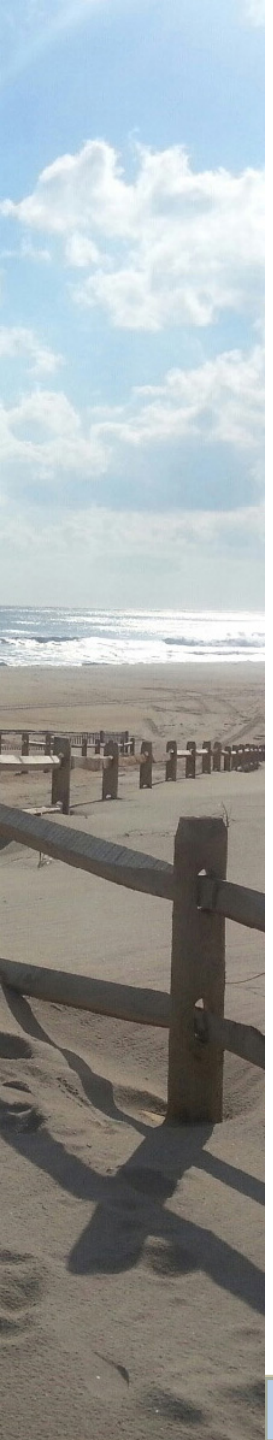


Promoting Open Science Throughout the Research Lifecycle: The Integrative Role of Libraries

Norm Medeiros

Associate Librarian for Collection Management & Metadata Services
Haverford College

