# Choosing and Using ARK (Archival Resource Key) Persistable Identifiers

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# Why care about ARK identifiers?


- Because robust web links are rare – the average URL lifetime is 100 days
- ARKs can be “persistent” identifiers (PIDs), but we prefer “persistable”
- “Ten persistent myths about persistent identifiers”

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

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

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# 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)

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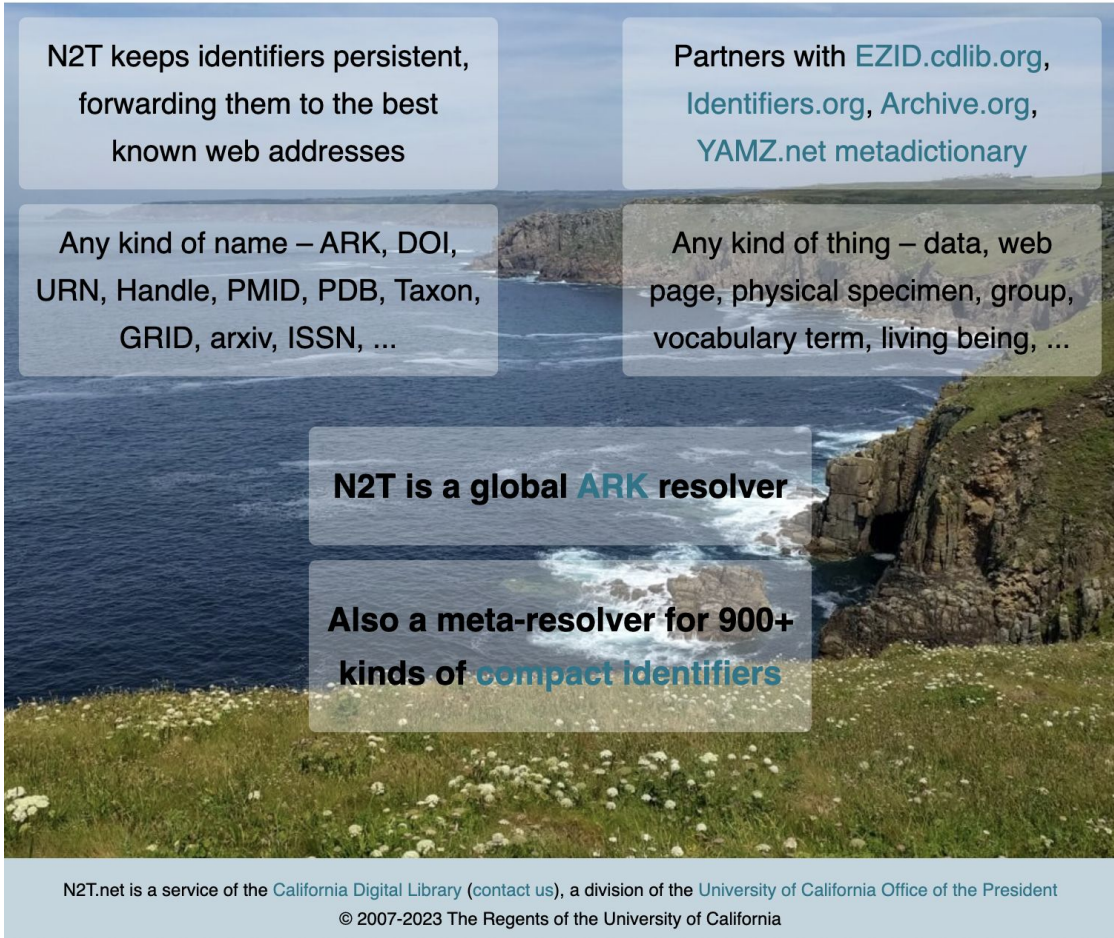
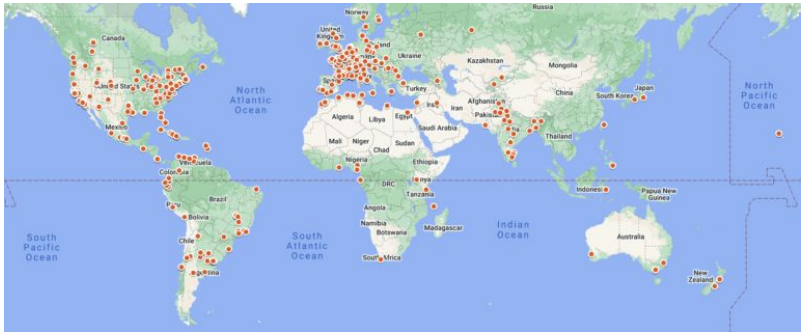
# N2T.net is a global “name” to “thing” resolver

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

Because ARKs are inclusive and resolvers generalize easily.



