LOTS OF COPIES KEEP STUFF SAFE

Lots of LOCKSS Keeping Stuff Safe: The Future of the LOCKSS Program

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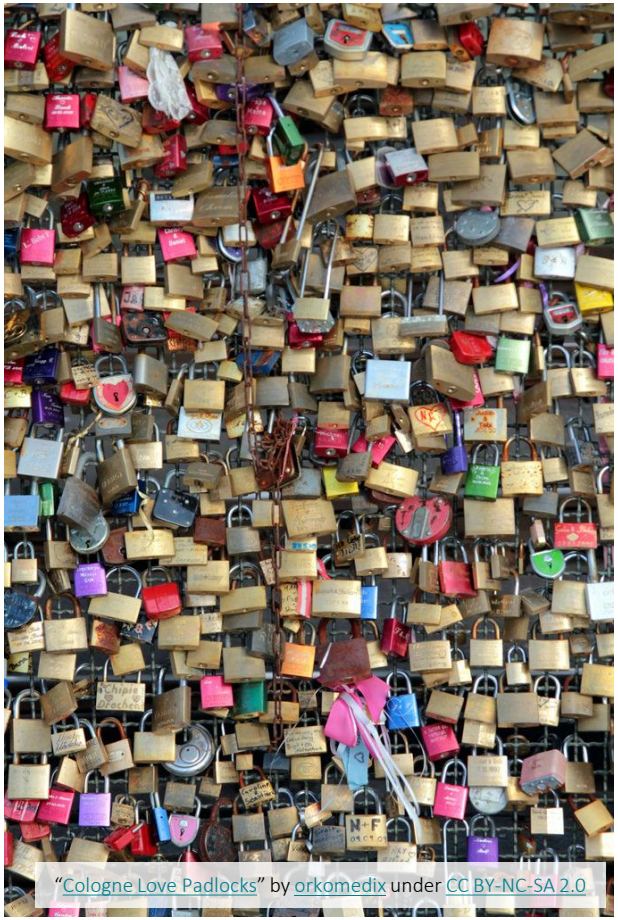
why more LOCKSS?

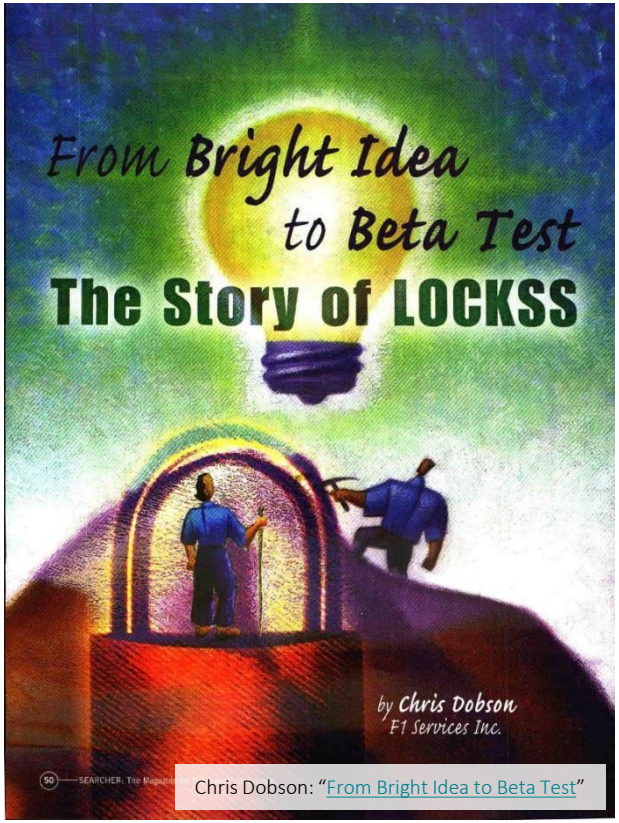
- mature, **community-validated** technology
- research-based + built to a specific **threat model**
- **web-centric preservation** for web-centric scholarship
- **community-centric preservation** for collective challenges + opportunities
- robust, **distributed** digital preservation



Program History

inception

- a serials librarian + a computer scientist
- print journals → Web
- **conserve library's role** as preserver
  - **collect** from publishers' websites
  - **preserve** w/ cheap, distributed, library-managed hardware
  - **disseminate** when unavailable from publisher



Chris Dobson: "From Bright Idea to Beta Test"