Co-Director, Project TIER

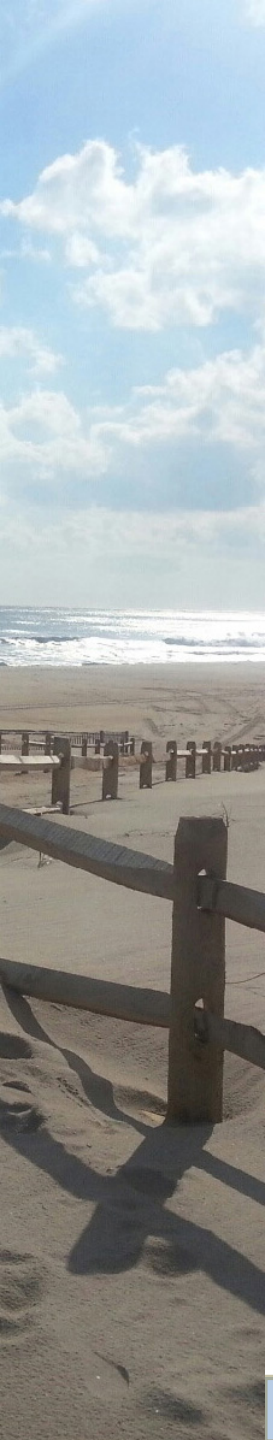
16 June 2017

HAVERFORD COLLEGE

PROJECT TIER
TEACHING INTEGRITY IN EMPIRICAL RESEARCH

Project TIER is generously supported by the Alfred P. Sloan Foundation

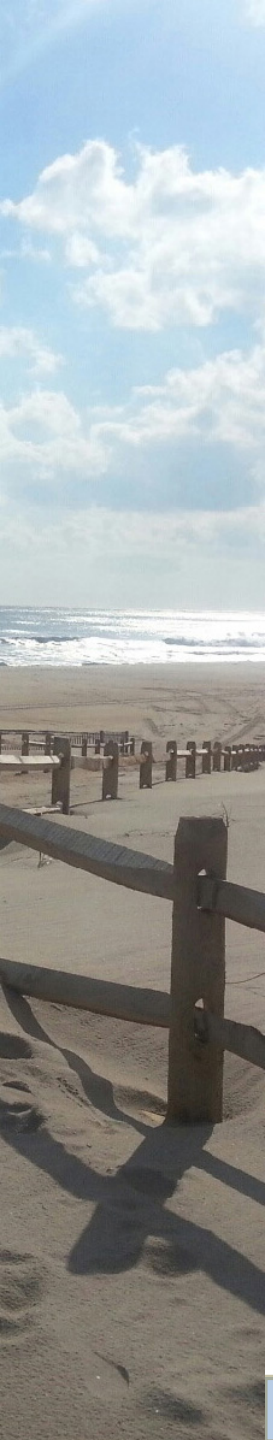
Alfred P. Sloan FOUNDATION



What to expect

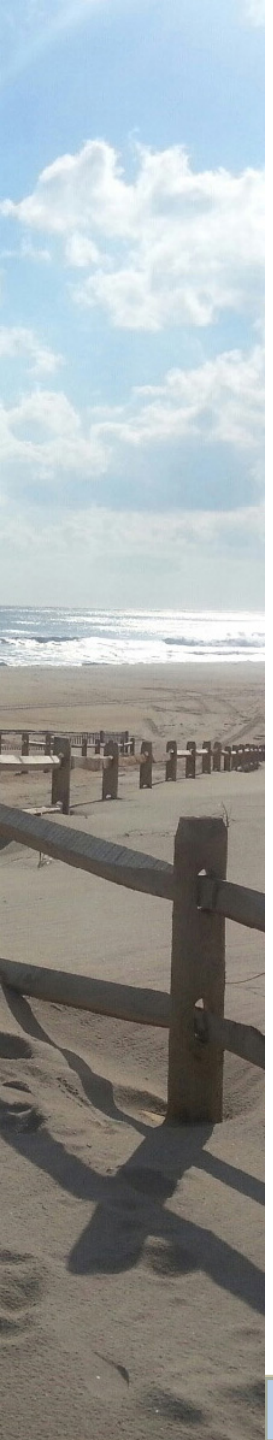
- Opportunities in academic libraries and technical services, especially research data management and digital scholarship

- An introduction to open science and prospective library services integration therein



About Me

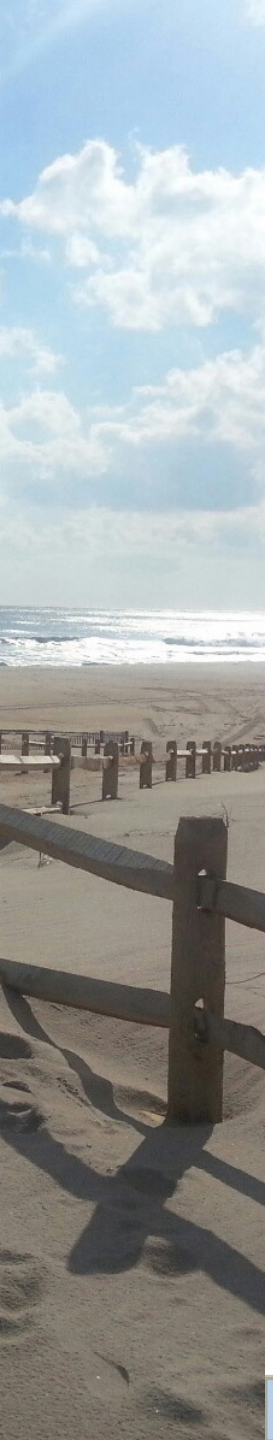
- Why librarianship?



