

# Archival Resource Key (ARK) – the other PID

## Did you know

- ... that ARK is a PID (Persistent IDentifier), along with DOI, ORCID, and ROR?
- ... that there are more than 15.3 billion ARKs in the world?
- ... that the ARK scheme is more than 25 years old?
- ... that, as of late 2025, ARK organizations include  
13 national libraries, 215 universities,  
254 archives, 144 museums,  
124 journals, and 59 scientific centers?



# Archival Resource Key (ARK) persistent identifiers: affordable, inclusive linking infrastructure for long term cultural heritage

ARK Alliance



arks.org

*John Kunze, Donny Winston*  
ARK Alliance, 2026



# Why care about ARK identifiers?



- Because robust web links are rare – the [average URL lifetime is 100 days](#)
- ARKs can be “persistent identifiers” (PIDs), which serve as permalinks
- “Ten persistent myths about persistent identifiers”

<https://n2t.net/ark:13030/c7gb1xh09>

The ARK (Archival Resource Key) identifier scheme was introduced in 2001.



# ARK anatomy

A labelled URL with a globally unique identity inside it



<https://n2t.net/ark:12345/fk1234>

↑  
makes ARK  
actionable  
(the resolver)

↑  
core globally unique  
identity (independent  
of web and hostname)

# N2T.net is a global “name” to “thing” resolver

Why not “ARKresolver.net” like  
most other PID schemes?

- Because ARKs use an inclusive, non-siloed approach to identifiers, serving 900+ schemes

## N2T - Identifier Resolution Service

`N2T` is an identifier scheme resolver that given a provided identifier, matches it to an identifier scheme definition. Depending on the form of the request, a successful match will either redirect to the registered target or present information about the matched definition.

# ARK organizations

15.3 billion ARKs created by 1700+ institutions – libraries, archives, museums, publishers, data centers, educators, etc. For example,



Internet Archive  
Bodleian Libraries  
Berkeley Law Library  
Bibliothèque Mazarine  
New York Public Library  
French National Archives  
National Library of Austria  
Library and Archives Canada

University of California Berkeley  
Smithsonian National Museum  
National Library of France  
University of Chicago  
Musée du Louvre  
Family Search  
British Library  
Google



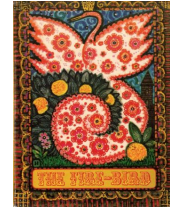
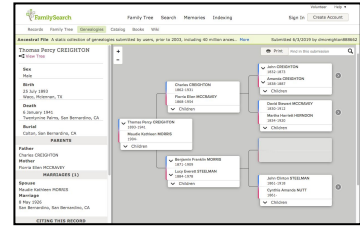
<https://n2t.net/ark:53355/cl010066723>



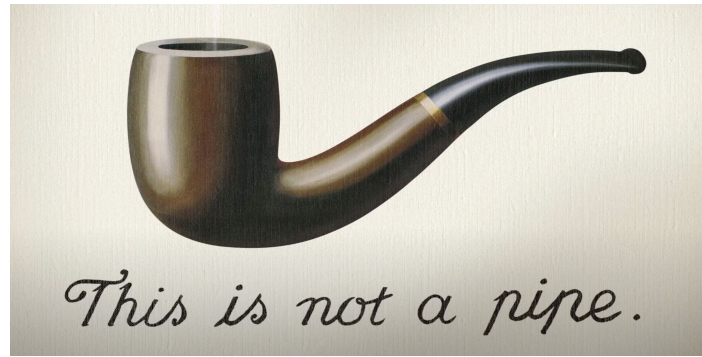
arks.org

# What are ARKs used for?

- genealogical records (15 billion [FamilySearch](#))
- publisher content (157 million [Portico](#))
- scientific datasets and records (22 million [INIST](#))
- scanned books and texts (50 million [Internet Archive](#))
- bibliographic records (27 million [BnF main catalog](#))
- museum specimens (15 million [Smithsonian Institution](#))
- public health documents (20 million [UCSF IDL](#))
- historical documents (36 million [CDL](#), 6 million [BnF Gallica](#))
- historical authors and scholars (4 million [SNAC](#))
- fine art museum collections (490,000 [Louvre](#))
- vocabulary terms (30,000 [Periodo](#), [YAMZ](#))



# Yay, AI! Can't we stop talking about everything from before?



No, quite the opposite

- AI says my pipe isn't a pipe – what the heck – sources please?
- No one is preserving AI models, training sets, prompts, outputs, etc.
- We need metadata, preservation, and permalinks more than ever

Emory University  
ARKs: 25593

Welcome to ArchivesSpace, the new Emory Libraries discovery system for archives. Visit the [Help page](#) for more information about using ArchivesSpace. We encourage questions and comments via our [feedback form](#).



