The Memento Infrastructure to Support Research Using Web Archive Collections

http://mementoweb.org/

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Past Web Archive Landscape

Slide from Michael L. Nelson:
https://www.slideshare.net/phonedude/weaponized-web-archives-provenance-laundering-of-short-order-evidence

Current Web Archive Landscape

WebCite

Perma.cc

LIBRARY OF CONGRESS

ARCHIVE-IT

MediaWiki

Fedora Commons

archive.is
webpage capture

INTERNET ARCHIVE

WordPress

hanzo

STANFORD UNIVERSITY LIBRARIES

The National Archives

ARQUIVO.PT

UK WEB ARCHIVE
preserving uk websites

Leabharlann Náisiúnta na hÉireann
National Library of Ireland

Vefsafn.is
Landsbókasafns Íslands - Háskólabókasafn
Þekkingarveita í allra þágu

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Status Quo on Web Archive-Based Research

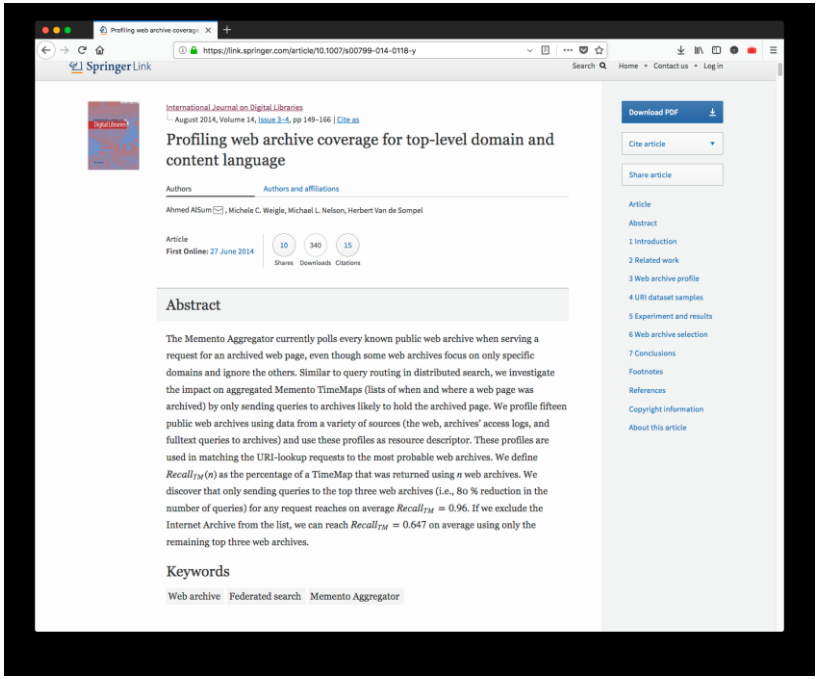
"These URLs were checked against the Internet Archive … "

"… few encountered links were actually available in the Internet Archive"

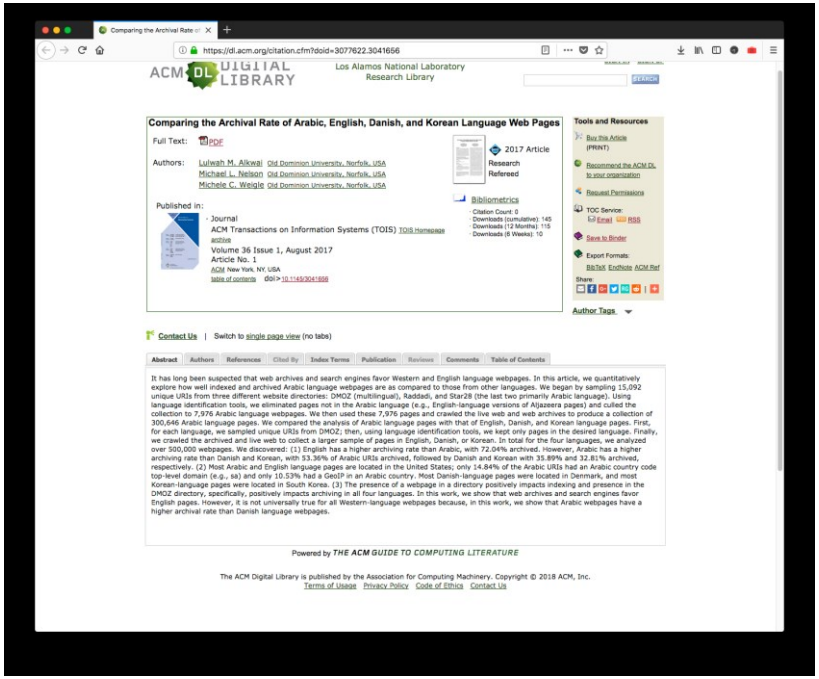
"We illustrate the challenges using data extracted from .... a collection of all Web pages from the … top level domain crawled by the Internet Archive ..."

Fortunately the Internet Archive appear to have a good record of the account...
Getting ... is important because it continually changes, and the Internet Archive's crawler will only get the initial page of results.

Merit of Using Multiple Web Archives



AlSum et al.
"Profiling web archive coverage for top-level domain and content language"
https://doi.org/10.1007/s00799-014-0118-y



Lulwah M. Alkwai et al.
"Comparing the Archival Rate of Arabic, English, Danish, and Korean Language Web Pages"
https://doi.org/10.1145/3041656

