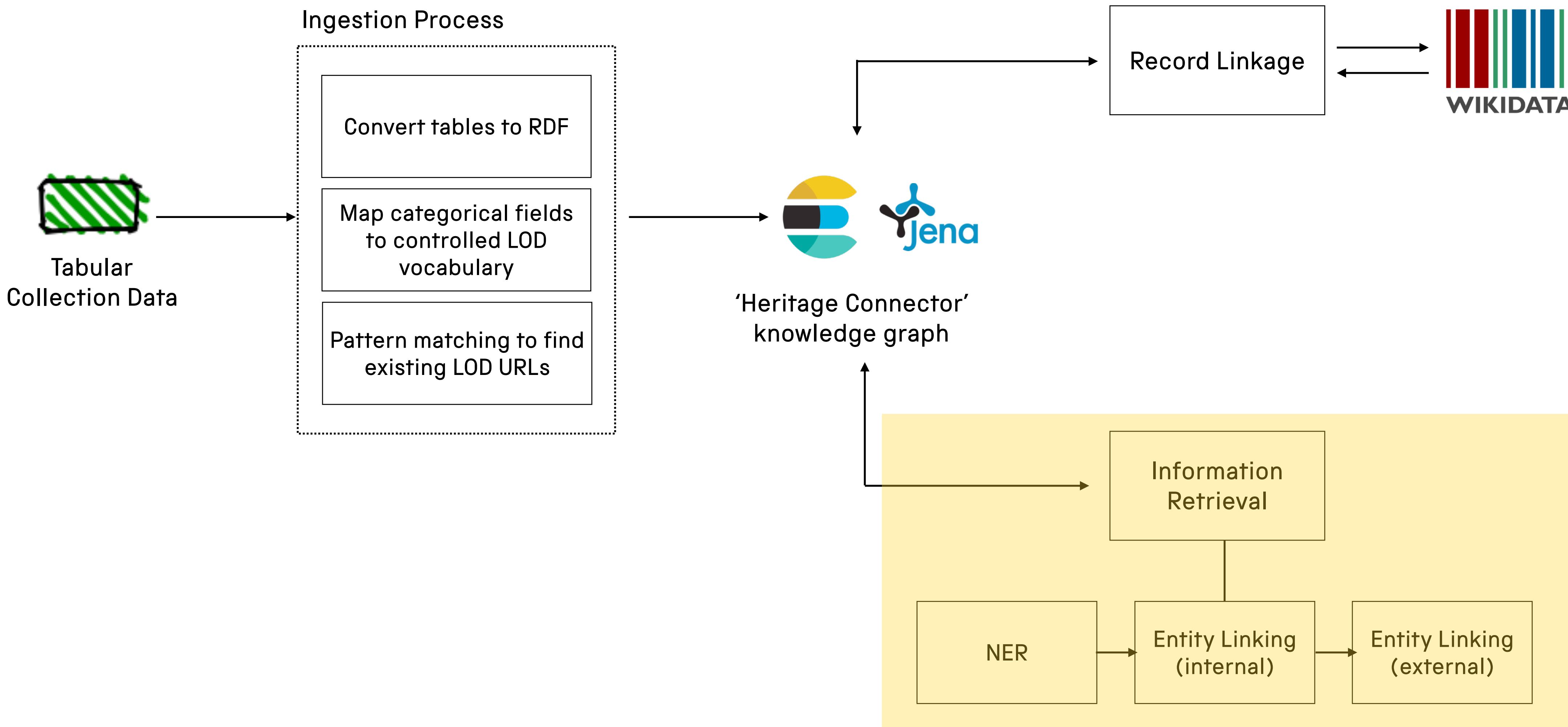
Record Linkage

	Lookup of URLs		Record Linkage (ML)	
	No. connections created	% of records with connection	No. connections created	% of records with connection
People	2,925	28.3%	5,343	51.6%
Organisations	697	9.0%	1,692	21.9%
Objects	0	0.0%	551	0.2%

There were challenges!

- This process was **slow** and required **annotated data**. Only ran on 15,000/300,000 objects.
- Most objects in the SMG collection don't have Wikidata records to connect to.

Building the knowledge graph - technical summary



Information Retrieval: Named Entity Recognition (NER) and Entity Linking (EL)

British astronaut, Helen Sharman's Sokol spacesuit made by Zvezda. Sharman wore this rescue suit during the space flight on board the SOYUZ-TM-12 and MIR spacecraft in May 1991. Space suit model number KV-2 No. 167.

