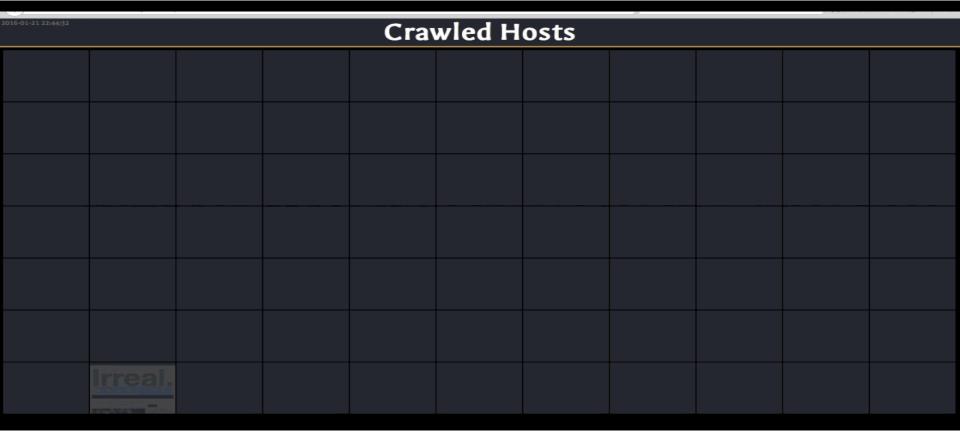
Web archiving: practices and options for academic libraries



Helen Hockx-Yu, Director of Global Web Services, Internet Archive



Outline

- Web archiving basics
- Web archiving landscape
- Key approaches & challenges
- The Internet Archive
- Case studies
- Web archiving options for academic libraries
- Key considerations



Web archiving basics

- What: selecting, capturing, storing, preserving and managing access to Web resources over time
 - Notion of longevity, authenticity, reliability and future usefulness of archival material
 - Stewardship traditionally associated with libraries and archives
- When: started by the Internet Archive in 1996
- How:
 - Use crawler software to download Web resources automatically
 - Stored in archival formats
 - Provide access in Web archives by replaying archived content



Why and Who?

Why?

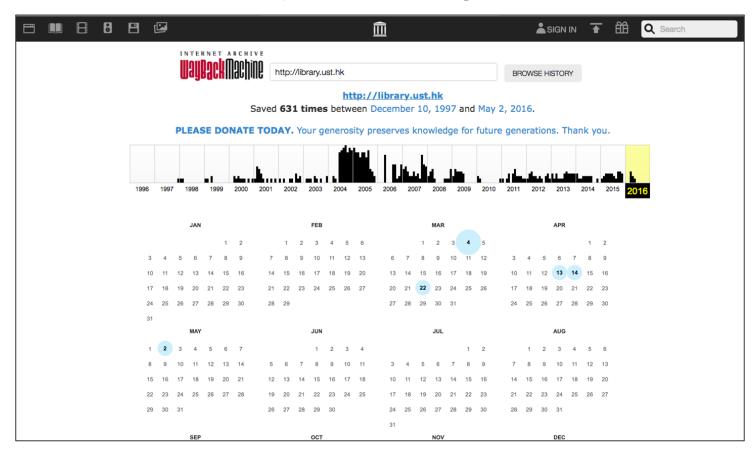
- Global information resource but ephemeral by nature
- Published national heritage: legal deposit
- Historical and sociological data that may not be found elsewhere: research value
- Government / corporate records
- Regulatory compliance, litigation readiness
- Preservation of scholarly citation

Who?