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Memento

http://mementoweb.org/
https://tools.ietf.org/html/rfc7089

#memento

Memento

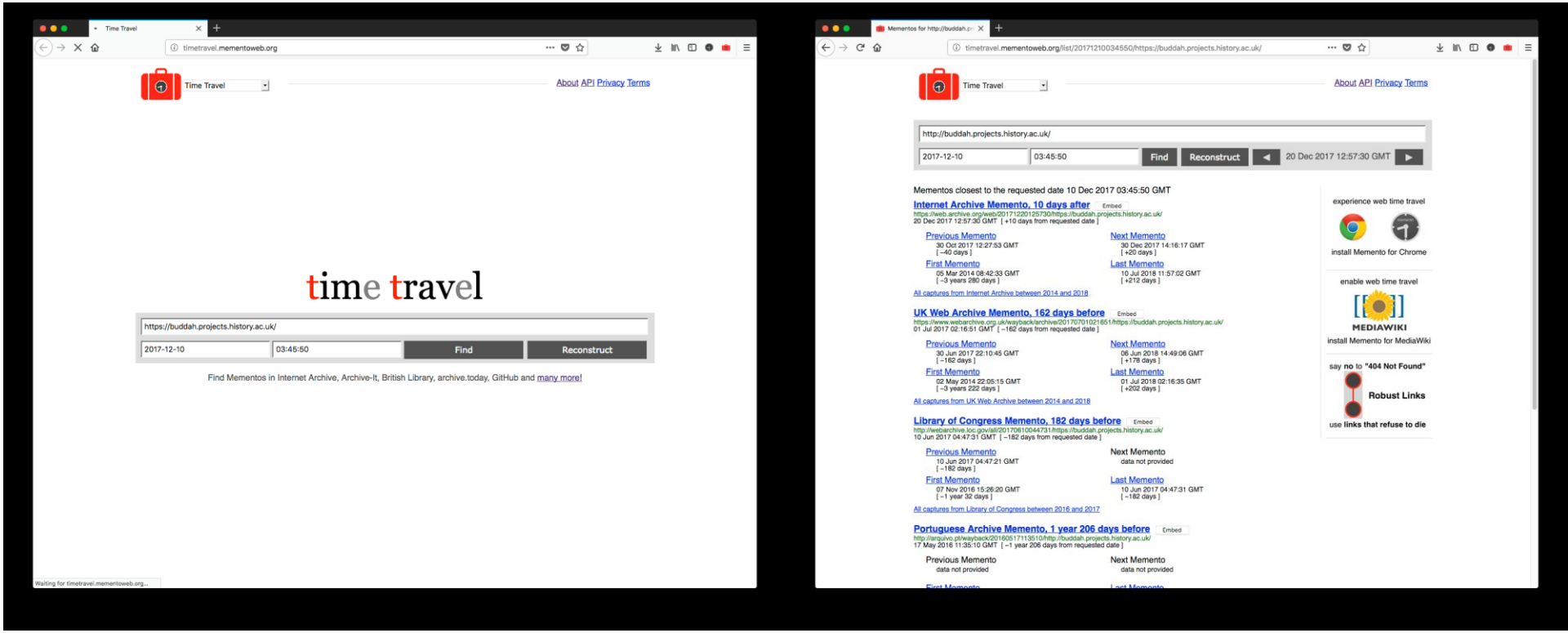
2 components to Memento

1. Retrieve archival snapshot of URI-R at time t
   - Datetime negotiation

2. Retrieve a list of all archival snapshots of URI-R - TimeMap
   - Version history

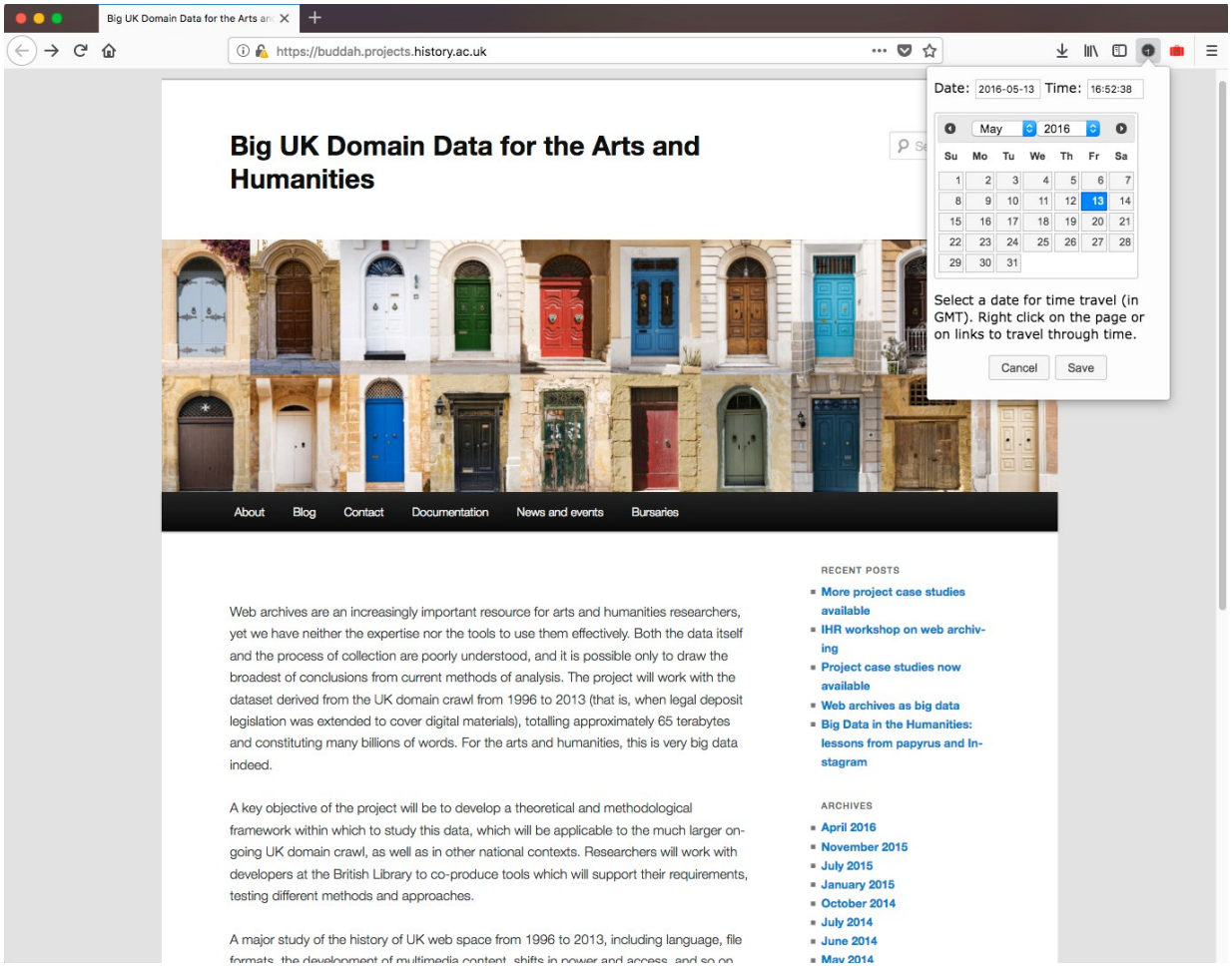
- Responses to the above reflect perspective of who you ask
  - Individual web archive (IA, Arquivo.pt, etc)
  - Individual resource versioning system (W3C Wiki, Specs)
  - Aggregator (all Memento-compliant web archives)