About Me

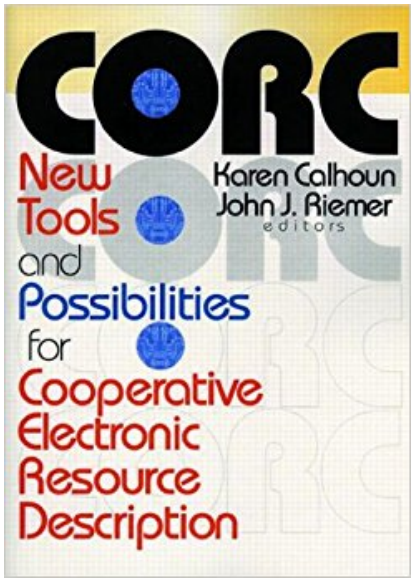
- University of Rhode Island ‘95

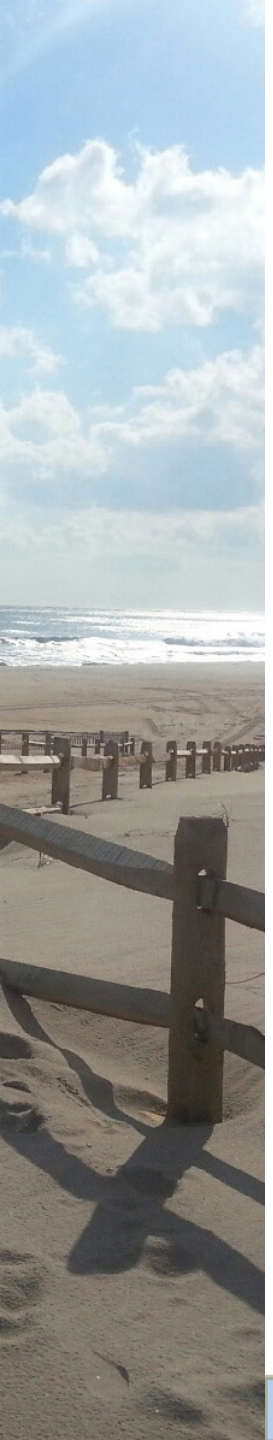
- Exciting times: online catalog; World Wide Web; improving economy



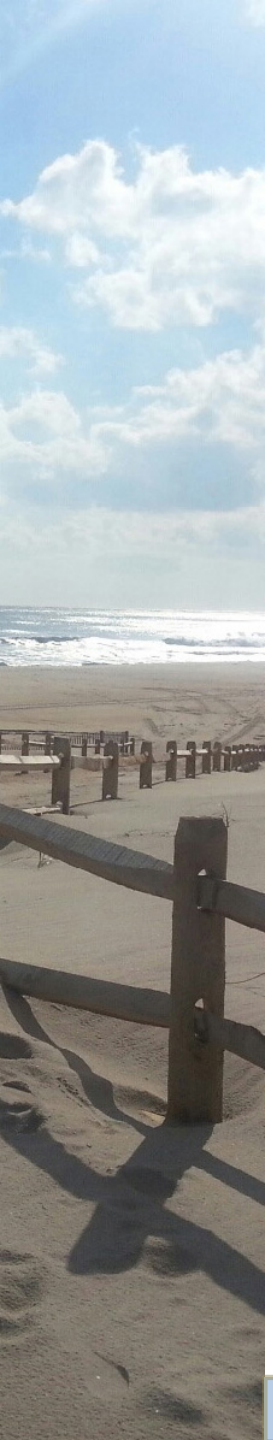
About Me

- Very traditional opening act
- Followed by "Let's catalog the Web!"
- Last 16+ years at Haverford trying to provide valuable, cost-effective, and sustainable collection & technical services with a lean staff and modest budget.
- ALCTS: Association for Library Collections & Technical Services



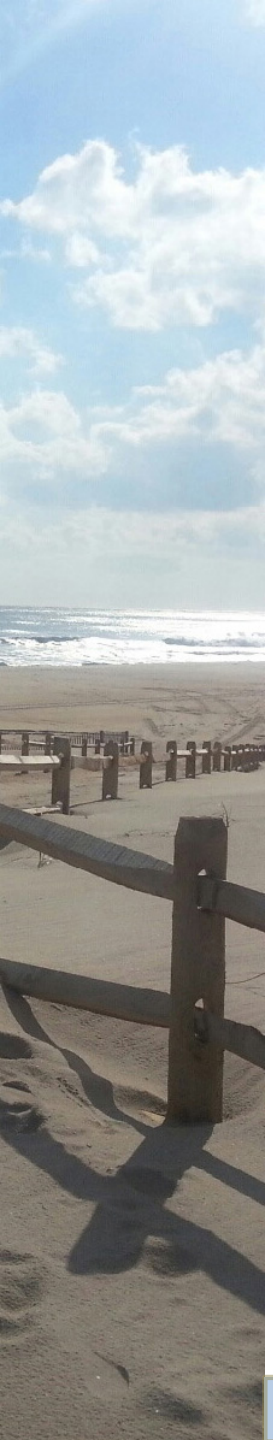


About Me



Expanding Role of Academic Libraries & Technical Services

- What is technical services today? What is cataloging? What is acquisitions?
- Fewer positions, fewer MLIS students, greater inter-divisional cooperation
- More forward-facing work
- More immediate service to users
- From collections- to user-orientation