LOCKSS

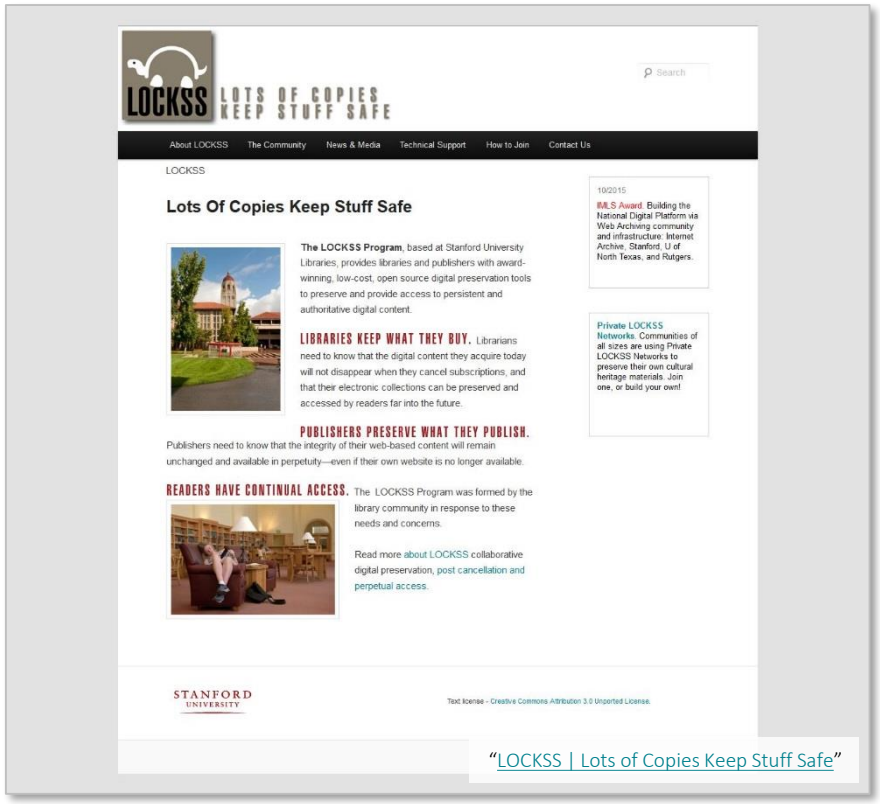
philosophy + focus

- lots of **copies** keep stuff safe
- preservation is an **active** community effort
- lots of **communities** keep stuff safe
- enable communities to preserve + access **their scholarly record**

LOCKSS

present day

- financially self-sustaining
- tens of networks
- hundreds of institutions
- all types of content



"LOCKSS | Lots of Copies Keep Stuff Safe"

looking forward

- organizational changes
- software evolution
- LOCKSS networks
- distributed digital preservation

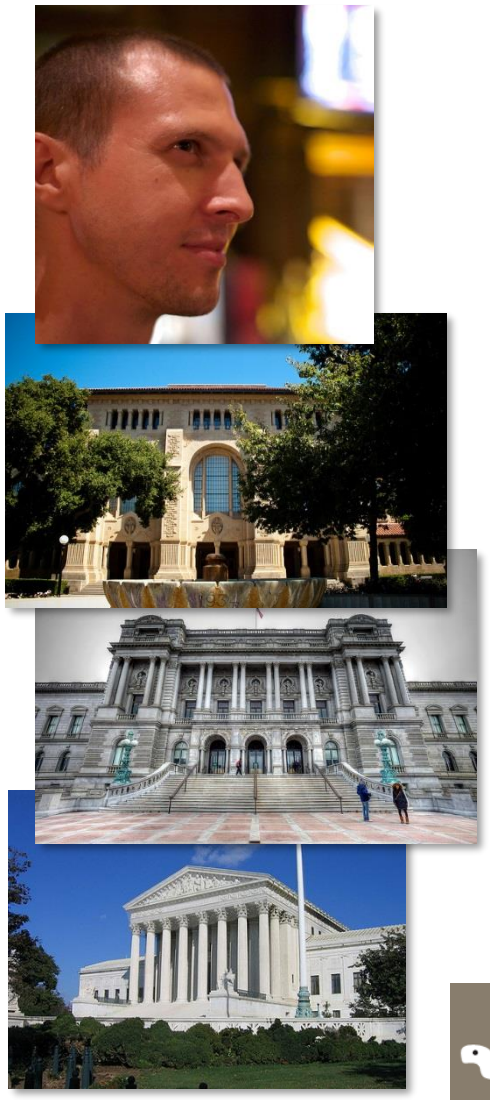
Organizational Changes

David + Vicky

American Library Association: "Victoria Reich and David S.H. Rosenthal"

personal introduction

- 10 years in research libraries:
  - Stanford University Libraries (2013 – present)
  - Library of Congress (2010 – 2013)
  - U.S. Supreme Court (2007 – 2010)
- professional background:
  - web archives
  - digital library services
  - library technology
- what I care about:
  - **scalability + sustainability** of PLNs, CLOCKSS
  - **mainstreaming LOCKSS** for digital preservation
  - building collaborative **technical communities**



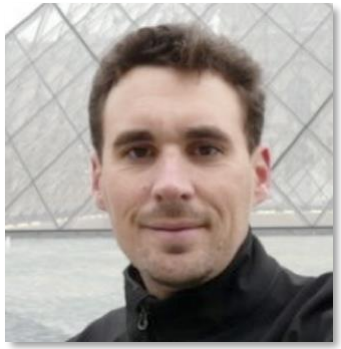
SUL Web Archiving

- end-to-end service:
  - collect
  - preserve
  - make accessible
  - make discoverable
- integrate w/ collection development
- use cases:
  - scholarly inputs/outputs
  - institutional legacy/compliance
  - government information

Internet Archive: "Stanford University Homepage"

LOCKSS + DLSS administrativa

- LOCKSS integrating w/ SUL **Digital Library Systems & Services** (DLSS)
- led by **Tom Cramer**, Director & Associate University Librarian
- LOCKSS + SUL Web Archiving, under **Nicholas Taylor**