- Heritage and memory institutions
- Governments
- Scholarly organisations such as academic libraries
- Not-for-profit and commercial organisations
- Activists
- Individual researchers

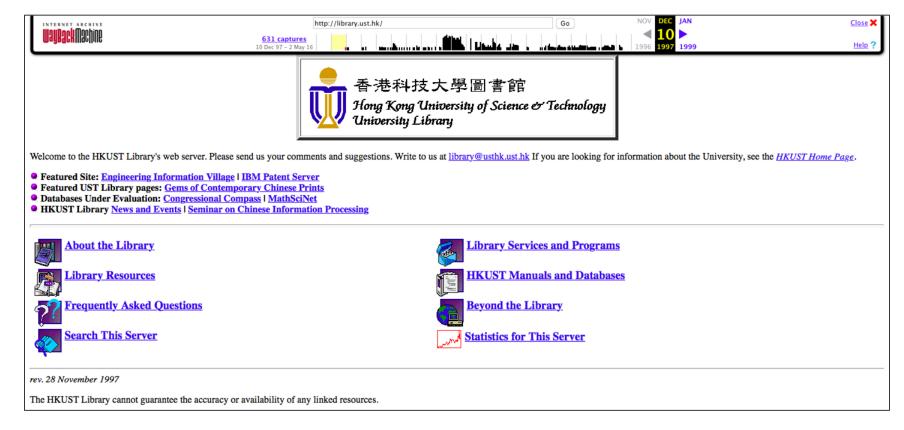


HKUST Library homepage 1997 - 2016

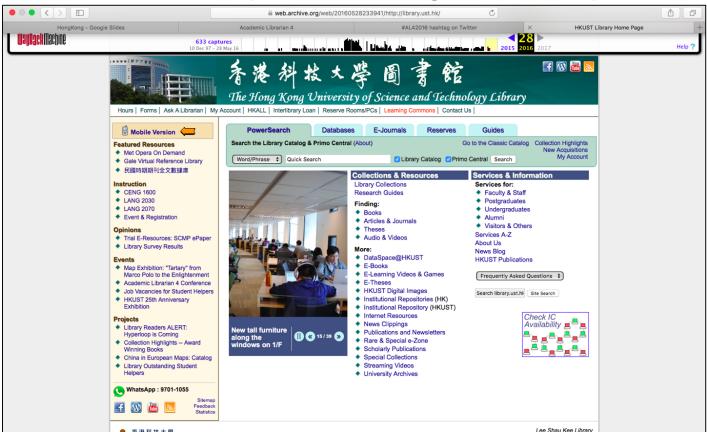




HKUST Library homepage 10 Dec. 1997



HKUST Library homepage 28 May 2016



Web archiving landscape (1)

- Internet Archive's Wayback Machine
 - Largest and oldest Web archive in existence
 - Global scale, unrestricted access
- National Web archives
 - Operated by national libraries & organisations
 - Goal is to preserve national heritage
 - 30+ national libraries have web archiving programmes
- Government and corporate Web archives
 - Preserving records
 - UK Government Web Archive
 - Websites Archives of EU Institutions



Web archiving landscape (2)

- Research-driven Web archives
 - Mostly operated by university libraries
 - The Human Rights Web Archive
 - Digital Archive for Chinese Studies
- Efforts of individuals and small groups
 - Archive Team
 - Dale Askey Archive
- Web archiving service providers
 - Archive-It & Internet Memory Foundation
 - Collections open to everyone
- Commercial services: e.g. <u>Hanzo</u>
 - Closed
- International Internet Preservation Consortium (IIPC)
 - High concentration of use of technology and practice



Collecting strategy

- Broad crawls of global or national Web
 - Cannot collect everything
 - Arbitrary boundaries
- Selective archiving
 - Subset of a national domain, e.g. .gov.uk
 - Thematic, events-based collections
 - Focuses on resources considered to be particularly valuable or relevant to an organisation's collecting remit
 - Requires additional resource
- Many use a combined strategy of domain and selective archiving