Memento Implementations for Humans 1/2



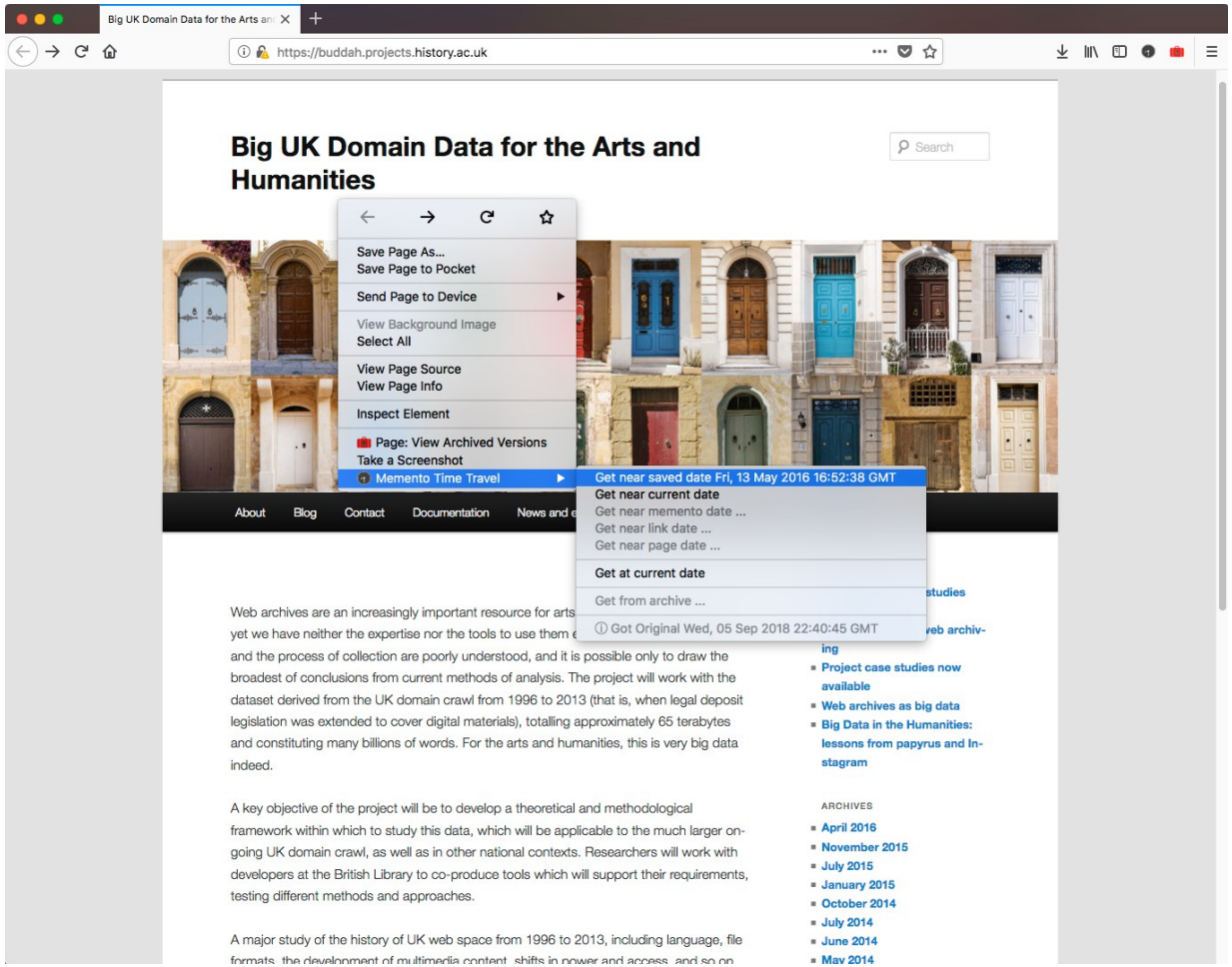
http://timetravel.mementoweb.org/
http://timetravel.mementoweb.org/list/20171210034550/https://buddah.projects.history.ac.uk/

Memento Implementations for Humans 2/2



http://bit.ly/memento-for-chrome
http://bit.ly/memento-for-firefox

Memento Implementations for Humans 2/2



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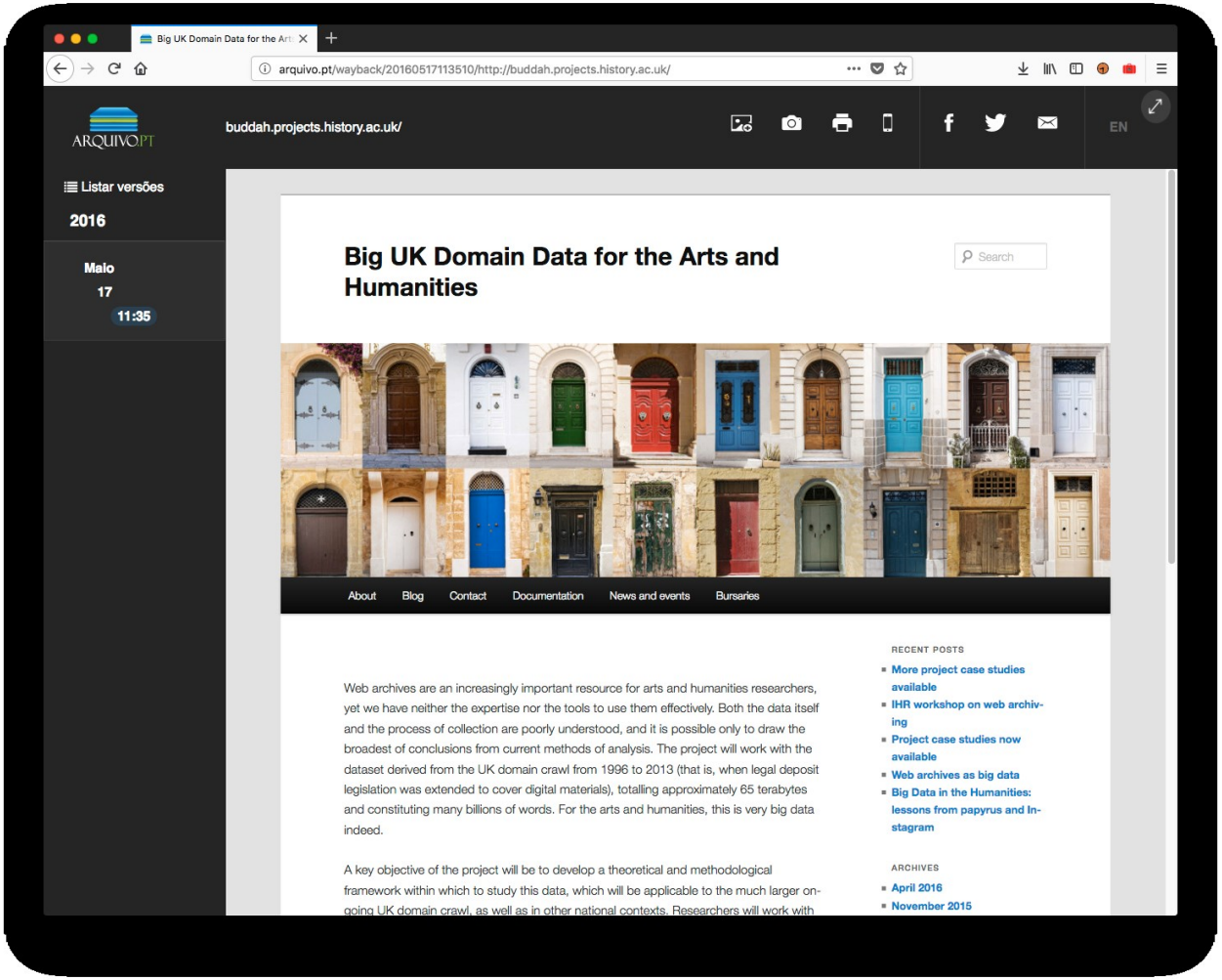
Memento Implementations for Humans 2/2