Sokol-KV-2 rescue suit worn by Helen Sharman during the Juno mission to the Mir space station, 1991

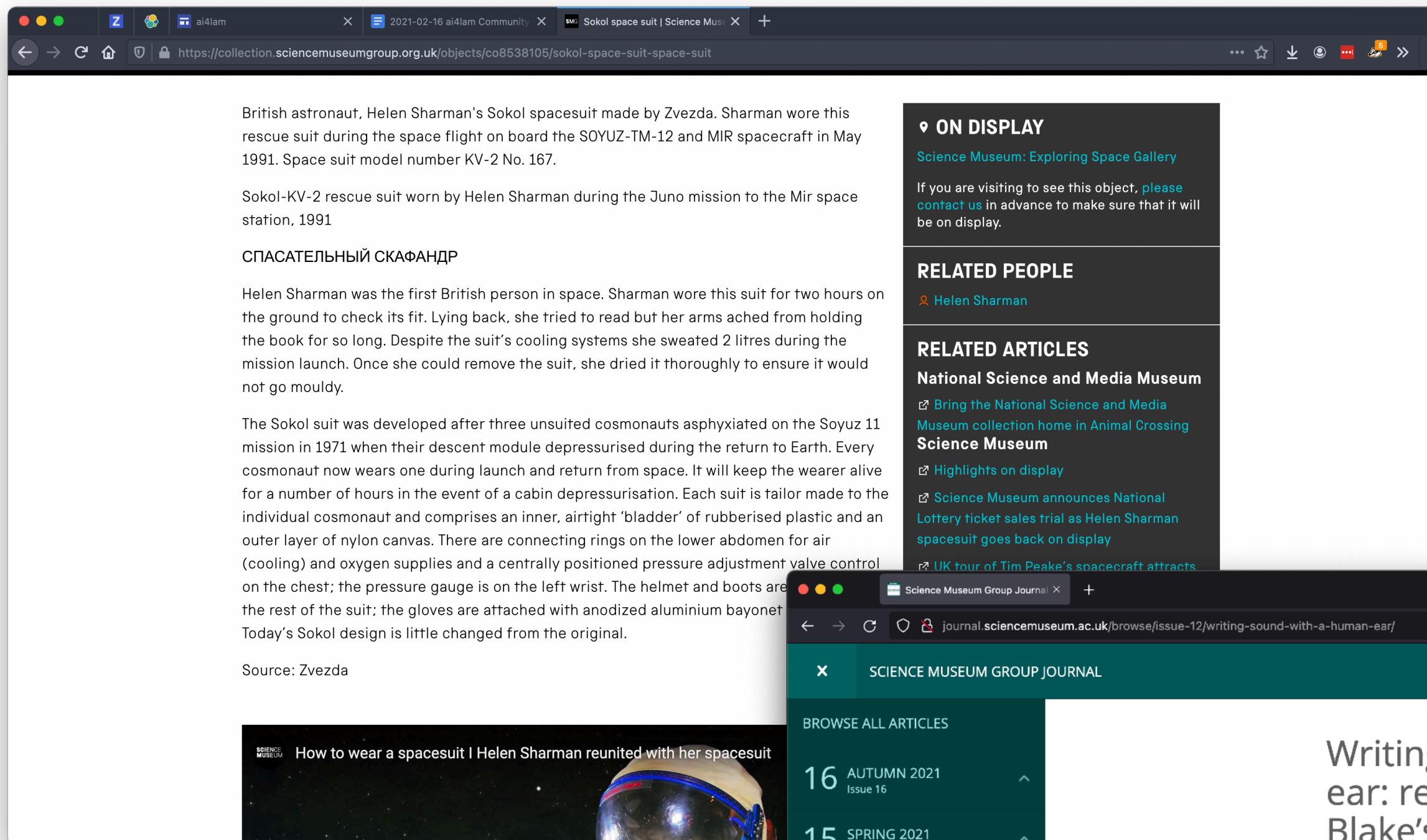
СПАСАТЕЛЬНЫЙ СКАФАНДР

Helen Sharman was the first British person in space. Sharman wore this suit for two hours on the ground to check its fit. Lying back, she tried to read but her arms ached from holding the book for so long. Despite the suit's cooling systems she sweated 2 litres during the mission launch. Once she could remove the suit, she dried it thoroughly to ensure it would not go mouldy.

The Sokol suit was developed after three unsuited cosmonauts asphyxiated on the Soyuz 11 mission in 1971 when their descent module depressurised during the return to Earth. Every cosmonaut now wears one during launch and return from space. It will keep the wearer alive for a number of hours in the event of a cabin depressurisation. Each suit is tailor made to the individual cosmonaut and comprises an inner, airtight 'bladder' of rubberised plastic and an outer layer of nylon canvas. There are connecting rings on the lower abdomen for air (cooling) and oxygen supplies and a centrally positioned pressure adjustment valve control on the chest; the pressure gauge is on the left wrist. The helmet and boots are the rest of the suit; the gloves are attached with anodized aluminium bayonet. Today's Sokol design is little changed from the original.