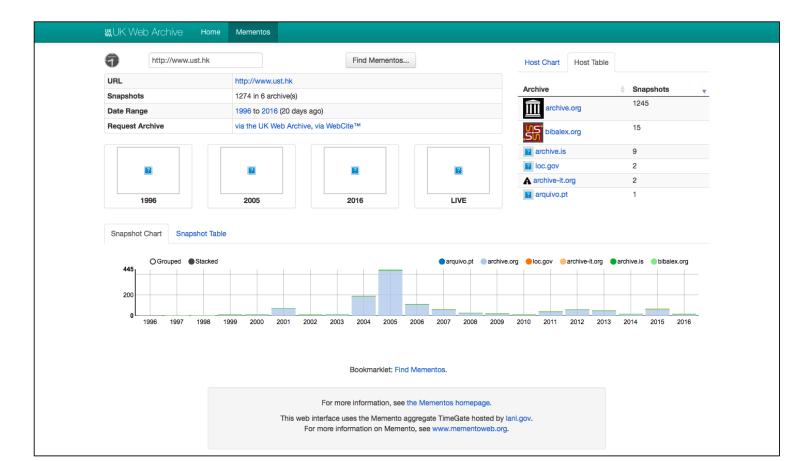


Open source technology

- Heritrix: Web crawler crawls and captures web pages
- Umbra: Assists the crawler to access social media and other sites in the same way a browser would
- Wayback: Access tool for rendering and viewing pages - surf the web as it was
- NutchWAX & SOLR: Full-text and metadata search engine
- WARC: ISO standard for storing Web archives



Who archived what? - Memento look-up service



Conceptual challenges

- Existing concepts, legislation, network...
- Different from traditional archives, not just because it contains digital content
- Different from "live Web" and digitised material, considered as "reborn" by <u>Brugger & Finnemann</u>
- Blurred distinction between "publications", "grey literature", and "records" - confusion around responsibilities
- Additional boundary issues
 - The Web never ends
 - National approach to archiving global Web



Technical challenges

- Content gaps in Web archives
 - JavaScript, streaming & downloadable media, password protected & paywall content, form and database driven content, robots.txt exclusions
 - Social media: Twitter, YouTube, Facebook...
- Scale
 - Full-text search
- Complexity throughout the end to end web archiving process
 - Temporary inconsistency
- Benchmarking
 - How do you know if you have done a good job?
- In an arms race with Web technology



Legal challenges

- Copyright
- Libellous or defamatory content
- Illegal content
- Personal data
- "Rights to be forgotten"
- Robots.txt
- Notice and take-down



Curatorial & organisational challenges

- Web archiving requires a hybrid of skills
 - Not supported by existing organisational structure
- Collaboration adds complexity
- Selection
 - o Bias?
 - Gaps and overlap
- Authenticity
- Curation largely manual & does not scale up
 - Quality Assurance (QA)
 - Descriptive metadata
- Growing costs



Access & use challenges

- Comprehensiveness versus openness
- URL-based discovery, focus on replaying "text"
- Very little is explained or explicitly stated beyond HTML
 - The Unknown Aspects of Web Archives
- Not enough versus too much
 - Pre-selected or defined collections not relevant to all researchers;
 difficulty in finding relevant content in large scale web archive
- Methodological challenges
 - Revealing British Euroscepticism in the UK Web Domain and Archive Case Study
 - Using web archive as primary source: speculative and experimental
 - Unexpected pitfalls and challenges
 - Digital methodology: necessary requisite?
 - Goodle mindset

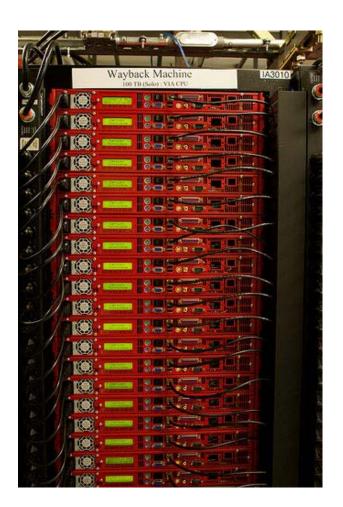




90,000 Software Titles 2,000,000 Moving Images 2,300,000 Book Archive 2,400,000 Audio Recordings **3,000,000** Hours of 4,000,000 Television 472,000,000,000 eBooks Web Captures 25,000,000,000,000 Bytes Archived (25 PetaBytes)