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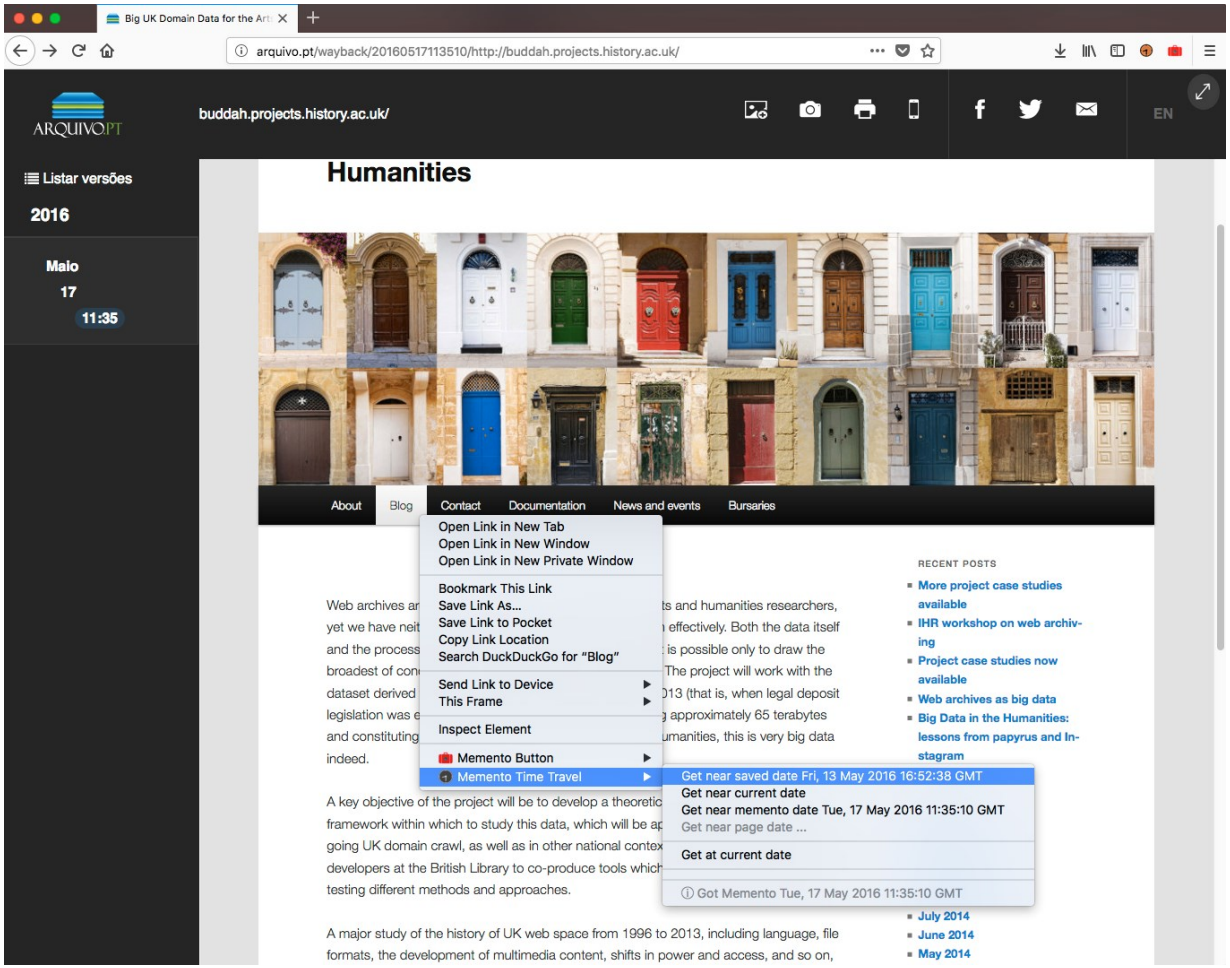
Memento Implementations for Humans 2/2



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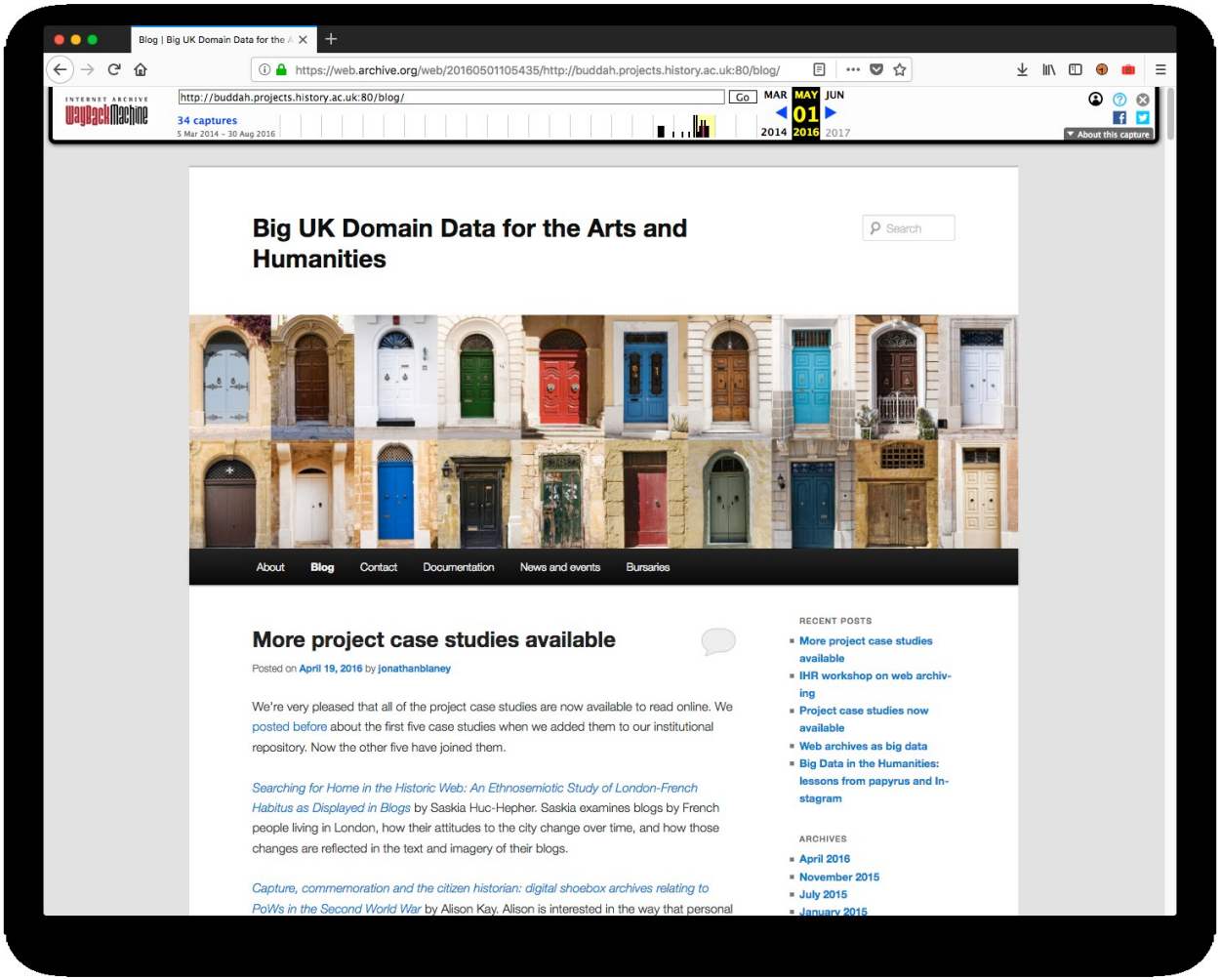
Memento Implementations for Humans 2/2



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Memento for Machines

- Request the best Memento from a compliant web archive

  curl -L -H "Accept-Datetime: <DATETIME>" http://compliant.archive/timegate/<URI-R>

- Request a TimeMap from a compliant web archive

  curl http://compliant.archive/timemap/<URI-R>

- Request a TimeMap from the Memento Aggregator

  curl http://labs.mementoweb.org/timemap/format/<URI-R>

Memento APIs for Machines

- Redirect to best Memento

  http://timetravel.mementoweb.org/memento/YYYY<MM|DD|HH|MM|SS>/URI

- Provide a JSON description of a Memento

  http://timetravel.mementoweb.org/api/json/YYYY<MM|DD|HH|MM|SS>/URI

Overview of APIs & archives' endpoints:
http://timetravel.mementoweb.org/guide/api/
http://labs.mementoweb.org/aggregator_config/archivelist.xml

Overview of related tools:
https://github.com/machawk1/awesome-memento

Research Efforts Enabled by Memento 1/2

- Assess “Content Drift” in scholarly communication
- How much has a web resource that was referenced in a scholarly article changed since the publication of the article?
- We don’t know what “was there” at the time of publication. We only know what “is there” now.