Source: Zvezda

How to wear a spacesuit | Helen Sharman reunited with her spacesuit



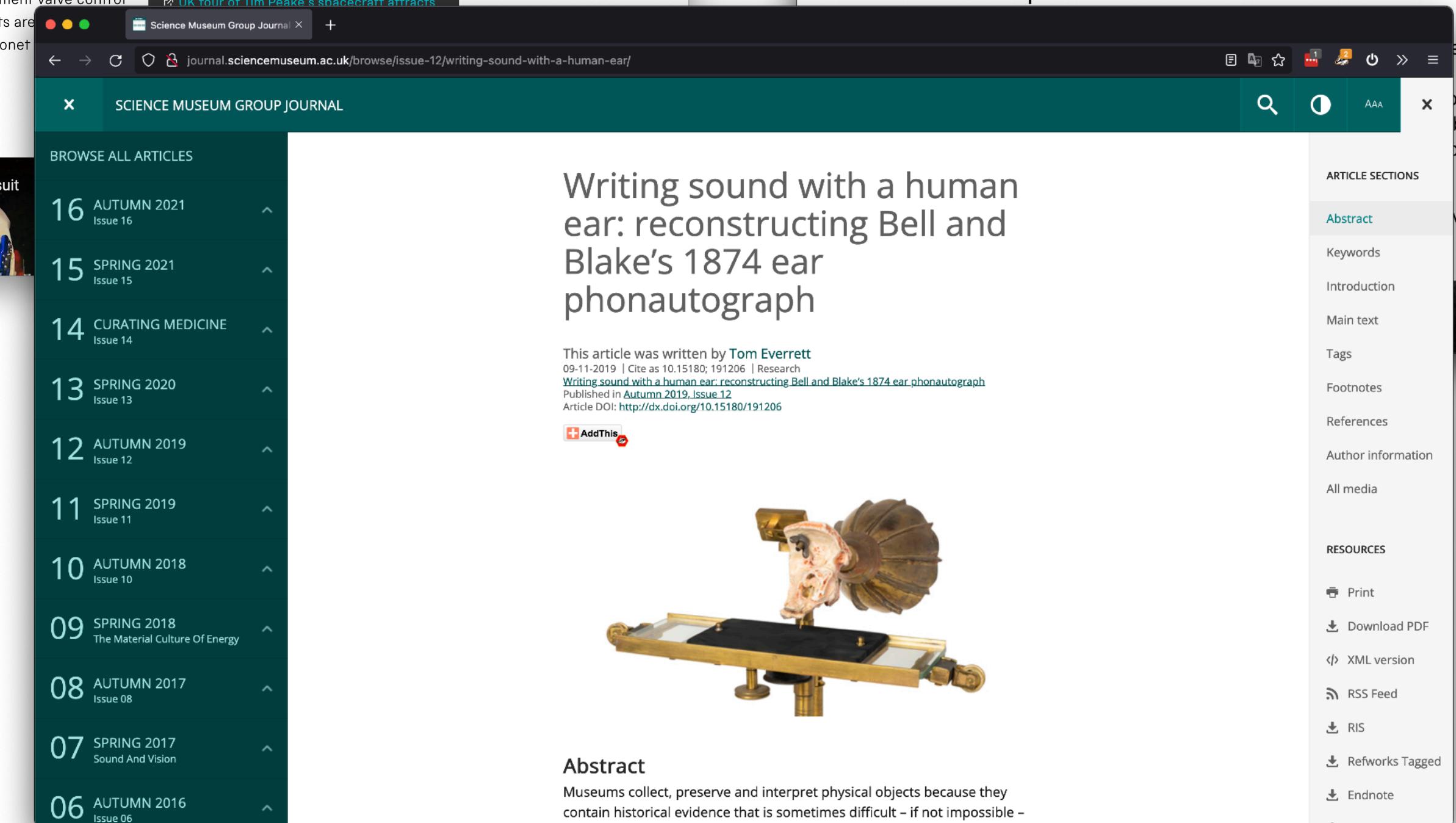
SCIENCE MUSEUM GROUP JOURNAL

BROWSE ALL ARTICLES

- 16 AUTUMN 2021 Issue 16
- 15 SPRING 2021 Issue 15
- 14 CURATING MEDICINE Issue 14
- 13 SPRING 2020 Issue 13
- 12 AUTUMN 2019 Issue 12
- 11 SPRING 2019 Issue 11
- 10 AUTUMN 2018 Issue 10
- 09 SPRING 2018 The Material Culture Of Energy
- 08 AUTUMN 2017 Issue 08
- 07 SPRING 2017 Sound And Vision
- 06 AUTUMN 2016 Issue 06

Writing sound with a human ear: reconstructing Bell and Blake's 1874 ear phonograph

This article was written by Tom Everett
09-11-2019 | Cite as 10.15180/191206 | Research
[Writing sound with a human ear: reconstructing Bell and Blake's 1874 ear phonograph](#)
Published in Autumn 2019, Issue 12
Article DOI: <http://dx.doi.org/10.15180/191206>