Petabox storage system





Web scale preservation

- Ongoing crawls incl. snapshot of the global web; wikipedia, news, RSS feeds, YouTube etc.
 - 1 billion URLs/week
- Save Page Now
- Also receives donation of crawl data from comp
- Wayback Machine, access service to Internet Archive's Web archive collections
 - Released in 2001
 - 480+ Billion URLs, 100+ million websites
 - Content in 40+ Languages
 - 600,000 visitors / day
- A Ple https://archive.org/holp/wayback_api.php





Libraries and archives partnership

- Have worked with many national libraries / archives since 2000
- Crawling of national domains and building thematic collections
- Tailored to partners' requirements
- Identify and collect in-scope content outside country code top level domains (ccTLDs)
- Comprehensive coverage of national domain, e.g 546 million unique .nz URLs for NLNZ versus 273 million through other crawls
- Deliver bulk data + metadata, index, reports and datasets



Support Open Source Software

HERITRIX

Home

Collections

rawls

es .

Help

Home

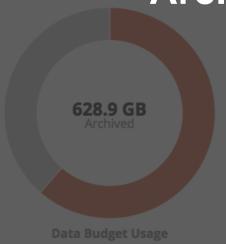
Archive-It Demo Account

3.6 TB archived since Sep 22, 20

Current Subscraft Archive-It: ait@archive.org

Create a Collection

♣ Download Collection List



Collection Name	Data (this period) 🕶	Docs (this period)	Active Seeds	Last Crawl
Archive-It Websites and Press	72.4 GB	1,187,978		
2015 United Nations Climate Ch	42.6 GB	726,589		Dec 10, 2015
	1.9 GB		13	Dec 27, 2015

Archive-It

- Subscription service launched in February 2006
- Fully hosted web application for creating, managing accessing and storing web archive collections
- Captures HTML, PDF, Twitter, YouTube...
- Support for cataloguing and metadata
- Browse archived content 24 hours after capture; full-text search available within 7 days
- Private access option



Archive-It partners

- 400+ partners worldwide
 - Including universities and colleges, state archives and libraries, museums and art galleries, public libraries and local governments, national organisations, NGOs...

Motivation

- Create a thematic/topical web archive on a specific subject or event
 - Often related to traditional collecting activity around the same focus
- Fulfill a mandate to capture/preserve evolving web history
 - Meet records retention requirements
 - Capture publications/documents that are no longer in print form
 - Construct a historical record of an institution or individual's web/social media presence over time



University of Texas at Austin: LAGDA

- Archive government documents from 18 different countries in Latin America
- Content includes:
 - Full-text versions of official documents
 - Original video and audio recordings of key regional leaders
 - Thousands of annual and "state of the nation" reports
 - Specific collections for Latin American elections and
 political parties



Honduras Presidential site 2008 (before the Coup)

You are viewing an archived web page, collected at the request of University of Texas at Austin Libraries, Latin American Government Documents Archive using Archive-It. This page was captured on 22:37:09 Dec 15, 2008, and is part of the Latin American Government Documents Archive, LAGDA collection. The information on this web page may be out of date. See All versions of this archived page. Luchemos y salvemos la naturaleza, Casa Presidencial el momento es hoy, mañana será HONDURAS demasiado tarde Pagina Principal Correo Institucional CANAL 8 - RED INFORMATIVA Hoy es: .Videos Petrocaribe y Petroalimentos December 15, 2008 Logros Menu Principal Poder Ciudadano Navegación **Presidente Zelaya** Encuesta Video de la Semana Logros Gobierno **ULTIMAS NOTICIAS** IXV Asamblea en New York Multimedia (ONECA) En 183 Aniversario del Ejército PRESIDENTE ZELAYA DESTACA Prensa NUEVO ROL DE LAS FUERZAS ARMADAS En Contacto Tegucigalpa. En el marco del 183 Para Tu Informacion >> aniversario del Ejército de Honduras, el Ministro de Defensa, Aristides Mejía, Presidente Zelaya anunció una inversión de 20 millones de lempiras para restaurar la sede de los HONDURAS: PAIS ABIERTO A batallones, la ampliación del hospital LA INVERSION EXTRANJERA militar del Norte y la presentación de un nuevo uniforme para los hombres de verde olivo. **HONDURAS: A COUNTRY** Usted es el Visitante Numero: **OPEN TO FOREIGN** INVESTMENT **EJECUTIVO RESPALDA CUALQUIER** 157,456 ACTO DE RECUPERACIÓN DE LAS