"SPO.101514.SLIDERlathrop.jpg" by Michael Hong

LOCKSS + DLSS synergies

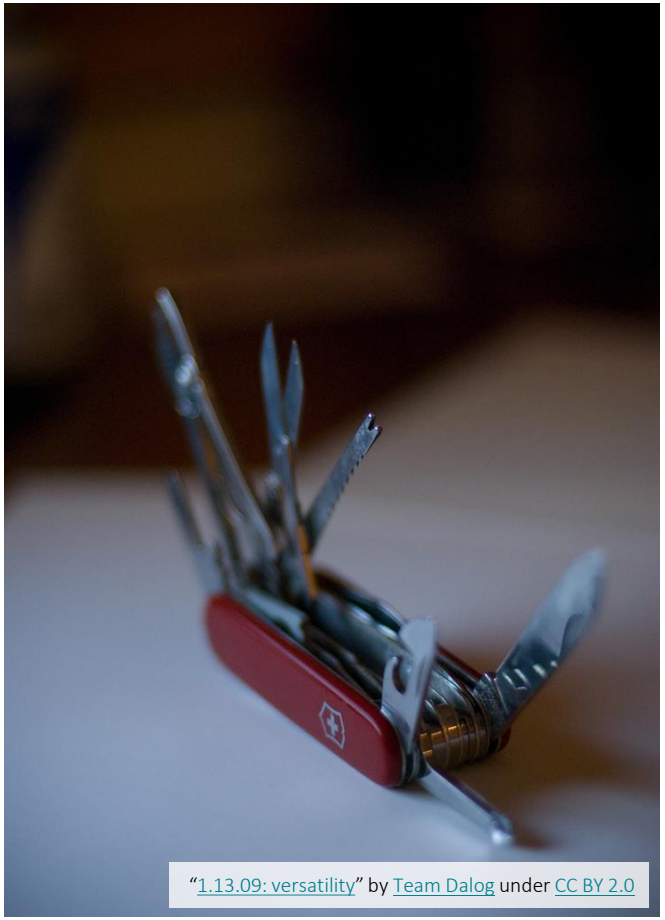
- realize **operational efficiencies**
- adopt, drive shared **engineering best practices**
- promote **API-oriented** architectures
- **streamline** repository → PLN **data hand-offs**
- **contribute upstream** to shared tools
- broaden, diversify **community outreach**

LOCKSS


Illustrator File Edit Object Type Select Filter Effect View Window Help
11:18 4352rpm 51° 71%
Software Evolution
"Why we love our macs" by Jason Corneveaux under CC BY-NC-ND 2.0

new functionality

- supported by Mellon Foundation grant
- ingest/harvest
  - form-filling
  - AJAX
- dissemination
  - Memento
  - Shibboleth
- preservation
  - polling performance



LOCKSS

new architecture

- existing functionality
- discrete components as web services
- incorporate external software

LOCKSS

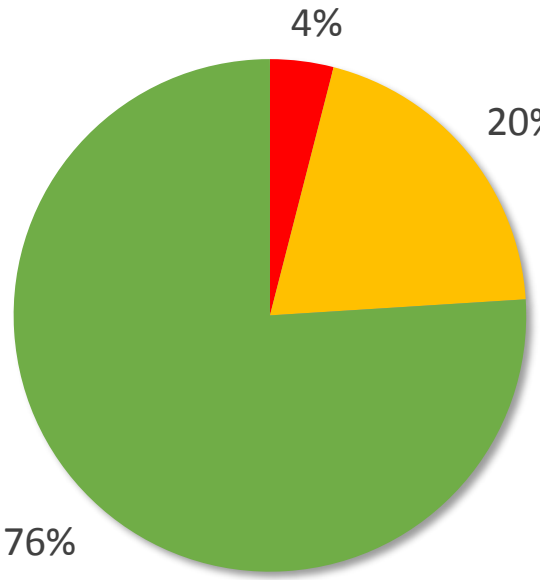
web services imperative

1. “All teams will henceforth **expose their data** and functionality **through service interfaces**.”
2. “Teams **must communicate** with each other **through these interfaces**.”
3. “There will be **no other form of interprocess communication allowed**: no direct linking, no direct reads of another team's data store, no shared-memory model, no back-doors whatsoever.”
4. “**All service interfaces**, without exception, must be **designed from the ground up to be externalizable**. That is to say, the team must plan and design to be able to expose the interface to developers in the outside world.”
5. “Anyone who doesn't do this **will be fired**.”

Steve Yegge: “Stevey's Google Platforms Rant”

risk of large projects

small projects (< $1 million)

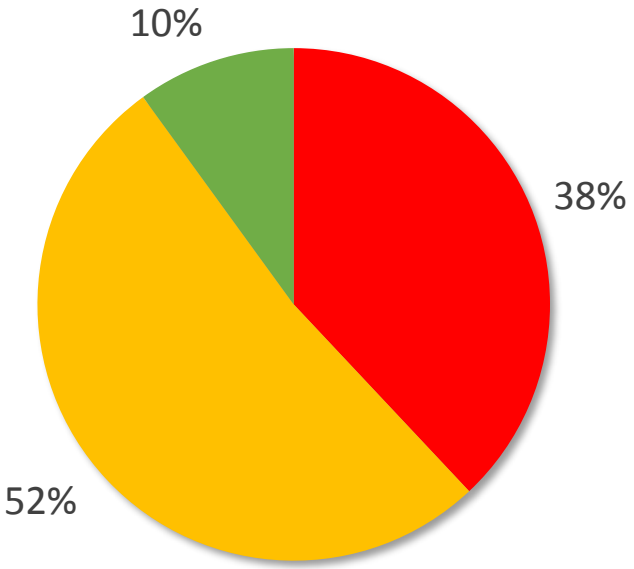


successful (on time, on budget)

challenged (late, over budget, lacking functionality)

failed (cancelled, or delivered and never used)

large projects (> $10 million)



Based on an 8-year survey of 50,000 software projects by the Standish Group.