SCIENCE MUSEUM

BLOG HOME MUSEUM SITE Q

BY LAURA BÜLLESBACH ON 4 OCTOBER 2021

HAPPY BIRTHDAY ALAN HART

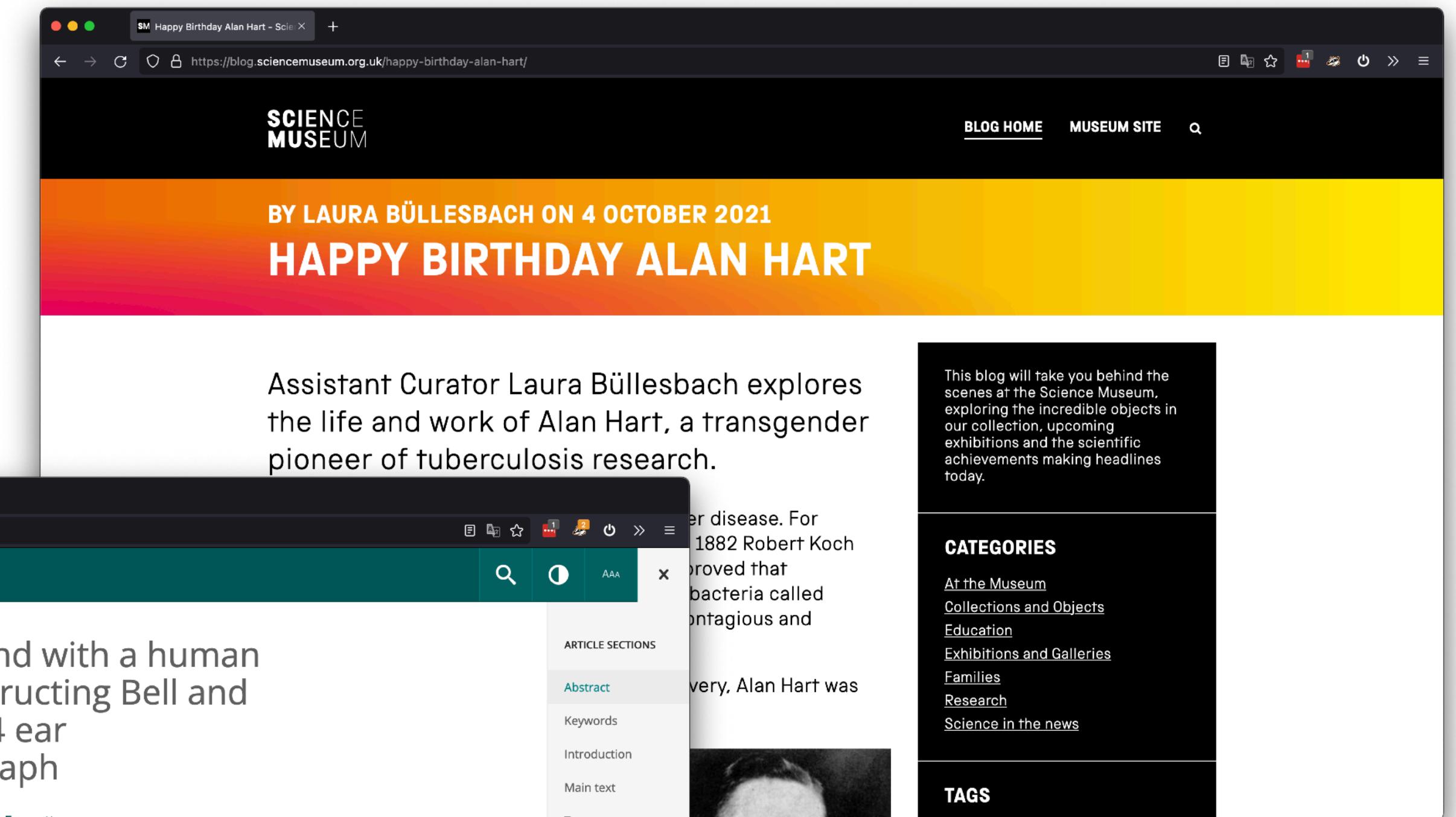
Assistant Curator Laura Bülesbach explores the life and work of Alan Hart, a transgender pioneer of tuberculosis research.

This blog will take you behind the scenes at the Science Museum, exploring the incredible objects in our collection, upcoming exhibitions and the scientific achievements making headlines today.

CATEGORIES

- At the Museum
- Collections and Objects
- Education
- Exhibitions and Galleries
- Families
- Research
- Science in the news

TAGS



Information Retrieval: Named Entity Recognition (NER) and Entity Linking (EL)

The screenshot shows a web browser window with the following details:

- Tab Bar:** ai4lam, 2021-02-16 ai4lam Community, SMG Sokol space suit | Science Museu
- Address Bar:** https://collection.science museum group.org.uk/objects/co8538105/sokol-space-suit-space-suit
- Content Area:**
 - Text:** British astronaut, Helen Sharman's Sokol spacesuit made by Zvezda. Sharman wore this rescue suit during the space flight on board the SOYUZ-TM-12 and MIR spacecraft in May 1991. Space suit model number KV-2 No. 167.
 - Text:** Sokol-KV-2 rescue suit worn by Helen Sharman during the Juno mission to the Mir space station, 1991
 - Section:** СПАСАТЕЛЬНЫЙ СКАФАНДР
 - Text:** Helen Sharman was the first British person in space. Sharman wore this suit for two hours on the ground to check its fit. Lying back, she tried to read but her arms ached from holding the book for so long. Despite the suit's cooling systems she sweated 2 litres during the mission launch. Once she could remove the suit, she dried it thoroughly to ensure it would not go mouldy.
 - Text:** The Sokol suit was developed after three unsuited cosmonauts asphyxiated on the Soyuz 11 mission in 1971 when their descent module depressurised during the return to Earth. Every cosmonaut now wears one during launch and return from space. It will keep the wearer alive for a number of hours in the event of a cabin depressurisation. Each suit is tailor made to the individual cosmonaut and comprises an inner, airtight 'bladder' of rubberised plastic and an outer layer of nylon canvas. There are connecting rings on the lower abdomen for air (cooling) and oxygen supplies and a centrally positioned pressure adjustment valve control on the chest; the pressure gauge is on the left wrist. The helmet and boots are integral with the rest of the suit; the gloves are attached with anodized aluminium bayonet fixings. Today's Sokol design is little changed from the original.
 - Text:** Source: Zvezda
- Right Sidebar:**
 - ON DISPLAY:** Science Museum: Exploring Space Gallery
If you are visiting to see this object, please contact us in advance to make sure that it will be on display.
 - RELATED PEOPLE:** [Helen Sharman](#)
 - RELATED ARTICLES:**
 - National Science and Media Museum
 - [Bring the National Science and Media Museum collection home in Animal Crossing](#)
 - [Science Museum](#)
 - [Highlights on display](#)
 - [Science Museum announces National Lottery ticket sales trial as Helen Sharman spacesuit goes back on display](#)
 - [UK tour of Tim Peake's spacecraft attracts 1.3 million visitors as Science Museum marks Apollo anniversaries with Summer of Space](#)
- Bottom Content:**
 - How to wear a spacesuit | Helen Sharman reunited with her spacesuit Copy link
 - LOOK CLOSER:** Helen Sharman on her Sokol space suit