Honduras Presidential site in 2009 (during the Coup)

You are viewing an archived web page, collected at the request of University of Texas at Austin Libraries, Latin American Government Documents Archive using Archive-It. This page was captured on 20:32:26 Sep 19, 2009, and is part of the Latin American Government Documents Archive, LAGDA collection. The information on this web page may be out of date. See All versions of this archived page.

hide

Red Hat Enterprise Linux Test Page

This page is used to test the proper operation of the Apache HTTP server after it has been installed. If you can read this page, it means that the Apache HTTP server installed at this site is working properly.

If you are a member of the general public:

The fact that you are seeing this page indicates that the website you just visited is either experiencing problems, or is undergoing routine maintenance.

If you would like to let the administrators of this website know that you've seen this page instead of the page you expected, you should send them e-mail. In general, mail sent to the name "webmaster" and directed to the website's domain should reach the appropriate person.

For example, if you experienced problems while visiting www.example.com, you should send e-mail to "webmaster@example.com".

For information on Red Hat Enterprise Linux, please visit the <u>Red Hat, Inc. website</u>. The documentation for Red Hat Enterprise Linux is <u>available on the Red Hat, Inc. website</u>.

If you are the website administrator:

You may now add content to the directory /var/www/html/. Note that until you do so, people visiting your website will see this page, and not your content. To prevent this page from ever being used, follow the instructions in the file /etc/httpd/conf.d /welcome.conf.

You are free to use the image below on web sites powered by the Apache HTTP Server:

[Powered by Apache]

Honduras Presidential site in 2010 (after the Coup)



Columbia University Libraries: the Human Rights Web Archive

- Based at the Center for Human Rights Documentation & Research, Columbia University Libraries
- Existing commitment to collecting physical archival material from human rights organisations and activists
- Also wanted to collect born-digital outputs
- At-risk status of human rights organisations and their websites
- Received support from Mellon Foundation: exploratory, implementation and project grants
- Mainly funded by the University since 2013
- Sustainability
 - Mellon support allowed for dedicated staff
 - Existing expertise and engagement
 - Commitment to maintaining and growing collection



HUMAN RIGHTS WEB ARCHIVE

CENTER FOR HUMAN RIGHTS DOCUMENTATION & RESEARCH AT COLUMBIA UNIVERSITY

BETA

LEARN MORE -

NOMINATE A SITE -

CONTACT

SEARCH HISTORY

Showing item 1 of 1.

Amnesty International

Creator

Amnesty International. International Secretariat

Organization

Non-governmental organizations

Organization United Kingdom Based In

Geographic Focus

Global focus

Subjects

Human rights; Capital punishment; Torture; Civil rights; Political persecution; Political prisoners

Summary

Provides information on various aspects of human rights issues: latest news and information by country and region, photos, and, Al campaigns. Includes information about the organization: mission statement, annual reports, urgent actions, and library (archived reports, news releases). Access provided to a search engine, and links to related sites.