Research Data Management

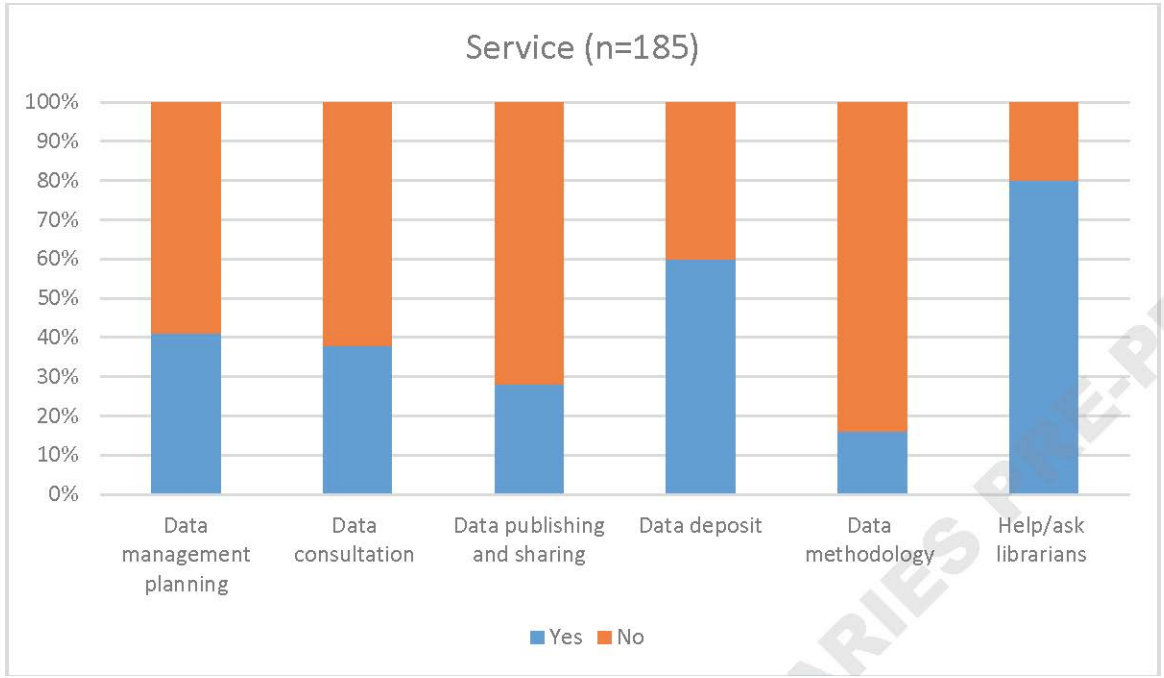
- Cliff Lynch in theory: "Institutional Repositories: Essential Infrastructure for Scholarship in the Digital Age," *ARL Bimonthly Report* 226 (February 2003)

Carol Hixson in practice: "Transforming Technical Services Staff and Librarians into Digital Library Specialists: The Continued Evolution of the University of Oregon's Metadata and Digital Library Services," AALL presentation (2006).