  → Devised a novel approach to assess content drift based on available Mementos

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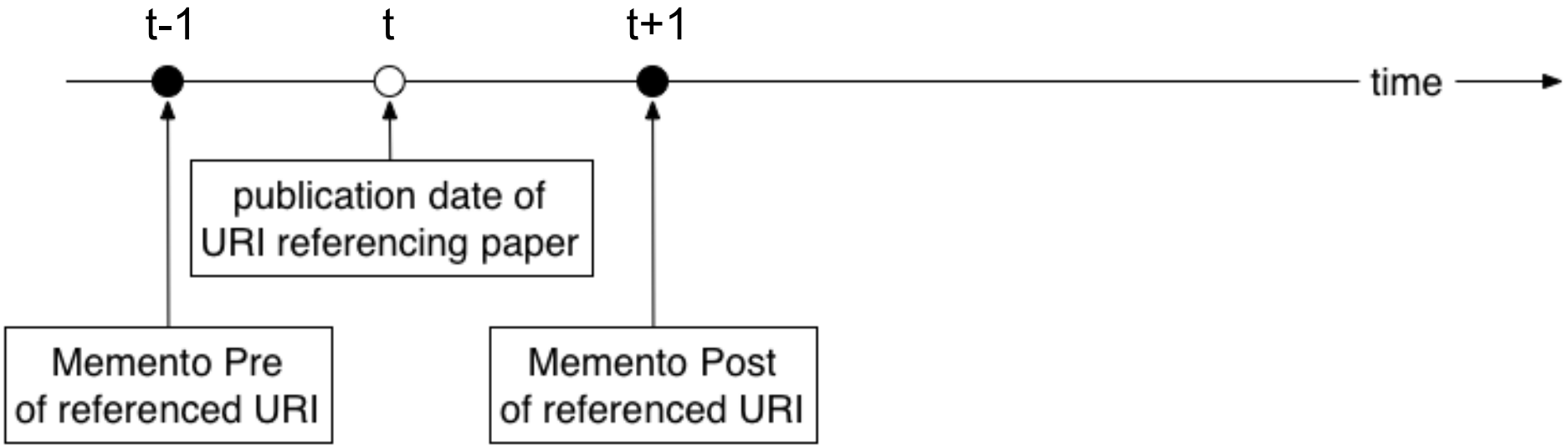
S. Jones et al. “Scholarly Context Adrift: Three out of Four URI References Lead to Changed Content” PLOS ONE 2017 https://doi.org/10.1371/journal.pone.0167475