EMORY UNIVERSITY  
**Emory Libraries**

# Audiovisual materials: King, Martin Luther, Jr., speech (side A), 1967 March 31



Digital Record

Identifier: [ark:/25593/w83zm](https://n2t.org/ark:/25593/w83zm)



# British Library

## ARKs: 81055

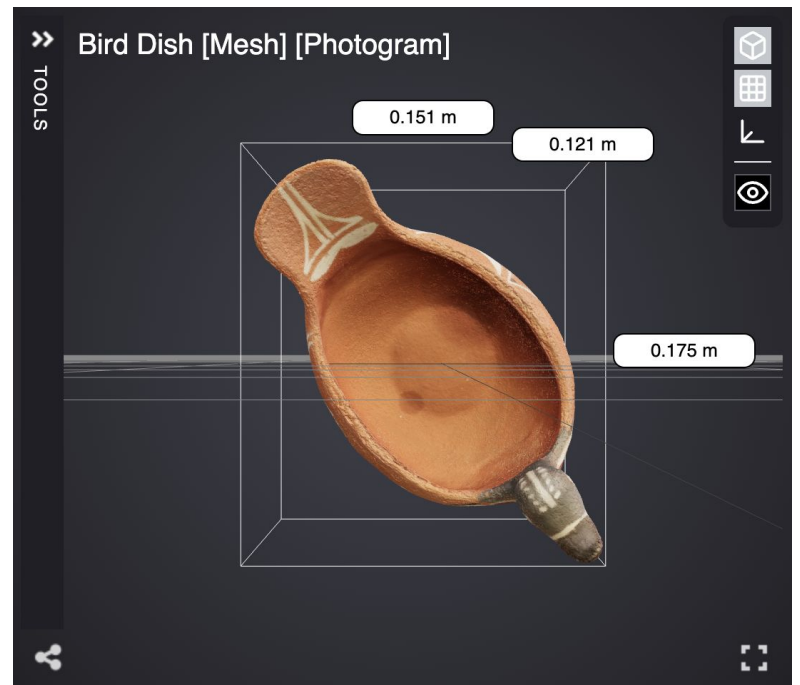
ark:[81055/man\\_10000006.0x000002](https://nbn-resolving.org/urn:nbn:uk:2009-0101-81055-man_10000006.0x000002)

'Lindisfarne Gospels'



Morphosource  
NAAN: 87602

<https://n2t.net/ark:87602/m4/480251>



# UTSC ARKs: 61220



UNIVERSITY OF  
**TORONTO**  
SCARBOROUGH

## Library



Floral Mind Map



Reflective Drawing



Pressed Herbaria

<https://ark.digital.utsc.utoronto.ca/ark:61220/utsc35669>

## Creative COVID Response Collection

The Creative COVID Response Collection consists of digital representations of over 100 creative canvas works created by UTSC students in response to the COVID-19 pandemic. Responses include artwork, digital art, poems, photographs, and more.



Reflective Drawing



Reflective Illustration

# LMEC ARKs: 76611

## Leventhal Map & Education Center

### Massachusetts Town Boundaries

Dataset

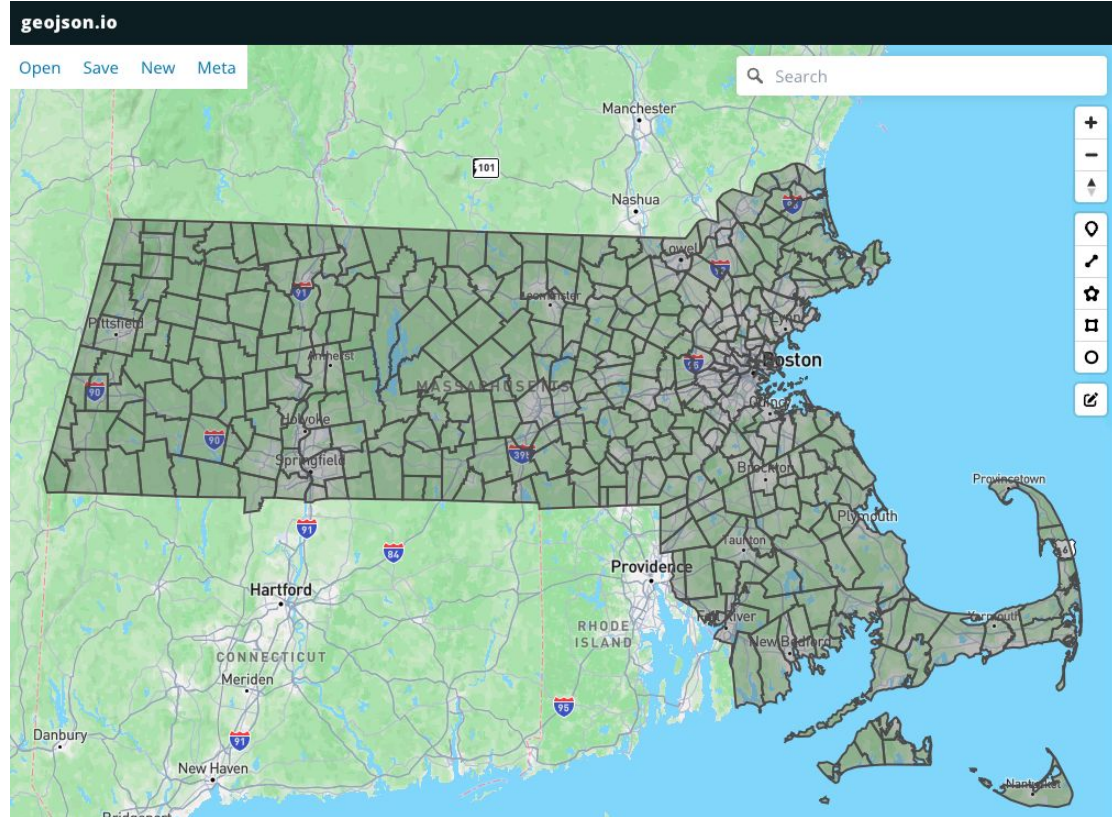
Identifier

[ark:/76611/dkgsk7g8m](https://arks.org/76611/dkgsk7g8m)