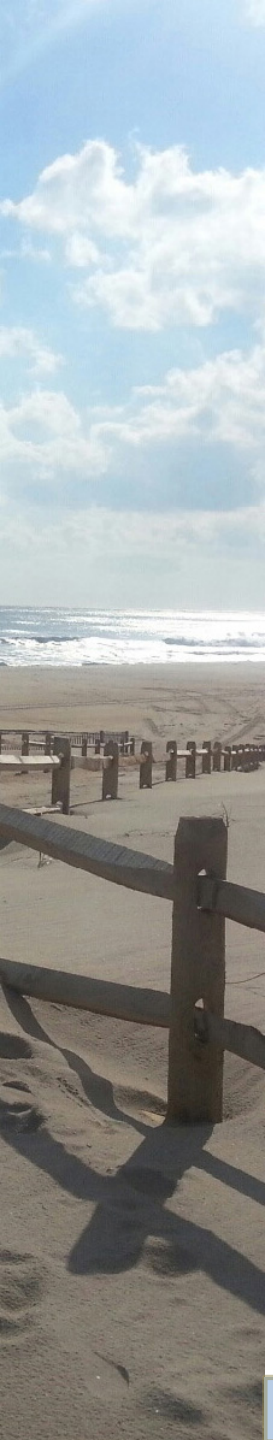
- Strong utilization of metadata & organizational skills

- Consultative role on NSF, NIH, grant funding requirements

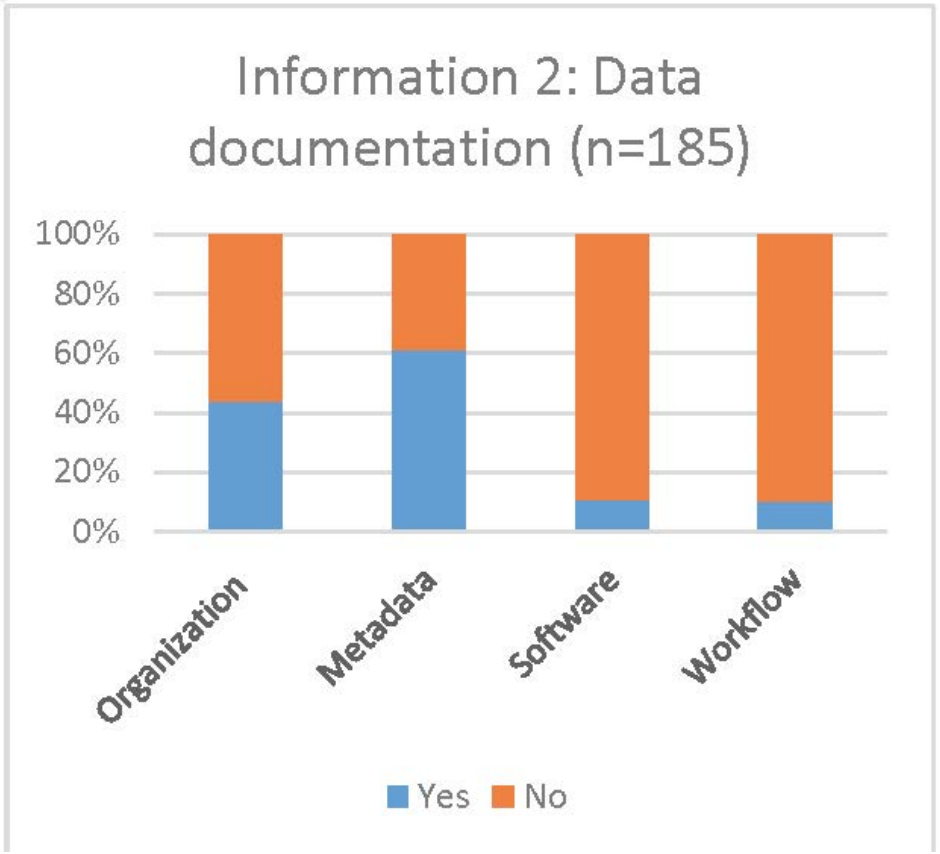
Research Data Management



Yoon & Schultz (2016). Research data management services in academic libraries in the U.S. A content analysis of libraries' websites. *College & Research Libraries* (preprint). Available: http://crl.acrl.org/content/early/2016/11/16/crl16-948.full.pdf.