Languages

English; Spanish; French; Arabic



View site captures for http://www.amnesty.org

Email This

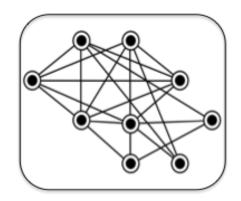
Contact • Problem Report • Terms of Use

Columbia University Libraries 2012

Web Archive Datasets



WAT Datasets
(Web Archive
Transformation)
Key Metadata from Every
Resource



LGA Datasets
(Longitudinal
Graph Analysis)
What Links to What
over Time



WANE Datasets
(Web Archive
Named Entities)
Names of People, Places,
Organizations





Archive-It Research Services

http://bit.ly/ait_ars

October 2014 entities – Columbia U.'s Human Rights collection (~4M docs; 330GB)

TOP 6 People Entities (of 1,887,523)







Ilham Tohti



Julien Asssange



George W. Bush



Pu Zhiqiang



Bashar al-

TOP 6 Organisations (of 1,335,232)







HUMAN RIGHTS WATCH

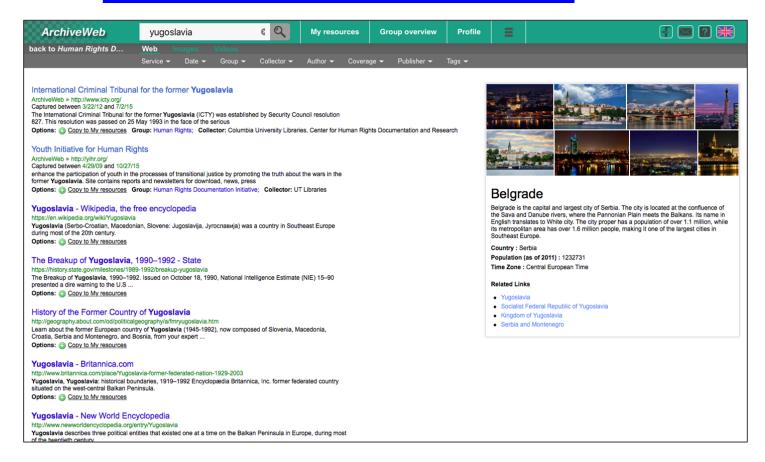


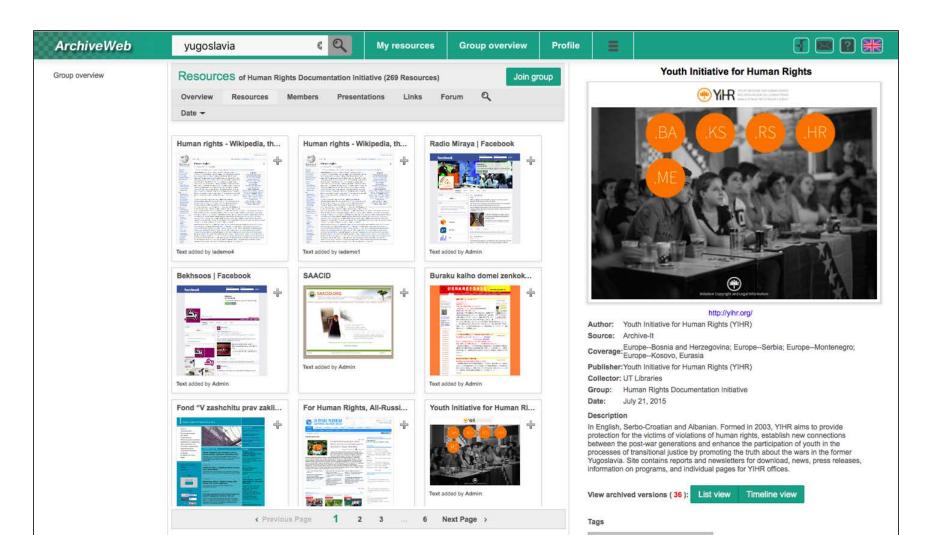


TOP 9 Locations (of 373,155)