Information Retrieval: Named Entity Recognition (NER) and Entity Linking (EL)

Helen Sharman 1963

OCCUPATION: Astronaut, Broadcaster, Chemist, Engineer, Lecturer

NATIONALITY: British

BORN IN: Sheffield, South Yorkshire, England, United Kingdom

British NORP astronaut, Helen Sharman's PERSON Sokol OBJECT spacesuit made by Zvezda ORG . Sharman PERSON wore this rescue suit during the space flight on board the SOYUZ-TM-12 and MIR spacecraft in May 1991 DATE . Space suit model number KV-2 No. 167 CARDINAL .

Sokol-KV-2 OBJECT rescue suit worn by Helen Sharman PERSON during the Juno OBJECT mission to the Mir OBJECT space station, 1991 DATE

СПАСАТЕЛЬНЫЙ СКАФАНДР

Helen Sharman PERSON was the first British NORP person in space. Sharman PERSON wore this suit for two hours on the ground to check its fit. Lying back, she tried to read but her arms ached from holding the book for so long. Despite the suit's cooling systems she sweated 2 litres during the mission launch. Once she could remove the suit, she dried it thoroughly to ensure it would not go mouldy.

The Sokol OBJECT suit was developed after three unsuited cosmonauts asphyxiated on the Soyuz 11 OBJECT mission in 1971 DATE when their descent module depressurised during the return to Earth LOC . Every cosmonaut now wears one during launch and return from space. It will keep the wearer alive for a number of hours in the event of a cabin depressurisation. Each suit is tailor made to the individual cosmonaut and comprises an inner, airtight 'bladder' of rubberised plastic and an outer layer of nylon canvas. There are connecting rings on the lower abdomen for air (cooling) and oxygen supplies and a centrally positioned pressure adjustment valve control on the chest; the pressure gauge is on the left wrist. The helmet and boots are integral with the rest of the suit; the gloves are attached with anodized aluminium bayonet fixings. Today DATE 's Sokol ORG design is little changed from the original.

Sokol space suit (Q1197668)

Russian spacesuit used on Soyuz

Sokol IVA | Sokol

NPP Zvezda (Q541905)

company in Moscow, Russia

[edit](#)

K-36DM | Zvezda (Russia) | Research-and-production enterprise "Zvezda" to them.

GI Severin | Zvezda Research and Production Enterprise

British NORP astronaut, Helen Sharman's PERSON Sokol OBJECT spacesuit made by Zvezda ORG . Sharman PERSON wore this rescue suit during the space flight on board the SOYUZ-TM-12 and MIR

spacecraft in May 1991 DATE . Space suit model number KV-2 No. 167 CARDINAL .

Sokol-KV-2 OBJECT rescue suit worn by Helen Sharman PERSON during the Juno OBJECT mission to the Mir OBJECT space station, 1991 DATE

СПАСАТЕЛЬНЫЙ СКАФАНДР

Helen Sharman PERSON was the first British NORP person in space. Sharman PERSON wore this suit for two hours on the ground to check its fit. Lying back, she tried to read but her arms ached from holding the book for so long. Despite the suit's cooling systems she sweated 2 litres during the mission launch. Once she could remove the suit, she dried it thoroughly to ensure it would not go mouldy.

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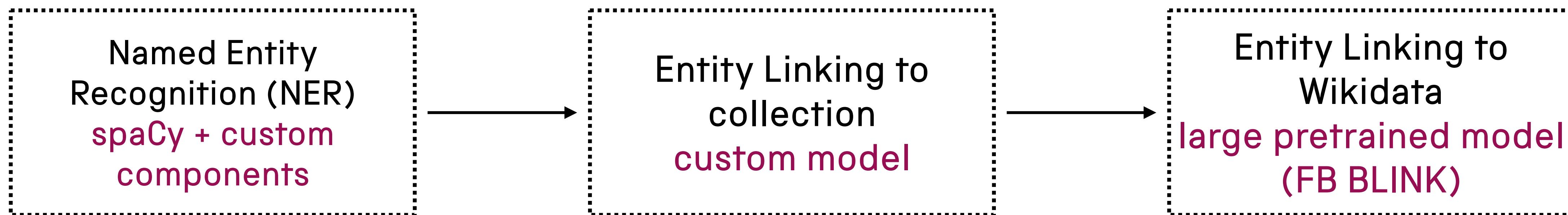
's Sokol ORG design is little changed from the original.