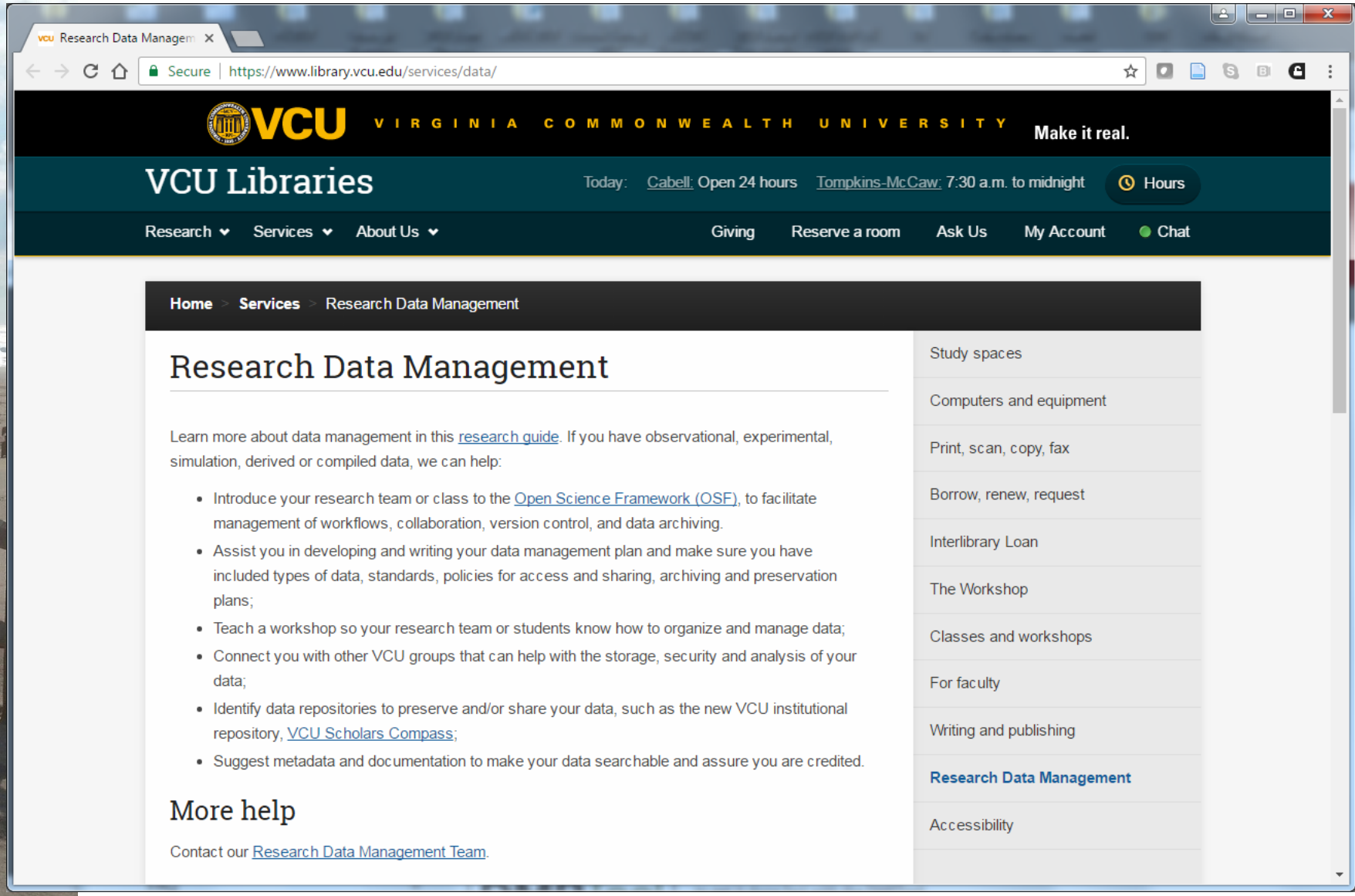


Research Data Management



Yoon & Schultz (2016). Research data management services in academic libraries in the U.S. A content analysis of libraries' websites. *College & Research Libraries* (preprint). Available: http://crl.acrl.org/content/early/2016/11/16/crl16-948.full.pdf.