ArchiveWeb Interface





Restoring a lost domain

By Dr Anat Ben-David (@anatbd) of the Open University of Israel

Archival reconstruction of the Yugoslav Internet domain

.yu deleted from the internet root zone on 20 March 2010

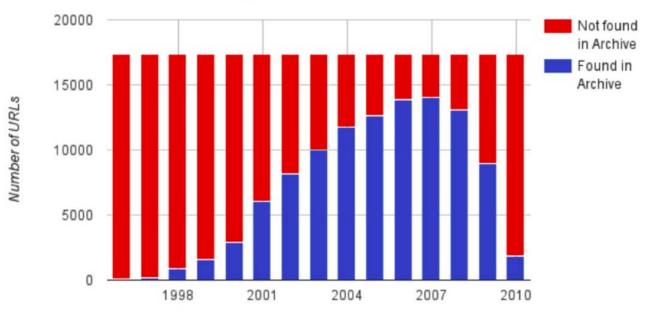
Hosted 70,000 websites at its peak

Used various sources to generate a list of URLs in .yu domain incl. wikipedia

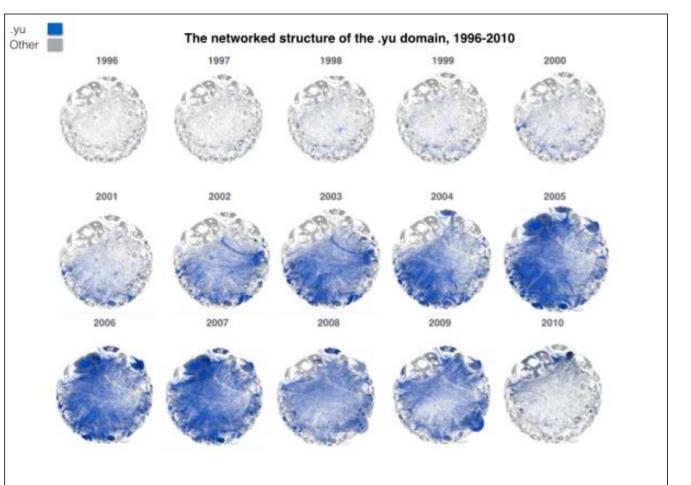
Extracted outlinks to .yu from archived pages in the Wayback Machine

Recovered dataset contains 1.92 million unique pages once hosted in the .yu domain between 1996 and 2010

Archival coverage of the reconstructed dataset



Year



More information

On reconstruction of .yu

https://webarchivehistorians.org/2015/09/07/what-does-the-webremember-of-its-deleted-past/

http://www.slideshare.net/anatbd/resaw2015-bendavidpresentation

http://www.bbc.co.uk/programmes/p031zp5y 00:34 - 7:09

Web Archives for historians

Historians who use, think about and work with web archives



Typology of research interest

- Documentary: Evidentiary, Attestation, Legal discovery/claim
- Social/Political Scientists: Communications, Politics/Government, Social Anthropology
- Web Science: Technology Systems and Protocols
- (*Digital*) *Humanities*: Historians and humanities disciplines, networks, collection building
- Computer Science: Information Retrieval, Data Processing and Indexing, Infrastructure and tools
- Data Analysts: Mining/Training, language processing, trend analysis, NLP/NER



Sample Research Partnerships















NATIONAL ENDOWMENT FOR THE HUMANITIES



















The academic library has died?

- The academic library has died," ... "One reason for cause of death is that library buildings were converted into computer labs, study spaces and headquarters for informational-technology departments." - Brian Sullivan, librarian at Alfred University
- No denying the academic library as we know is changing
- Still need to support teaching, learning and research
- Cannot walk away from the Web



Web archiving options

- In-house operation
 - High entry barrier
 - Maintenance of technical infrastructure
 - Ongoing tools development & user support
 - Staff expertise and training
- Outsource
 - Few service providers
 - Less control
- In-house + outsource
 - Operate core components in-house
 - Use existing web archives (e.g. API)
- Collaboration
 - E.g. centralised infrastructure and technical services, distributed collection development