Standish Group: "Chaos Manifesto 2013: Think Big, Act Small"

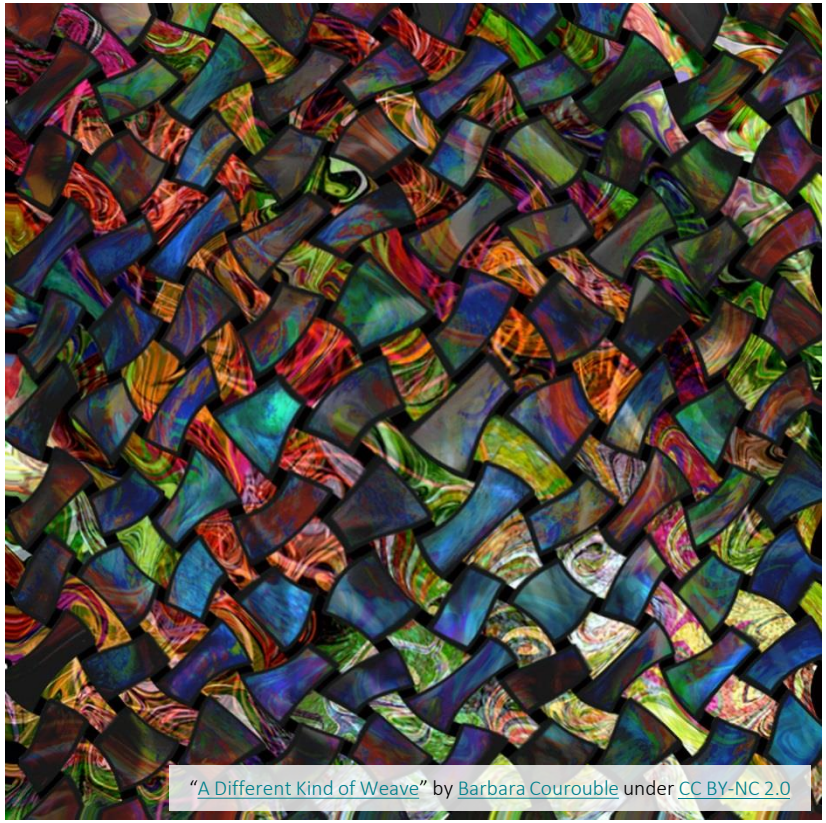
LOCKSS

why re-architect LOCKSS?

- reduce support + operations costs
  - leverage web-scale open-source software
  - align w/ web archiving mainstream
- de-silo components + enable external integration
  - metadata extraction
  - archive access via DOI + OpenURL
  - polling + repair protocol
- prepare to evolve w/ the Web
  - web services architecture as flexible foundation

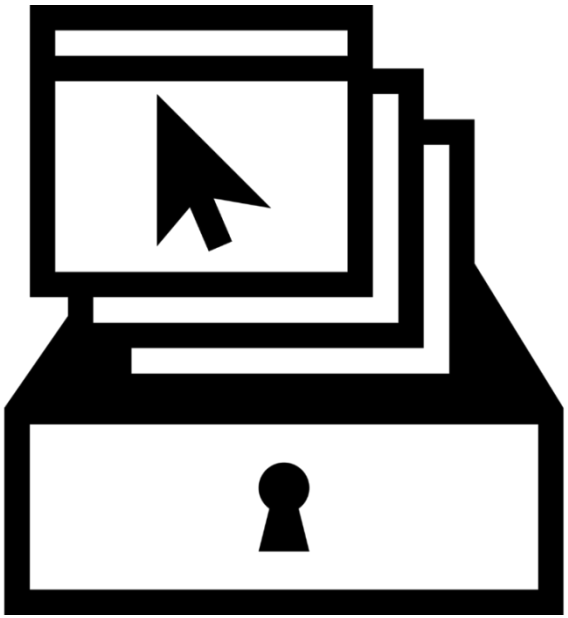
integration opportunities

- polling + repair
  - repository replication layer
  - other distributed digital preservation systems
- access
  - Dockerized full-text search for web archives
  - DOI + OpenURL access to web archives
- metadata extraction



aligning with web archiving

Web ARChive (WARC) format



compatible technologies

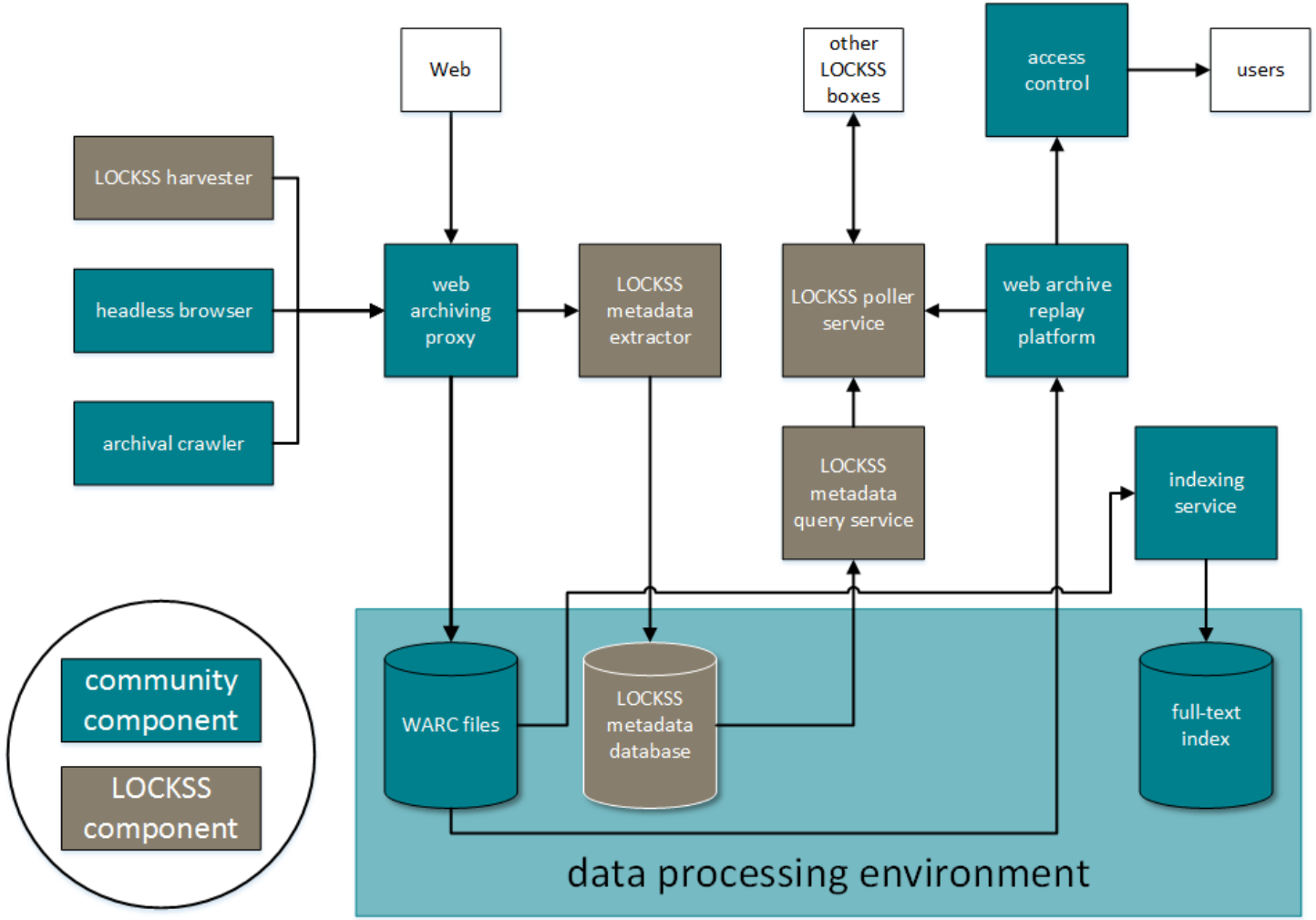
- Heritrix
- OpenWayback
- WarcBase
- Web Archiving Proxy