Soyuz 11 (Q648581)

Manned Soviet space mission to the Salyut 1 Space Station

Information Retrieval: Named Entity Recognition (NER) and Entity Linking (EL)

Processing pipeline



- No training data requirement
- Increased precision by 5% at same recall
- Recognition of objects was least accurate (what is an object?)

- Low training data requirement (~100 samples)
- Small model -> cost-effective to run

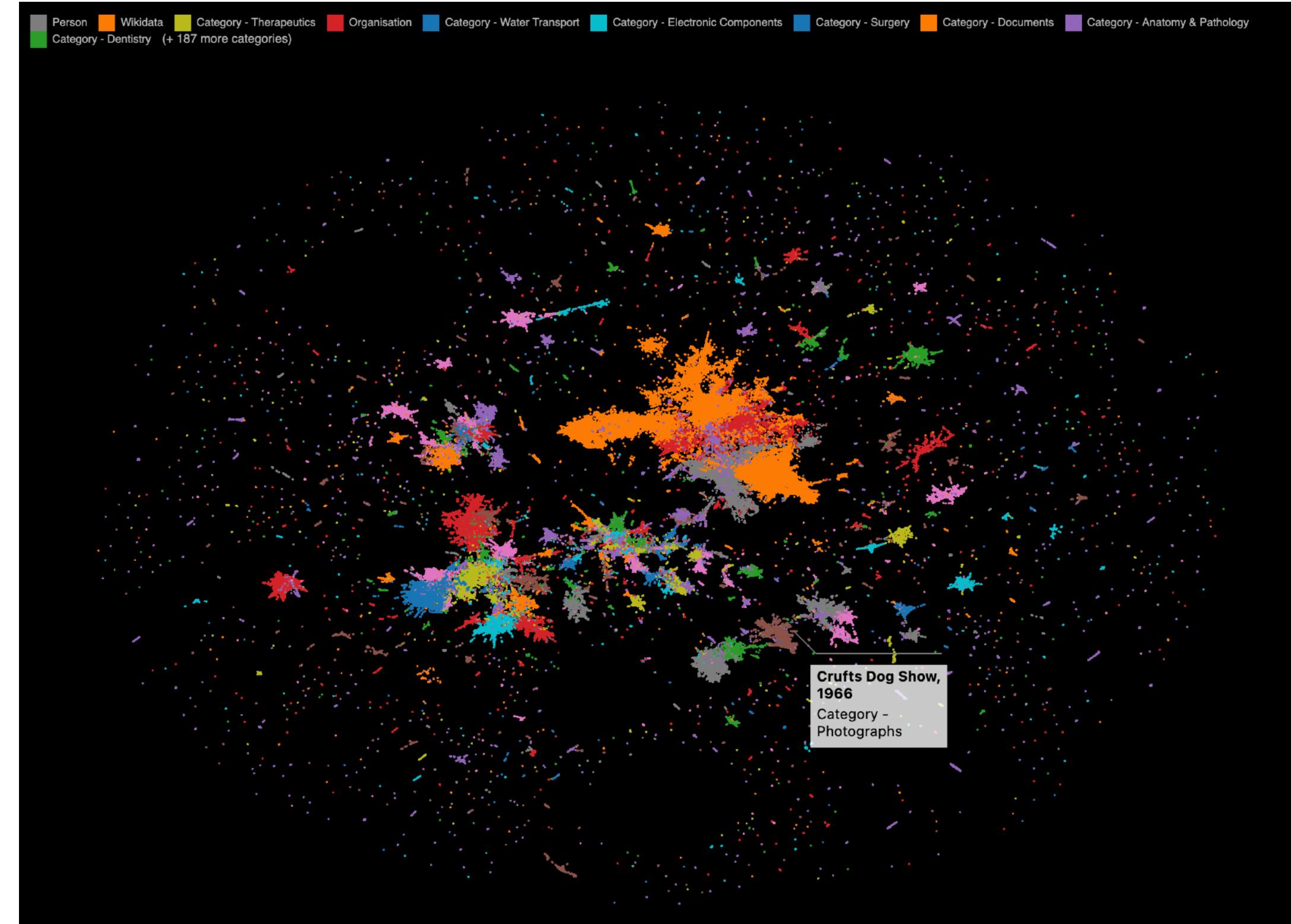
- Worked very well
- No training data requirement
- Expensive to run
- Difficult to update