# ARK organizations



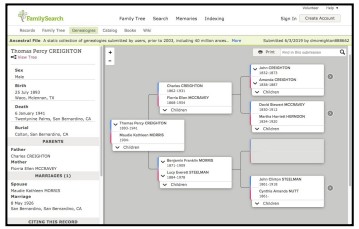

8.2 billion ARKs created by 1100+ institutions – libraries, archives, museums, publishers, data centers, educators, etc. For example,

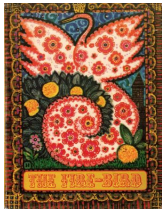
Internet Archive
Bodleian Libraries
Berkeley Law Library
Bibliothèque Mazarine
New York Public Library
French National Archives
National Library of Austria
Library and Archives Canada
University of California Berkeley
Smithsonian National Museum
National Library of France
University of Chicago
Musée du Louvre
Family Search
British Library
Google

https://n2t.net/ark:/53355/cl010066723 →

# What are ARKs used for?

- genealogical records (8 billion FamilySearch)
- publisher content (100 million Portico)
- scientific datasets and records (22 million INIST)
- scanned books and texts (30 million Internet Archive)
- bibliographic records (15 million BnF main catalog)
- museum specimens (15 million Smithsonian Institution)
- public health documents (15 million UCSF IDL)
- historical documents (21 million CDL, 5 million BnF Gallica)
- historical authors and scholars (4 million SNAC)
- fine art museum collections (490,000 Louvre)
- vocabulary terms (30,000 Periodo, YAMZ)





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archive.org
ARKs: 13960

INTERNET ARCHIVE


# USMARC Code List for Languages

by Network Development and MARC Standard office

| | |
|---|---|
| Publication date | 1996 |
| Collection | inlibrary; printdisabled; internetarchivebooks |
| Digitizing sponsor | Kahle/Austin Foundation |
| Contributor | Internet Archive |
| Language | English |
| 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 | urn:lcp:usmarccodelistfo0000netw:epub:34d7b206-8305-40a5-9027-3cc1b010af2e<br>urn:lcp:usmarccodelistfo0000netw:lcpdf:ec98575a-5387-49cb-923f-3260f1adeadb |
| Foldoutcount | 0 |
| Identifier | usmarccodelistfo0000netw |
| Identifier-ark | ark:/13960/s2wj1b5txr4 |
| Invoice | 1652 |

# History of “persistable” id schemes

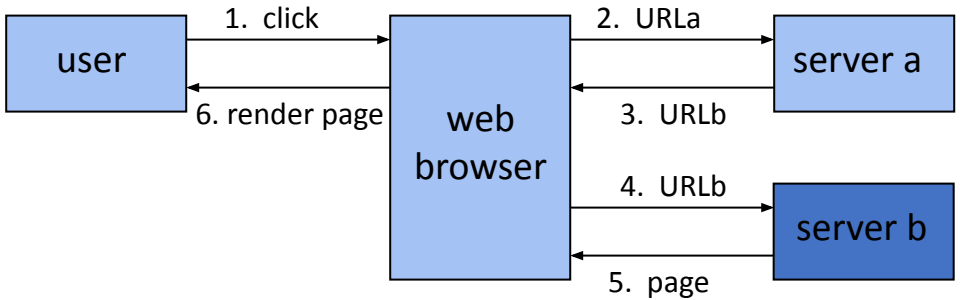
- PURL (Persistent URL) – “URLs are fine if you *redirect* from purl.org”
- URN (Uniform Resource Name), DOI (Digital Object Identifier) & Handle
  - “URLs and domain names are bad, except for ours, and we redirect”
- Tim Berners-Lee – “cool URIs don’t break”
- ARK (Archival Resource Key) – “URLs are fine if managed well, but do tell us which of your URLs are meant for what kind of persistence”

# PID schemes – pessimist view

| **Helps with major causes of broken links?** | **PURL** | **Handle** | **URN** | **DOI** | **ARK** |
|---|---|---|---|---|---|
| Prevents fire, war, flood, attack, bankruptcy, ... | No | No | No | No | No |
| Prevents human or service provider error | No | No | No | No | No |
| Guarantees your links, or fixes them for you | No | No | No | No | No |
| Best practices guard against copy/paste errors | No | No | No | No | **Yes** |
| Global resolver downtime less than 1 day per year | No | No | No | No | **Yes** |
| Identity independence from lost domain/server name | No | No | **Yes** | No | **Yes** |