web archiving system APIs (WASAPI)

National Digital Platform Projects funded in August 2015

Systems Interoperability and Collaborative Development for Web Archiving (LG-71-15-0174-15): The Internet Archive, working with partner organizations University of North Texas, Rutgers University, and Stanford University Library will undertake a two-year research project to explore techniques that can expand national web archiving capacity in several areas.

leveraging community components

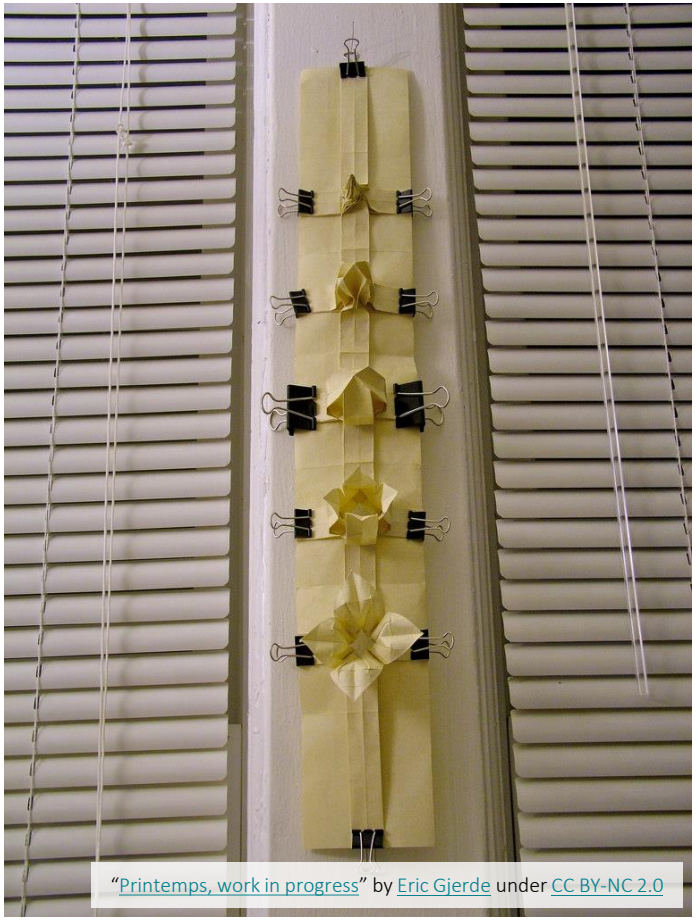


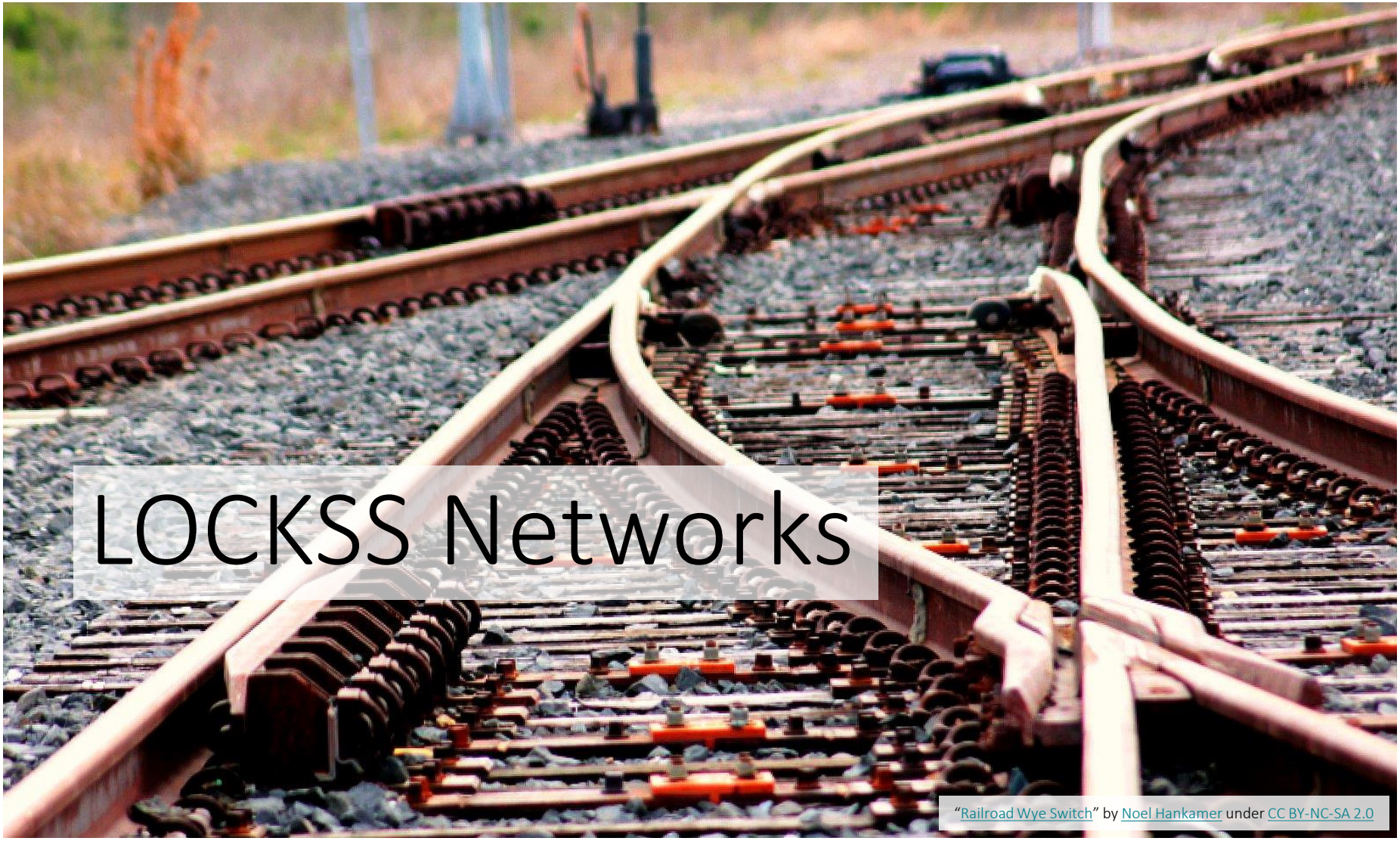
development progress

- access WARC-stored content via:
  - DOI
  - OpenURL
  - URL
  - Solr full-text search
- web services:
  - metadata extraction
  - metadata database

product roadmap

- 2017
  - Docker-ize components
  - web harvest framework
  - polling + repair web service
  - release to PLNs
- 2018
  - IP address + Shibboleth access via OpenWayback
  - OpenWayback format negotiation framework