Some high-level stats

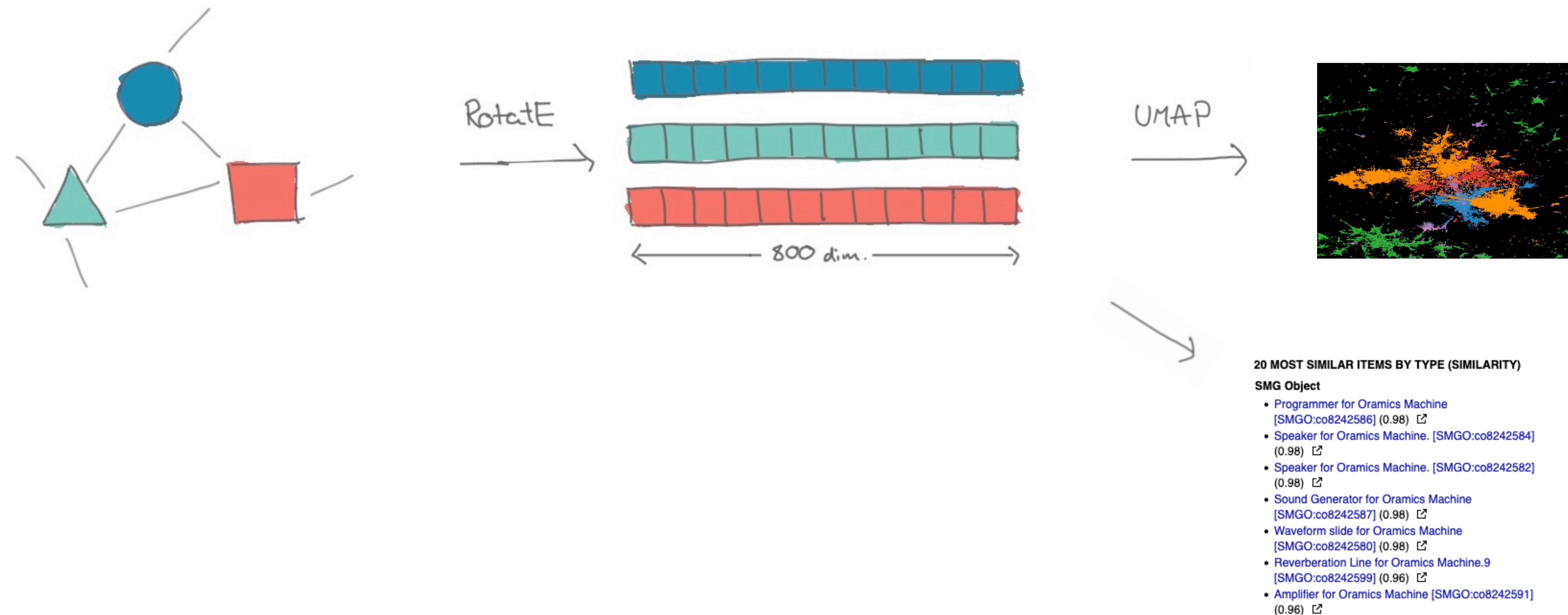
- ~354,000 SMG collection, blog and journal pages and ~325,000 V&A collection records have been processed.
- ~8,700 object, person and organisation have direct connections to Wikidata (only SMG processed)
- Using NER and EL:
 - ~484,000 connections have been added between collection records;
 - ~648,000 connections have been added to Wikidata;
 - ~1.2 million connections have been added to yet unknown entities.
- In total, there are ~110,000 Wikidata/Wikipedia pages in the knowledge graph

Affordances of this new dataset

- **serendipitous discovery**, through linking of previously isolated records
- **new entry points** into the collection from Wikipedia & Wikidata (events, bands, locations, ???)
- **macro-views** of the entire collection (plus the blog and journal)
- **new forms of interface**, to provide an alternative to keyword search