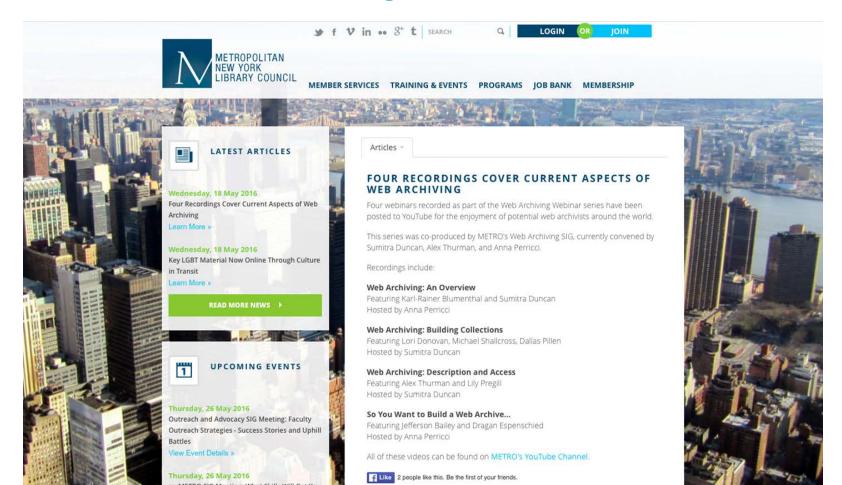


Key considerations

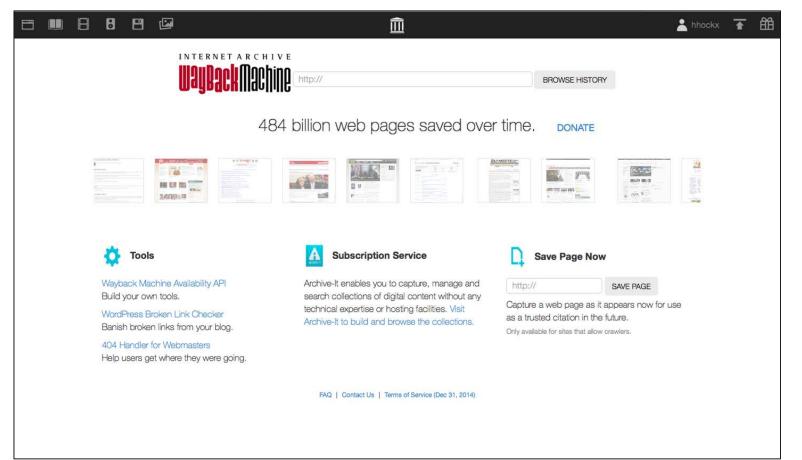
- Make informed decision on why / why not?
- Do your homework: e.g.
 - Web Archiving Environmental Scan
 - DPC Technology Watch Report: Web Archiving
- What resources are available?
 - Curatorial and technical
- Determine a collecting strategy
 - Examine existing collection policies
- Determine an operational model
 - Outsource + collaboration allows you to gain knowledge and experience part of learning process
- Appraise tools and services
- Know your rights and risks
- Run pilot, start small and progress
- Consider access, use, long term preservation and SUSTAINABILITY



Web archiving webminar series



Save Page Now



Perma CC

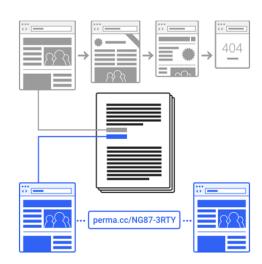
Perma.cc

About Perma.cc Guide Blog Sign up Log in

Websites change. Perma Links don't.

Perma.cc helps scholars, journals, courts, and others create permanent records of the web sources they cite.

Perma.cc is simple, free to use, and is built and supported by libraries.



Sign up and use Perma.cc for free

How can my library get involved?

20 Years of Web Archiving

- A portion of the web has been preserved
- Increasing awareness and growing community
- High concentration of use of technology and practice
- Legal issues much better understood
- Scholarly use of web archives start to emerge
 - Maximise transparency and make base-line knowledge self-explanatory
- Focus on derivation, portability, and access
- Focus on scalable partnerships & decentralisation
- Use standards and web technology
- Full potential of web archives yet to be exploited



THANKS! Helen Hockx-Yu, Internet Archive (helen@archive.org)

Crawled Hosts										
	Irreal.									