# Web access – direct

# Web access – indirect




HTTP *redirect*

Example: archive.example.org/photo123 → photos.example.org/vault/123

A *redirect* is like forwarding a (request) message to a new address

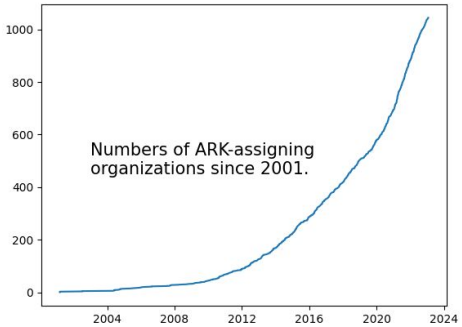
# PID schemes – optimist view

| **Features and costs** | **PURL** | **Handle** | **URN** | **DOI** | **ARK** |
|---|---|---|---|---|---|
| Decentralized resolution | No | No | No | No | **Yes** |
| Inferenceable syntax (variants, containment) | No | No | No | No | **Yes** |
| Flexible metadata by design, including none | No | No | No | No | **Yes** |
| Inflections (...?info) and content negotiation | No | No | No | No | **Yes** |
| Nuanced persistence statements by design | No | No | No | No | **Yes** |
| Path extensions during resolution (suffix passthrough) | **Yes** | No | **Yes**? | No | **Yes** |
| ***Free, non-paywalled, in unlimited numbers*** | Yes | No | Yes | No | **Yes** |

# PID schemes – ecosystem view

| **Identifiers in an Internet context** | **PURL** | **Handle** | **URN** | **DOI** | **ARK** |
|---|---|---|---|---|---|
| Appear in Data Citation Index, HathiTrust, Wikipedia, Wikidata, Internet Archive, ORCID profiles | Yes | Yes | Yes | **Yes** | Yes |
| Major adoption by most academic publishers outside the global South | No | No | No | **Yes** | No |
| Free (subsidized) account and admin interface for one-off use, e.g., purl.org, zenodo.org, archive.org | Yes? | No? | No? | Yes | Yes? |
| IETF standard URI, validated by web browsers | No | No | **Yes** | No | No |
| Replicated global resolver architecture | No | **Yes** | No | No | No |

# Summary: ARK benefits




ARKs can serve as persistable 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 same time

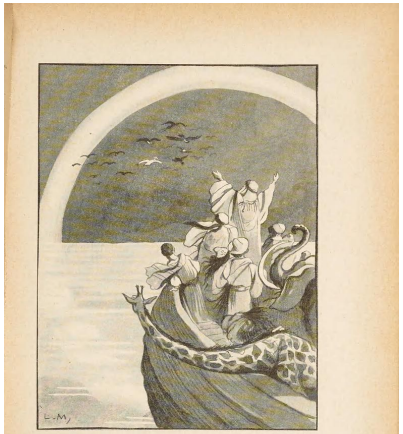
# Smithsonian ARKs: 65665

The Smithsonian Libraries & The Smithsonian Institution

- ARKs for collection metadata & multimedia objects
- Started in 2015
- By 2020 over 15 million ARKs and counting….

“ARKs are a perfect fit for our [Smithsonian] collections”

- Project size
- Cost
- Ease of implementation
- Permanence



Courtesy of the Smithsonian Libraries.
Alexandre, Arsène. Noé dans son arche.
Combet et Cie, 1902.

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# Smithsonian ARK record and image examples

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

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

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

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

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

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# For metadata, add ‘?info’ to the ARK

**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)
```

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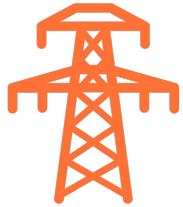
# … including DOI metadata for ARKs

**http://n2t.net/ark:/81986/caida.data.100004?info →**

```
datacite: <?xml version="1.0"?>
<resource
     xsi:schemaLocation="http://datacite.org/schema/kernel-4
     http://schema.datacite.org/meta/kernel-4/metadata.xsd"><identifier
identifierType="ARK">81986/caida.data.100004</identifier><creators><creator><cr
eatorName>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
     data</subject><subject>Internet traceroute
```

# A cross-scheme partnership?



In 2015, talks between CDL and Crossref about

- Mutual resolver backup – ARKs in Crossref, DOIs in N2T
  N2T loaded 60 million DOIs, demo'd resolution and content negotiation
- Including ARKs in PID Event Tracking
- Cross-scheme metadata integration

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## Principles for Open Scholarly Infrastructures

23 FEBRUARY 2015 14 COMMENTS

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iSamples

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# Wrap up

Questions?