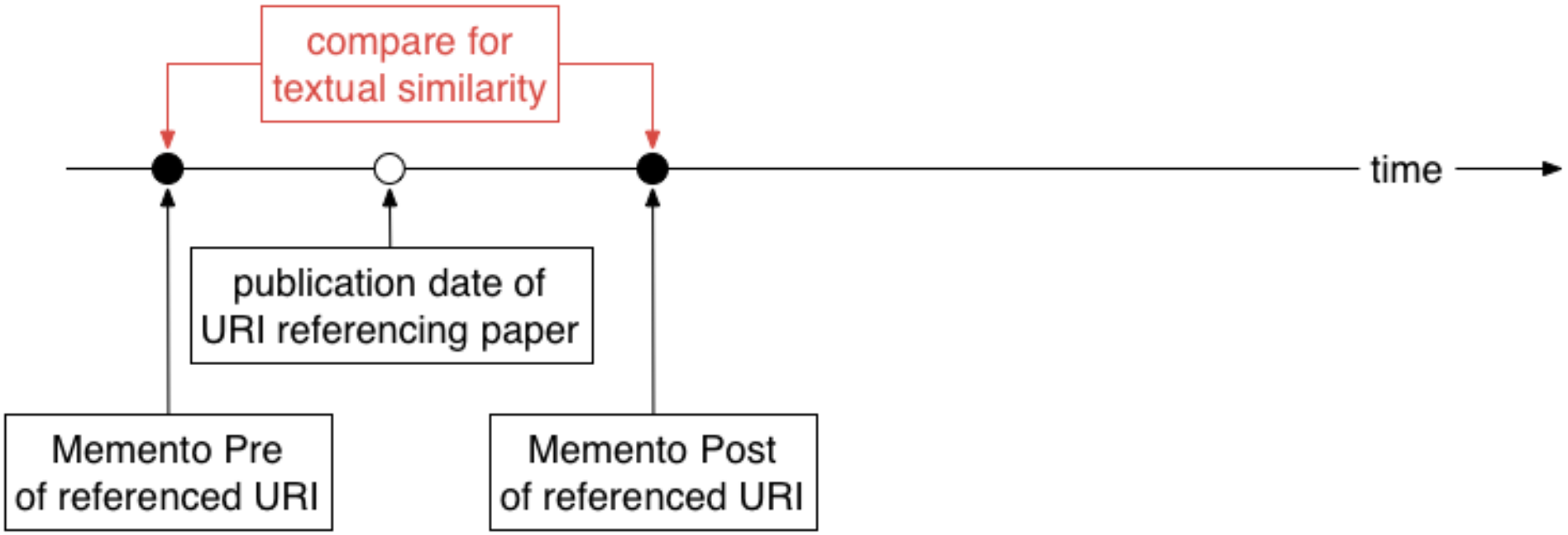
Novel Approach to Assess Content Drift

Memento Pre
of referenced URI

Step 1: Find Mementos



Step 2: Select Representative Mementos



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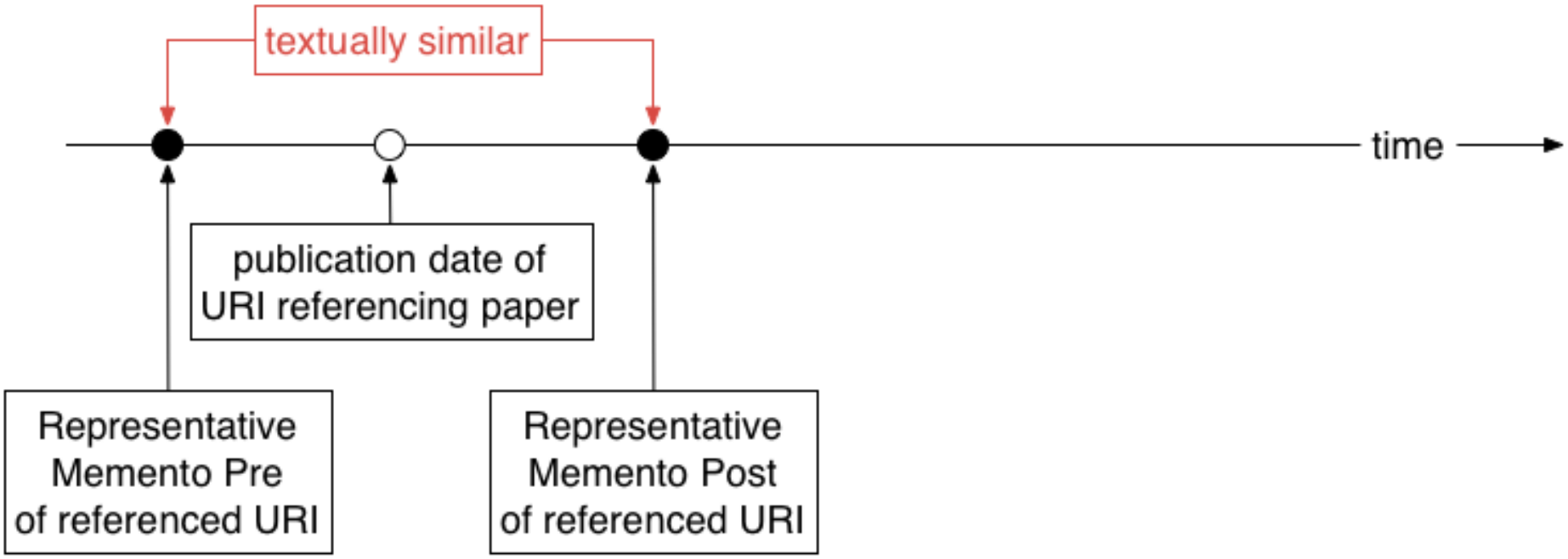
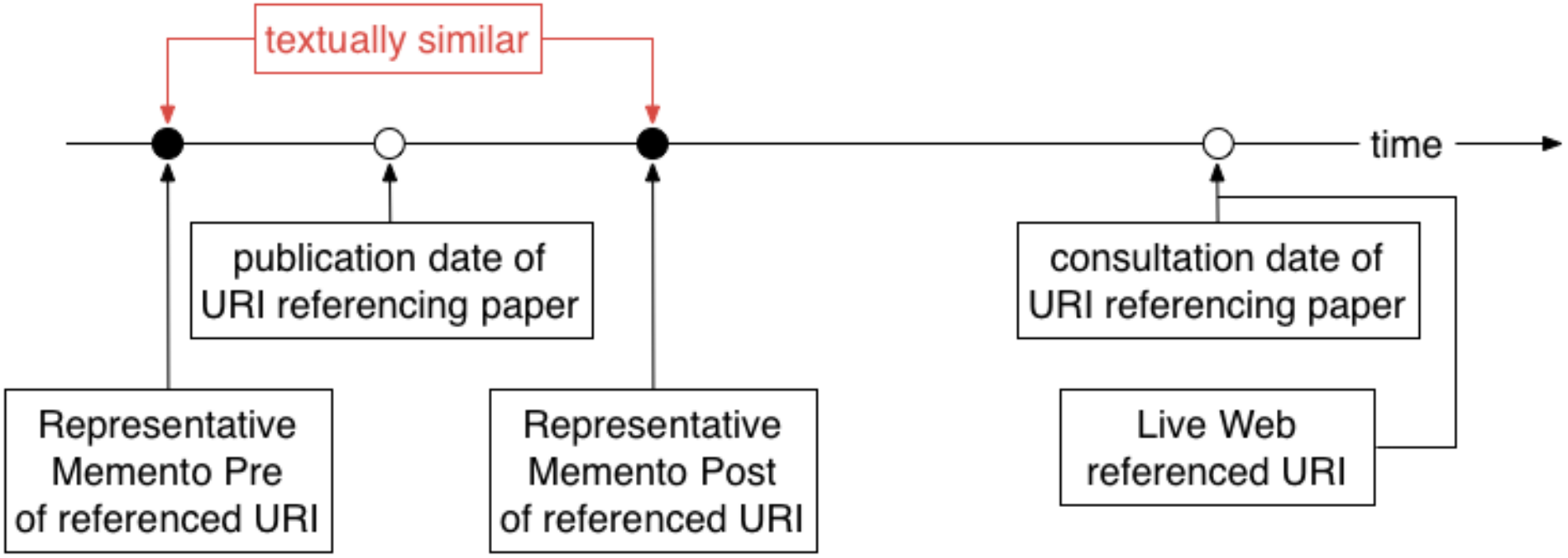
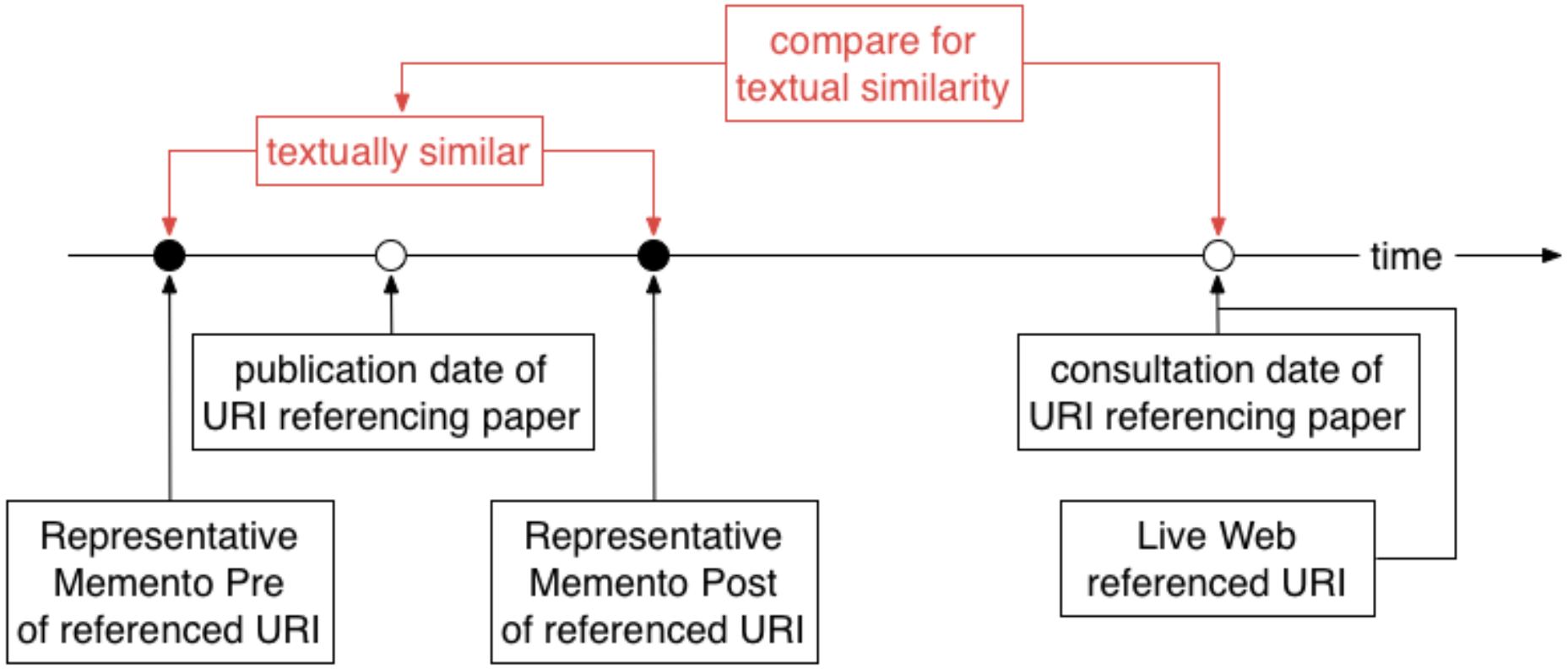