  - full-text search web service
  - release to GLN





LOCKSS Networks

Controlled LOCKSS (CLOCKSS)

- what is it?
  - library/publisher partnership
  - preserve the scholarly record
  - 12 globally-distributed nodes
  - dark until no longer accessible
  - triggered content world-accessible
- looking forward
  - expand **capacity**
  - increase pursuit of **long tail**
  - champion **standards** to simplify archiving (e.g., Signposting)

LOCKSS

Private LOCKSS Networks (PLNs)

- what are they?
  - community of interest
  - jointly designate content
  - run distributed nodes
  - establish governance
  - preservation via diverse technologies, institutions, networks
- looking forward
  - create **documentation**
  - enable **self-setup**
  - support **community collaboration**
  - preserve **web archives**

SAFE PLN
SAFE Archiving FEderation

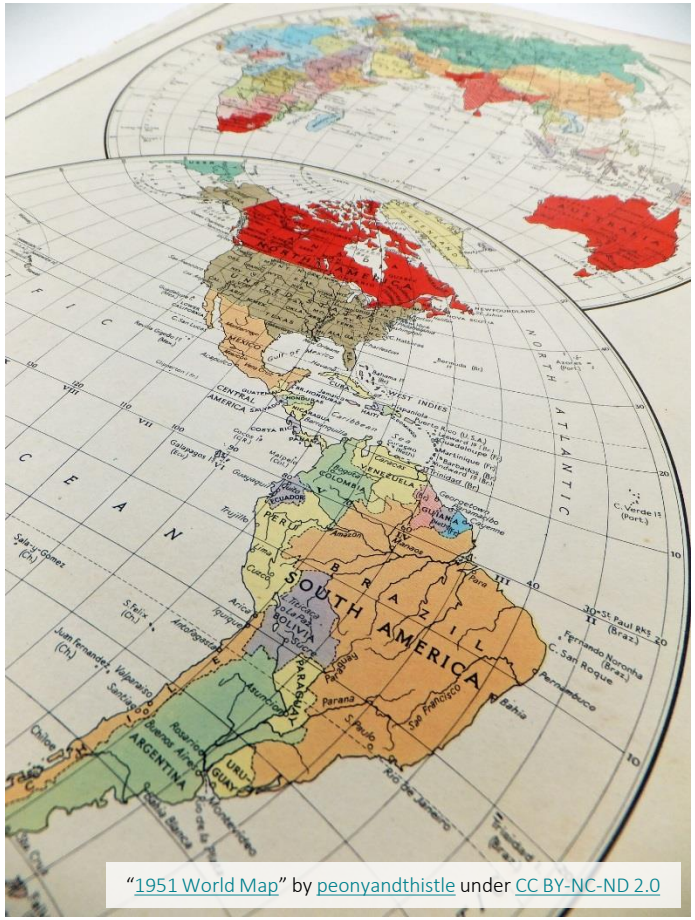
COPPUL | Council of Prairie and Pacific University Libraries