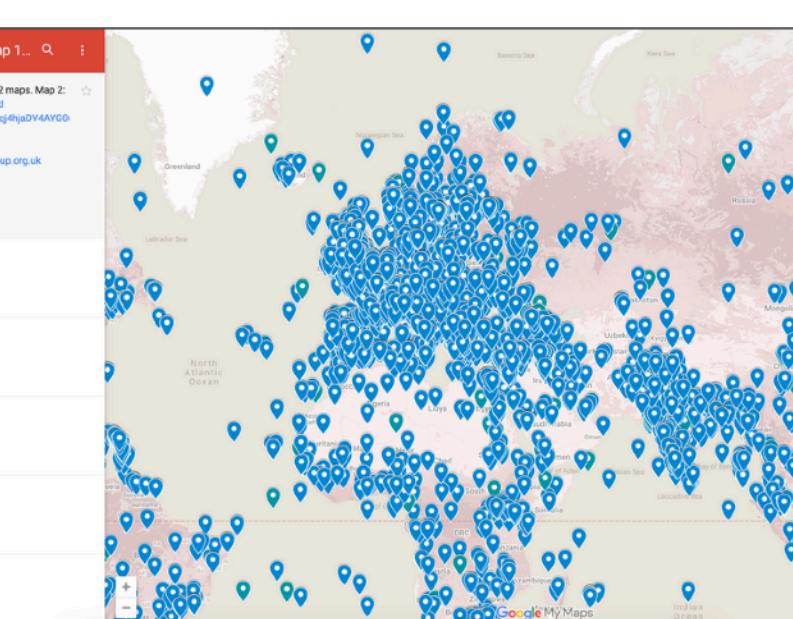


Knowledge graph embeddings for macro views and similar items



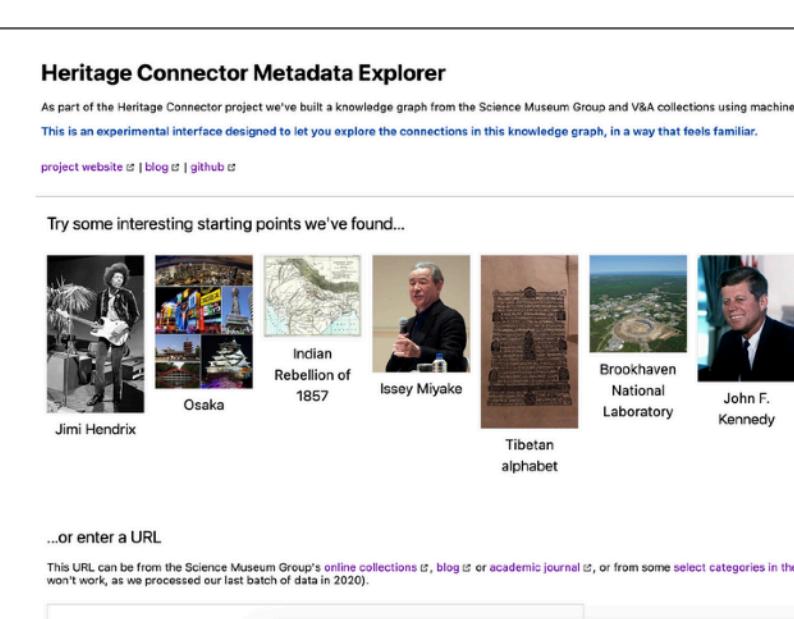
Demonstrators

This page serves as a directory of demos for the [Heritage Connector project](#). The source code for most of these demos can be found on [Github](#).



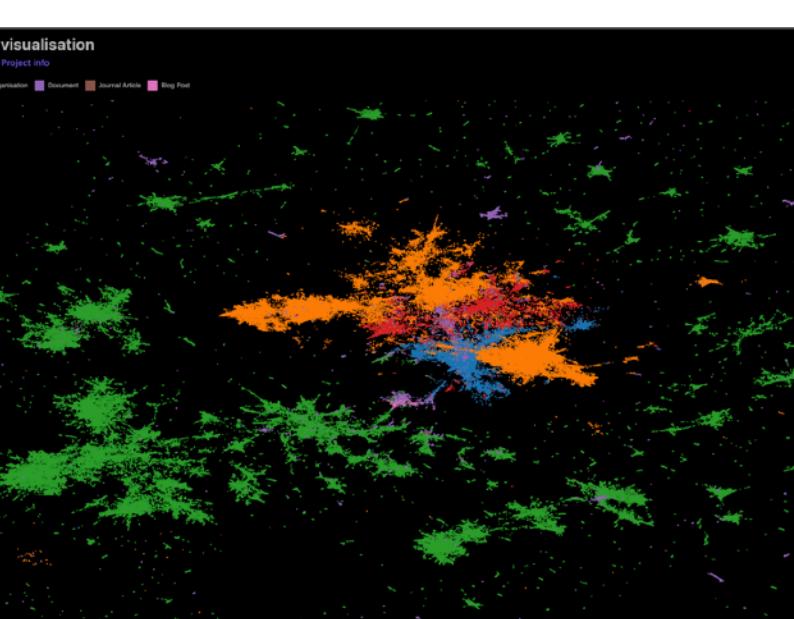
Mapping locations

Creating Google maps from places found in the Science Museum Group collection.



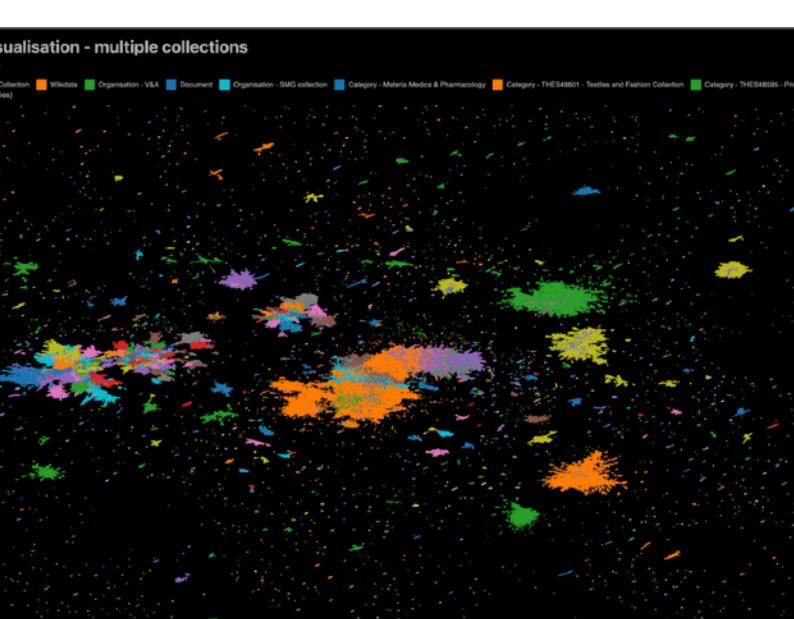
Metadata explorer

An interface for guided exploration of the Heritage Connector knowledge graph.



Visualisation

View a map of a knowledge graph containing the Science Museum Group's collection, blog and journal.



Visualisation - multiple collections

View a map of a knowledge graph containing the Science Museum Group's collection, blog and journal, and part of the V&A's collection.