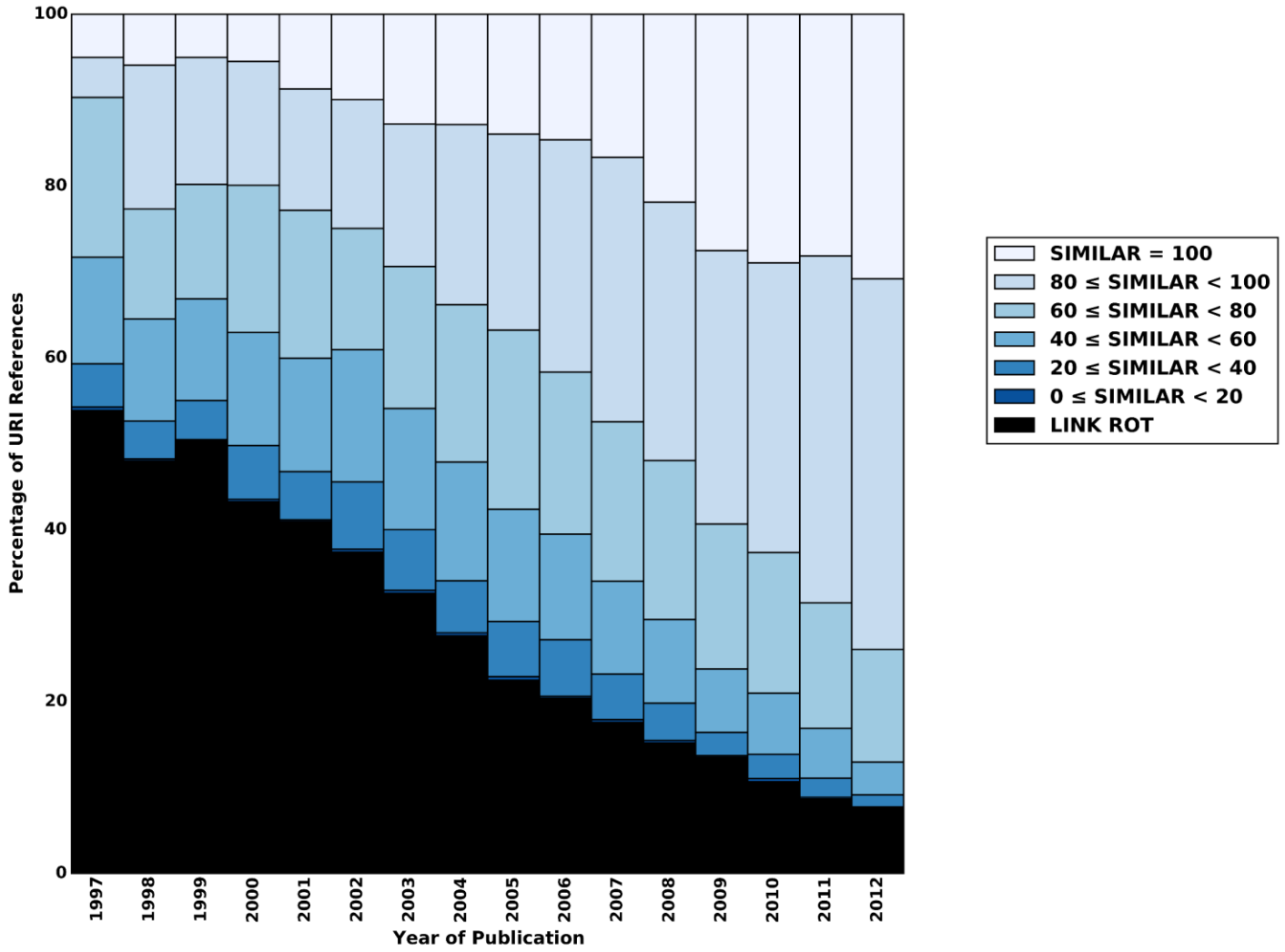
Step 3: Dereference Live Web Version of URI



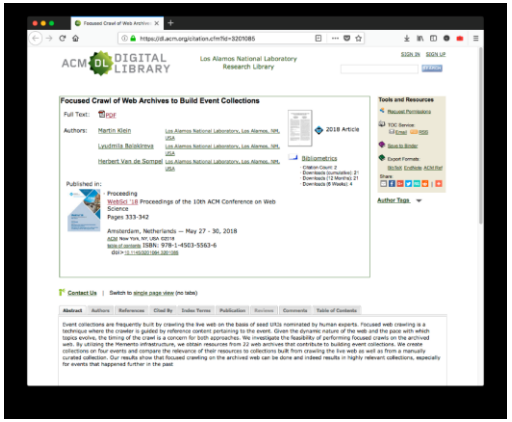
Step 4: Representative Memento vs. Live Version



Content Drift & Link Rot Over Time - arXiv



Research Efforts Enabled by Memento 2/2



Questions asked:

- Can we create event collections by focused crawling online-available web archives?
- How do event collections created from the archived web compare to those created from the live web?
- How does the amount of time passed since the event affect the collections built from the live and the archived web?
- How do event collections built from the archived web compare to manually curated collections?