PKP
PUBLIC KNOWLEDGE PROJECT

THE ALABAMA DIGITAL PRESERVATION NETWORK
PRESERVING ALABAMA'S DIGITAL RESOURCES

national networks

- what are they?
  - in-country preservation
  - local stewardship
  - perpetual access
  - non-consumptive use
- looking forward
  - more **networks**
  - preserving **national long-tail content**



Distributed Preservation

distributed preservation landscape

- better understanding of role of distributed dark archives
- next logical step beyond mature local preservation
- appealing option for those w/o mature local preservation

ACADEMIC PRESERVATION TRUST

CHRONOPOLIS

DPN

THE DIGITAL PRESERVATION NETWORK

LOCKSS

MetaArchive

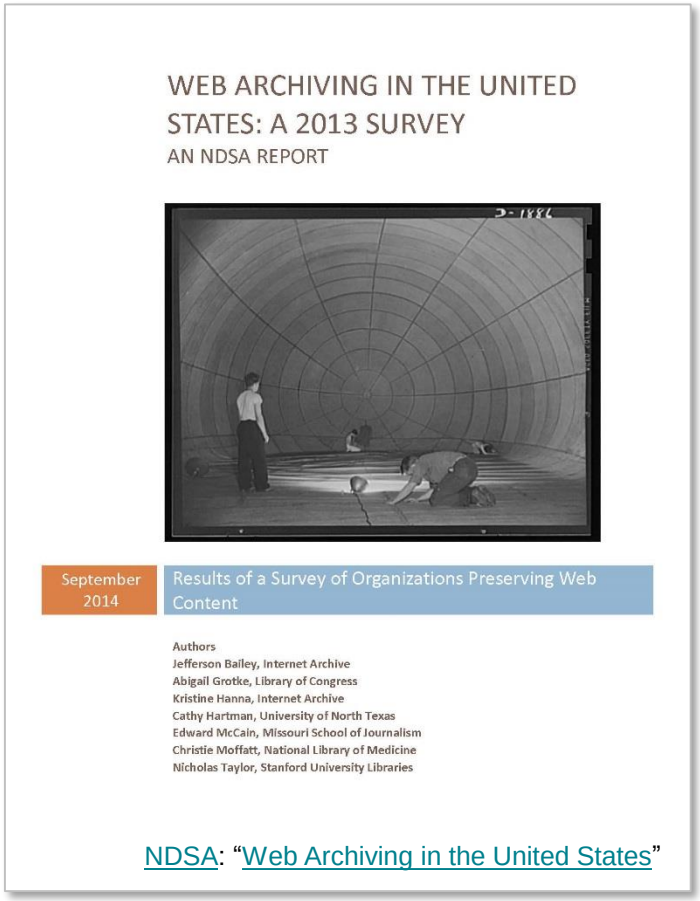
LOCKSS

a greater role for LOCKSS?

- bolster existing efforts
- undergird PLN service providers
- mainstream distributed digital preservation