Published

2020-06-16

Standardized boundary file showing city and town extents, updated to include a census join field; geography covers the state of Massachusetts; time period reflects the present



archive.org  
ARKs: 13960



# USMARC Code List for Languages

by [Network Development and MARC Standard office](#)

Publication date	1996
Collection	<a href="#">inlibrary</a> ; <a href="#">printdisabled</a> ; <a href="#">internetarchivebooks</a>
Digitizing sponsor	<a href="#">Kahle/Austin Foundation</a>
Contributor	<a href="#">Internet Archive</a>
Language	<a href="#">English</a>
Access-restricted-item	true
Addeddate	2023-03-08 20:13:15
Autocrop_version	0.0.14_books-20220331-0.2
Bookplateleaf	0002
Boxid	IA40872114
Camera	Sony Alpha-A6300 (Control)
Collection_set	printdisabled
External-identifier	<a href="#">um:lcp:usmarccodelistfo0000netw:epub:34d7b206-8305-40a5-9027-3cc1b010af2e</a> <a href="#">um:lcp:usmarccodelistfo0000netw:lcpdf:ec98575a-5387-49cb-923f-3260f1adeadb</a>
Foldoutcount	0
Identifier	usmarccodelistfo0000netw
Identifier-ark	<a href="#">ark:/13960/s2wj1b5txr4</a>
Invoice	1652



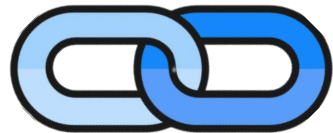
# Modern (ark:) vs classic (ark:/)



- Modern ARKs use only **ark:**
- Classic ARKs use **ark:/**
- Both forms are **equivalent** in perpetuity, for example, the two ARKs below *always* refer to the same thing

<https://n2t.net/ark:87602/m4/480251> =

<https://n2t.net/ark:/87602/m4/480251>



# What's a web link?

Example URL (Uniform Resource Locator)

```
https://www.alpha.com/article/2025/09/23/index.html
```

```
\_____\ / \_____\ / \_____\ /
```

*On the web... this **server** ...may know about this **path***

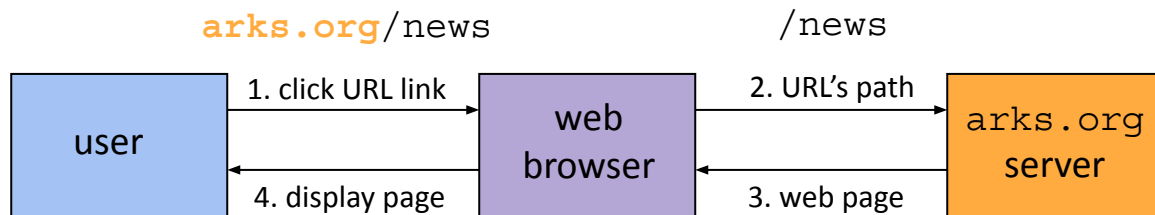
Shorter link: `alpha.com/article/2025/09/23`

Even shorter: `bit.ly/2C4fU8f`



# How does a link work?

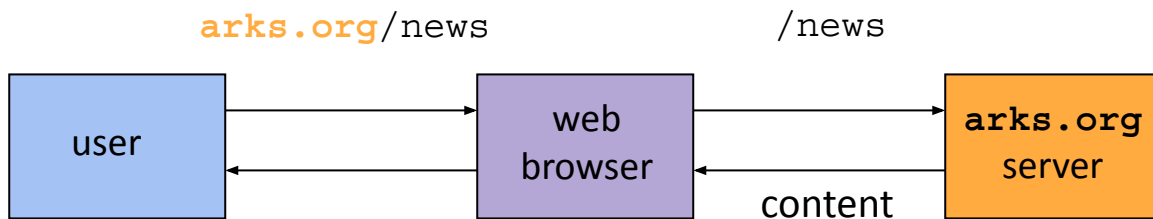
URL: **arks.org**/news  
parts: **resolver** **path**