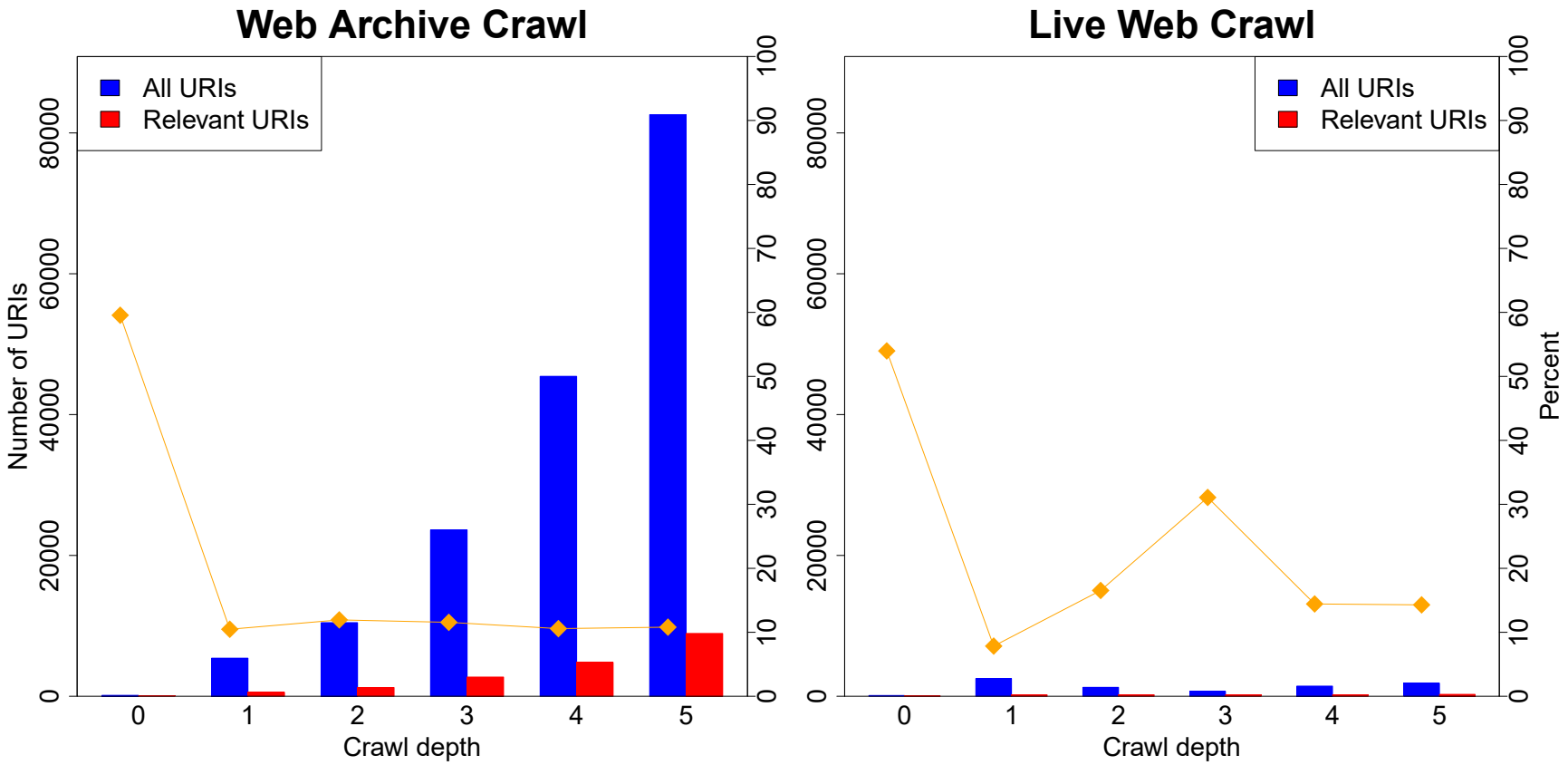
M. Klein et al. “Focused Crawl of Web Archives to Build Event Collections” in WebSci 2018
https://doi.org/10.1145/3201064.3201085

Experiment & Methodology

- Topics limited to terror attacks and mass shootings in the U.S.
- From different times in the past
- Focused crawl of:
  a) 22 archives, simultaneously, via Memento aggregator infrastructure
  b) the live web
- Take content and temporal relevance into account, equally weighted
- Use events' Wikipedia page - around the time of the event - and its references as input for focused crawler
  - URIs as seeds
  - Content for relevance assessment

Inspired by: G. Gossen et al. "Extracting event-centric document collections from large-scale Web archives", TPDL 2017, https://doi.org/10.1007/978-3-319-67008-9_10

TUC, 01/08/2011 – URIs per Level



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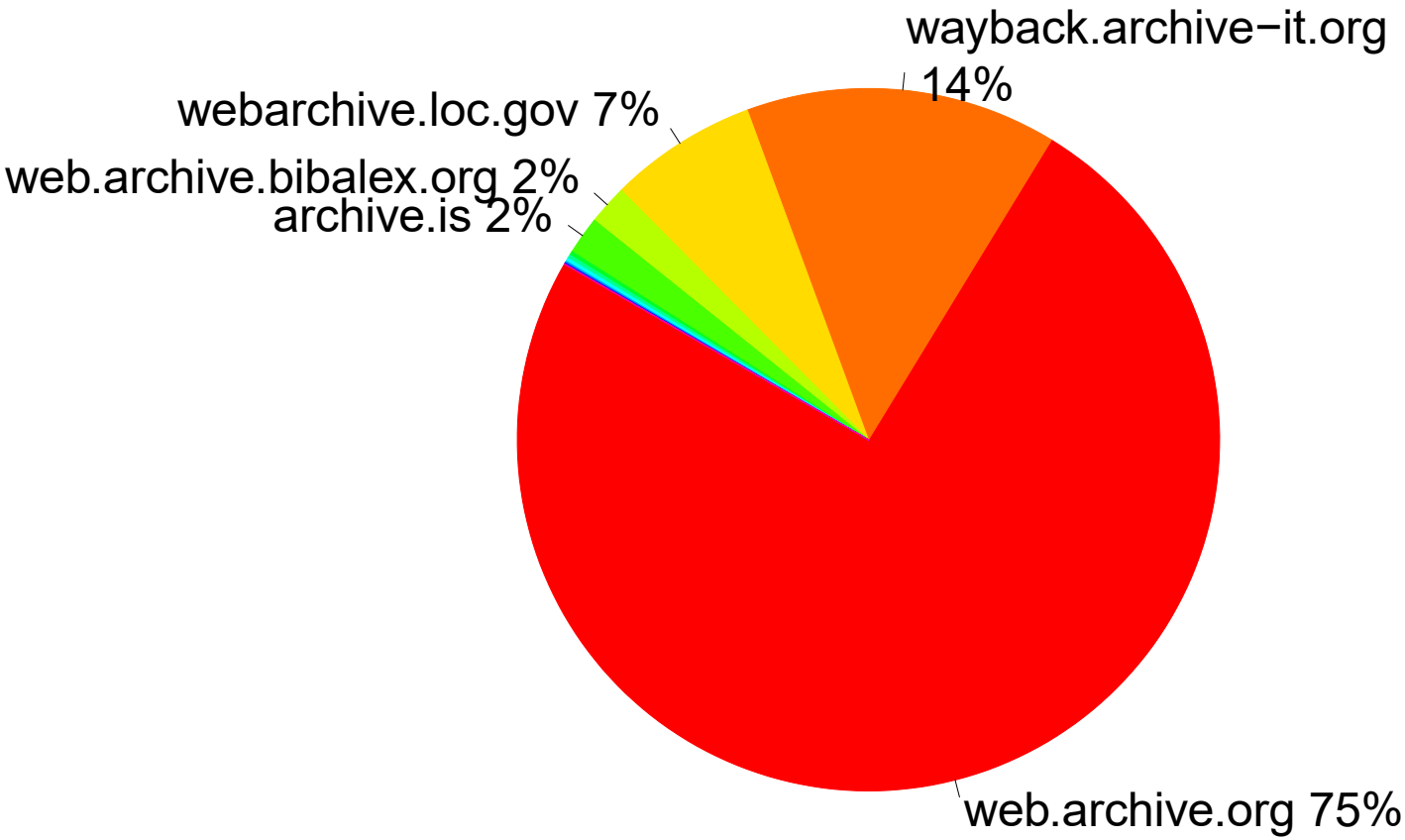
TUC, 01/08/2011 – Web Archive Contributions



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https://doi.org/10.1145/3201064.3201085

Limitations

- Memento is about URI and datetime
  - No search and TDM across archives
- Dark archives & personal archives commonly not accessible
  - Technical and political issues
- NZL, AUS, WebCitation, Wikipedia not Memento-compliant (we have the tools)

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