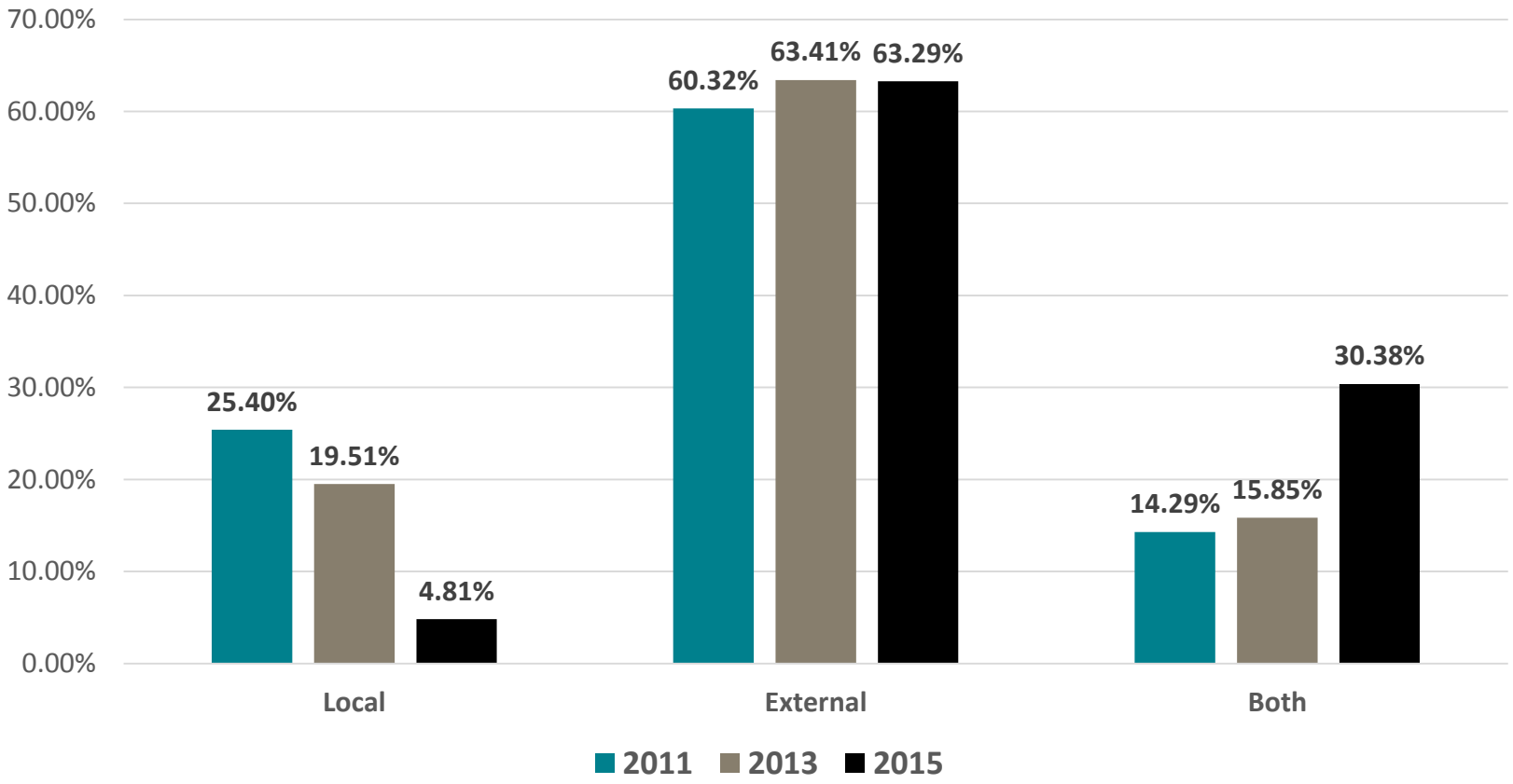
LOCKSS for web archiving

- growth in web archiving
- centralization in web archiving
- native WARC support
- logical complement for web archive preservation



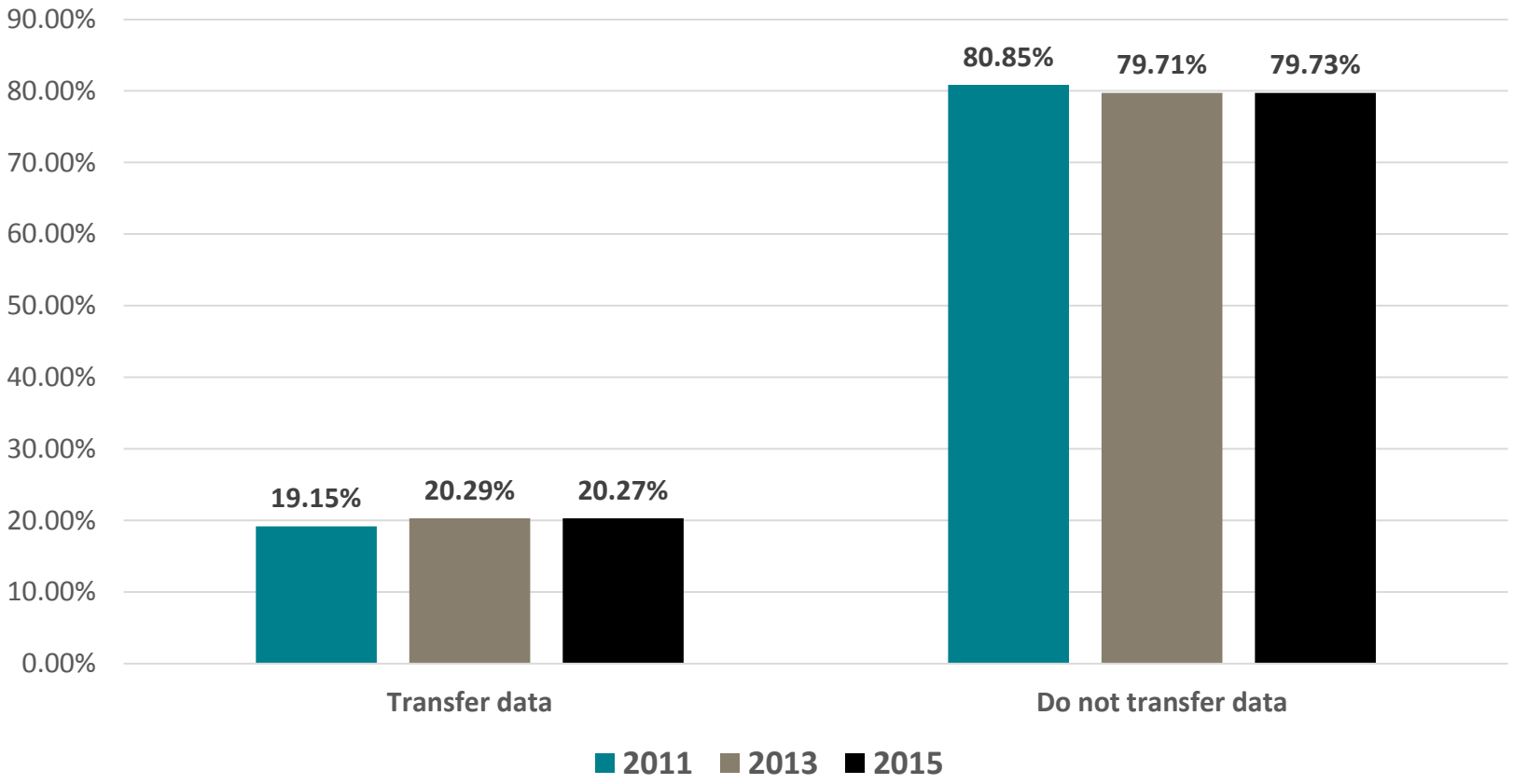
NDSA: "Web Archiving in the United States"

reliance on service provider



NDSA: "2016 NDSA Web Archiving Survey"

flat data transfer trend



NDSA: "2016 NDSA Web Archiving Survey"

vision

- better ensure the **preservation of web archives**
- LOCKSS team more actively engaged in **community-supported development efforts**
- communities enabled to **more easily contribute to LOCKSS software**, or run it w/o our help
- a **longer tail of institutions** able to capitalize on distributed digital preservation
- LOCKSS components applied in **contexts other than LOCKSS networks**