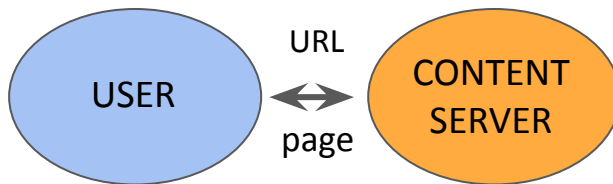
This is *direct* web access

# Web access – direct

URL: **arks.org**/news  
parts: **resolver** **path**



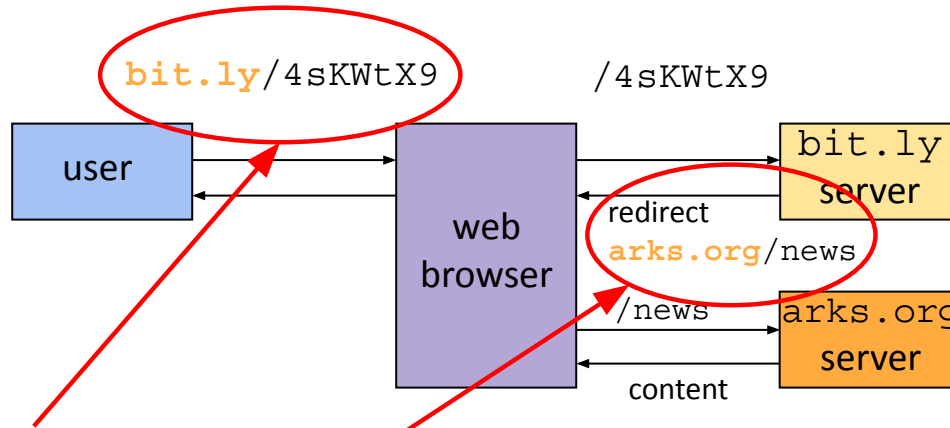
Behind the scenes



What users see

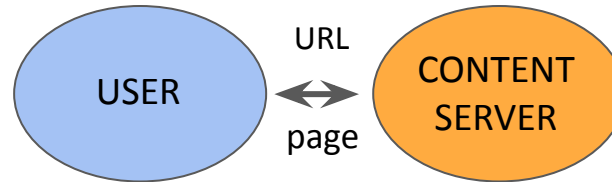
# Web access – indirect

URL: **bit.ly**/4sKWtX9  
parts: **resolver** **path**  
redirect: **arks.org**/news



Original URL

Redirect URL




Behind the scenes *redirect* to a new URL

What users see

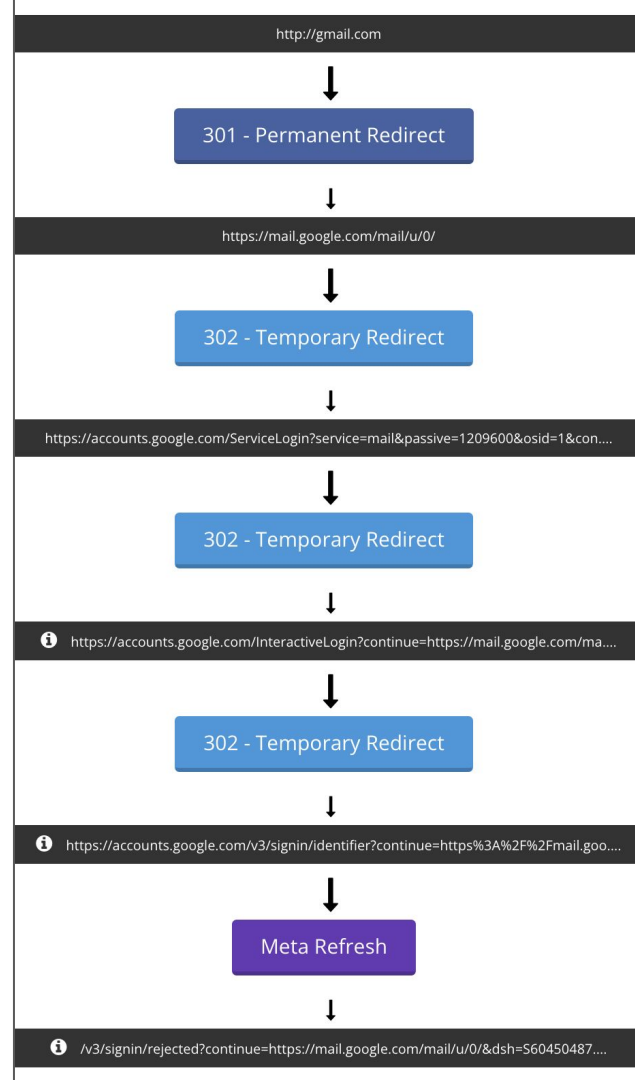
# Web redirects very common

## Example

- `gmail.com/` redirects 5 times before seeing any content, per [redirectdetective.com](http://redirectdetective.com) 

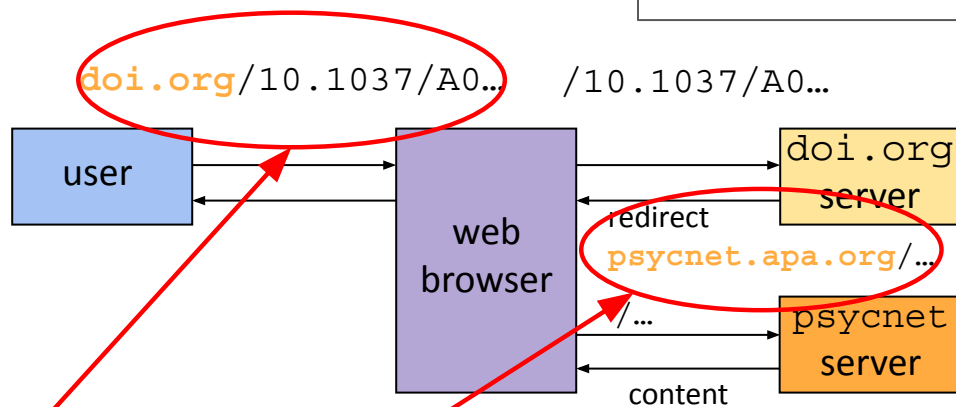
Simple, ancient, well-understood technology

- In every web server since 1992
- Only tech in all PIDs and URL shorteners
  - ARK, DOI, Handle, PURL, w3id.org, ...
  - Bitly, Tinyurl, Short.io, ...



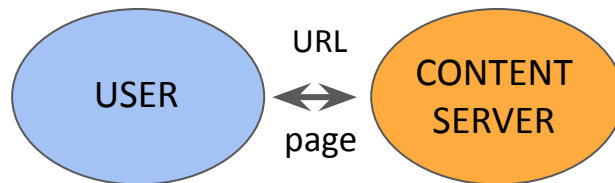
# Access via PID

URL: **doi.org/10.1037/A0040251**  
parts: **resolver** **path**  
redirect: **psycnet.apa.org/...**



Original URL

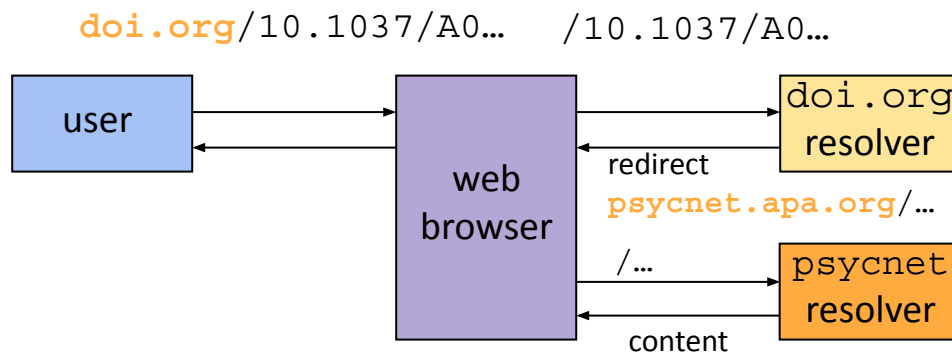
Final Redirect URL



Behind the scenes *redirects* to final new URL

What users see

# PIDs have little effect persistence



A redirect can come from any first resolver, ... which is irrelevant to what happens next.

# Persistent identifier (PID) basics

PIDs are just permalinks recognizable in the wild, unlike most URIs

- Examples – has “ark:” in it, or starts with doi.org/10....

No guarantees – PIDs and permalinks break by the thousands

- With effort and luck, some are repaired

One part of keeping PIDs persistent is *indirection*, with HTTP *redirection*

- Publish your *indirect* identifiers at a server (resolver) that can *redirect*





# PID resolvers – 1 pattern, 1 trick

PURL (Persistent URL)

[purl.org/dc/terms/creator](http://purl.org/dc/terms/creator)

Handle

[hdl.handle.net/4263537/4000](http://hdl.handle.net/4263537/4000)

URN (Uniform Resource Name)

[urn.fi/urn:isbn:9514005058](http://urn.fi/urn:isbn:9514005058)

DOI (Digital Object Identifier)

[doi.org/10.5334/dsj-2017-039](http://doi.org/10.5334/dsj-2017-039)

ARK (Archival Resource Key)

[n2t.net/ark:53355/c1010066723](http://n2t.net/ark:53355/c1010066723)



**Resolver**



**Name Assigning  
Authority**



**Name**



# Summary: ARK benefits

ARKs can serve as persistent identifiers with metadata

- found in the Data Citation Index, HathiTrust, Wikipedia, Wikidata, Internet Archive, ORCID profiles, etc.

In contrast to other id schemes, ARKs have

- no fees, no limits, no walled gardens (decentralized)
- very flexible metadata, including none
- can be assigned to anything digital, physical, or conceptual

There is no conflict using ARKs and other identifiers at the same time



# Example Smithsonian ARKs: 65665



**Scientific specimens** from the National Museum of Natural History  
<https://n2t.net/ark:65665/381440f27-3f74-4eb9-ac11-b4d633a7da3d>



**Cultural artifacts** from the National Museum of American History  
<https://n2t.net/ark:65665/ng49ca746b2-42dc-704b-e053-15f76fa0b4fa>



**Sculpture** from the Freer Gallery of Art & Arthur M. Sackler Gallery  
<https://n2t.net/ark:65665/ye3080ce305-a705-49cc-a70d-99aff8cb65da>

**Photographs** from the National Museum of African American History and Culture  
<https://n2t.net/ark:65665/fd5ad97cb86-caaf-4209-8fde-98d70f52f072>



**Paintings** from the Smithsonian American Art Museum  
<https://n2t.net/ark:65665/vk7a466371d-0413-451f-bd76-ca0becc46f94>



Slide credit: Bess Missell



# ARK anatomy: the **NAAN** (Name Assigning Authority Number)



`https://example.org/ark:12345/x54xz321/s3/f8.05v.tiff`

\\_\_\_\_\_ / \\_ / \\_ / \\_\_\_\_\_ / \\_ / \\_ /

ARK Label

Sub-parts Variants

Name Mapping Authority (NMA)

Assigned Name

**Name Assigning Authority Number (NAAN)**



# What's in a NAAN record?



A NAAN (Name Assigning Authority Number) is a 5-digit number

- Numbers are opaque, which is good for longevity. But what if you want to know what's behind a NAAN? In a browser, try

[n2t.net/ark:67375](https://n2t.net/ark:67375)

[n2t.net/ark:76611](https://n2t.net/ark:76611)

[n2t.net/ark:13960](https://n2t.net/ark:13960)

[n2t.net/ark:](https://n2t.net/ark:)

[n2t.net/pdb:1YOD](https://n2t.net/pdb:1YOD)

# Example NAAN record

Record for the National Autonomous University of Mexico

**n2t.net/ark:46171 →**

ark:46171:

when: 2017.10.27

name: Universidad Nacional Autónoma de México

target: <https://www.morelia.unam.mx/campus>



# The NAAN registry

The registry is a plain text file: [n2t.net/e/pub/naan\\_registry.txt](http://n2t.net/e/pub/naan_registry.txt)

Another example record: [n2t.net/ark:12148](http://n2t.net/ark:12148) →

```
ark:12148:
```

```
  when: 2005-07-17
```

```
  name: Bibliothèque nationale de France
```

```
  target: https://ark.bnf.fr
```

Purpose of the NAAN (Name Assigning Authority Number):

- Resolution reference point
- Isolating assignment (autonomy, uniqueness, re-use)



# Obtain a NAAN for your organization

Fill out this form (linked, in case you forget, from the [arks.org](https://arks.org) homepage):

`n2t.net/e/naan_request`



# ARK Alliance

## NAAN Request Form

Use this form to request a Name Assigning Authority Number (NAAN) so that you can create ARK (Archival Resource Key) identifiers. You may also use this form to request updates if you have an existing NAAN.

For a memory organization that holds content (a library, archive, data center, museum, etc.) or produces content (a laboratory, publisher, campus department, etc.), obtaining a NAAN allows it to assign ARKs. See [arks.org](https://arks.org) for more information.

When your request is verified, a unique 5-digit NAAN will be registered exclusively for the memory organization. If you have questions about this form, please use the discussion group at [groups.google.com/group/arks-forum](https://groups.google.com/group/arks-forum).

[Sign in to Google](#) to save your progress. [Learn more](#)

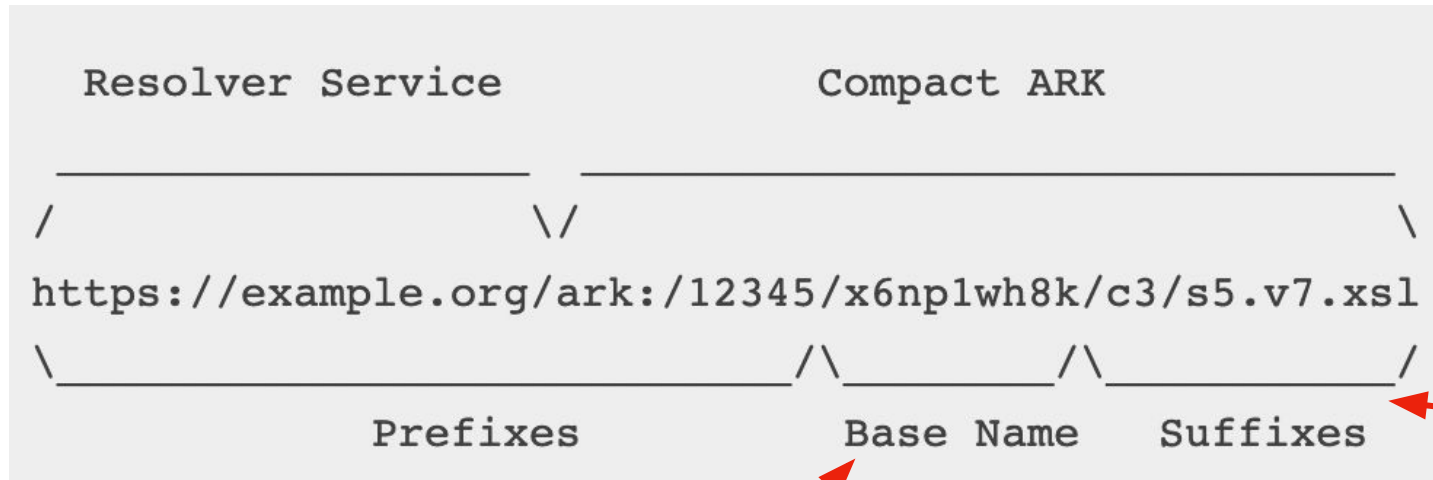
\* Required

I would like \*

To request a new NAAN



# Suffixes to identify a million possible image regions with just one ARK



Suffixes

Base Name

# French National Library ARKs: 12148

<https://gallica.bnf.fr/iiif/ark:12148/btv1b8449691v/f29/2131,4016,1467,948/full/0/default.jpg>



# Tools

Documentation and Software:

**[arks.org/resources](https://arks.org/resources)**

- Minters and resolvers: Noid, arknoid, arklet, and **arklet-Frick**
- Other minters: counters, UUID, ULID, ...
- Journal minter/resolver: OJS Plugin
- In-house library ARK system: **ARKs Service UTScarborough**
- Consider Suffix Passthrough in the style of arklet-Frick and EZID





# Suffix Passthrough in Action

*Registered ARK*

<http://n2t.net/ark:/12345/x98765>



*Baseline redirection*

*Registered target URL*

<http://datazoo.example.com/carbon288>



# Linked Data implicit in ARK syntax

ARK suffixes imply existence of related URIs

- Slashes “/” for hierarchy  
ark:.../A/B/C implies existence of A/B and A
- Periods “.” for variants  
ark:.../foo.jpg is a variant of ark:.../foo.pdf
- Inflections “?info” modifies an ARK to request metadata





# Stable legacy ids easily make great ARKs

Example URI format for “Allmaps” URIs

<https://here.allmaps.org/maps/41d9011e643dde7b>

To implement ARKs, publish this

<https://n2t.net/ark:12345/41d9011e643dde7b>

... and support ARKs with a one-line server configuration change:

```
RewriteRule 'ark:/?12345/(.*)' 'https://here.allmaps.org/maps/$1'
```



# ARK metadata

who | what |  
when | where

- An ARK in a URL returns access to the thing it identifies
- To get access to its metadata, it should support ARK + '?info', e.g.,

**`https://n2t.net/ark:81431/p3s39k?info` →**

`who: University of Pennsylvania Libraries`

`what: Walnut Street Theatre. Philadelphia, October 9, 1869.`

`when: 1869`

`where: ark:81431/p3s39k (currently  
https://ezid.cdlib.org/id/ark:81431/p3s39k)`

`how: (:unav)`

`id created: 2017.12.06_08:42:02`

`id updated: 2017.12.21_11:16:02`

`persistence: (:unav)`



# ARK metadata flexibility

Example: thousands of ARKs return DataCite DOI metadata

<https://n2t.net/ark:81986/caida.data.100004?info> →

```
datacite: <?xml version="1.0"?>
<resource
  xsi:schemaLocation="https://datacite.org/schema/kernel-4
https://schema.datacite.org/meta/kernel-4/metadata.xsd">
  <identifier
    identifierType="ARK">81986/caida.data.100004</identifier>
  <creators>
    <creator>
      <creatorName>University of California San Diego
        Center for Applied Internet Data Analysis (UCSD CAIDA)
      </creatorName>
    </creator>
  </creators>
  <titles>
    <title
      xml:lang="eng">The IPv4 Routed /24 Topology Dataset</title>
  </titles>
  <publisher>University of California San Diego
    Center for Applied Internet Data Analysis (UCSD CAIDA)
  </publisher>
  <publicationYear>2007</publicationYear>
  <resourceType
    resourceTypeGeneral="Dataset">Active measurements of Internet
    topology</resourceType>
  <subjects>
    <subject>Internet measurement
```

# Permanence is not binary

Preservation often demands change, such as

- larger thumbnail image sizes, better OCR algorithms
- 3-year-old “long term stable” Linux release gets security patches
- Typos in cover pages get corrected

Valuable objects tend to be complex, human-managed clusters



# What do you mean by persistence?

## Persistence statements: describing digital stickiness

John Kunze, Scout Calvert, Jeremy DeBarry, Matthew Hanlon, Greg Janée, Sandra Sweat

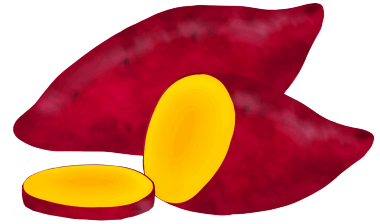
### **Abstract** (2017)

... There are few well-defined terms to describe the various kinds and qualities of persistence that object repositories and identifier resolvers do or don't provide.

... [they] should enable providers to articulate persistence policies and set user expectations.



# YAMZ.net ARKs: 99152/h1



*Secret: no one uses standard metadata except as inspiration for local dialects*

- YAMZ supports dialects with ARKs for working draft metadata concepts
- Note: shared NAAN with reserved “shoulder”: /h1  
(YAMZ = Yet Another Metadata Zoo)
- Vocabulary builder – term creation, sharing, and consensus
  - Big task: narrow down among many alternate terms/definitions
  - YAMZ is *not* a standard, but improves standards



# Firn

Search for a term

Alternative definitions (13), class: vernacular (0)



Term: **Firn**

Created 2022.03.08

0

Definition: In hydrologic terms, old snow on top of glaciers, granular and compact and not yet converted into ice. It is a transitional stage between snow and ice. Also called Neve.

Last Modified 2023.03.27

Contributed by GCW



Glossary

[\[watch\]](#)

NOAA-NWS

GCW

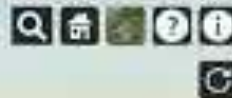
Permalink:

<https://n2t.net/ark:/99152/h5813>

Add comment

Comment

0, 0, 0



Viewer Charge



iSamples

Slide credit:  
Dave Vieglais



arks.org

# ARK Alliance: how to participate



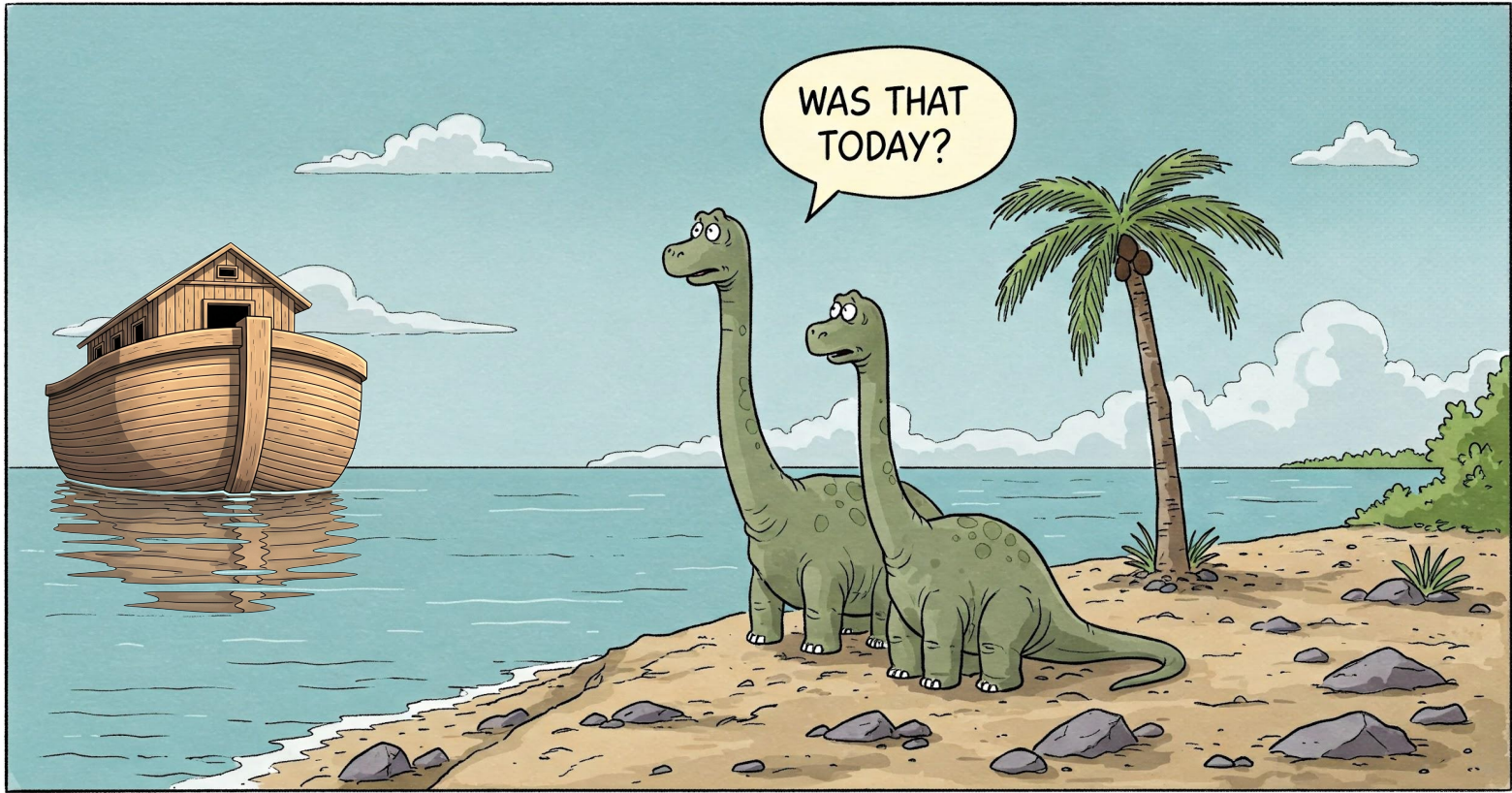
<https://arks.org>

We welcome contributions and volunteers for our technical, outreach, advisory, and NAAN record curation working groups

Discussion forums in English, French, and Spanish/Portuguese

- [arks-forum@googlegroups.com](mailto:arks-forum@googlegroups.com)
- [arks-forum-fr@framalistes.org](mailto:arks-forum-fr@framalistes.org)
- [arks-forum-ib@googlegroups.com](mailto:arks-forum-ib@googlegroups.com)





The ARK identifier – don't get left behind!

# Thank you. Questions?

ARK Alliance  
[info@arks.org](mailto:info@arks.org)  
arks.org

John Kunze, [jakkbl@gmail.com](mailto:jakkbl@gmail.com)  
Donny Winston, [donny@polyneme.xyz](mailto:donny@polyneme.xyz)

Form to  
request a  
NAAN