Research Data Management



Research Data Management

Data Management Servic ×

Secure | https://library.stanford.edu/research/data-management-services

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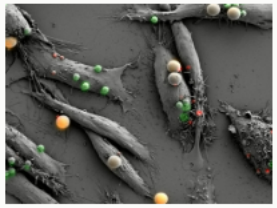

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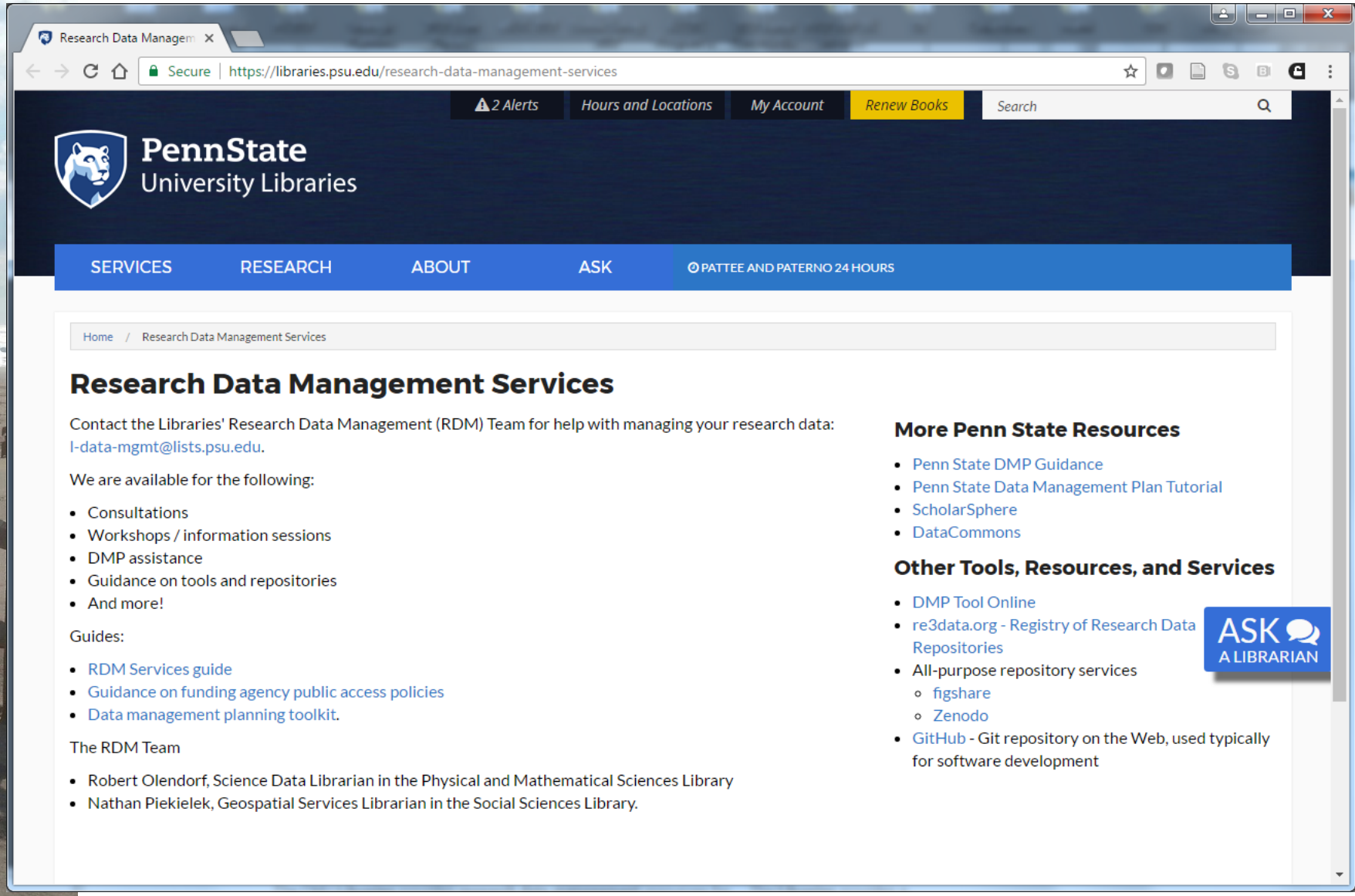
Research Data Management



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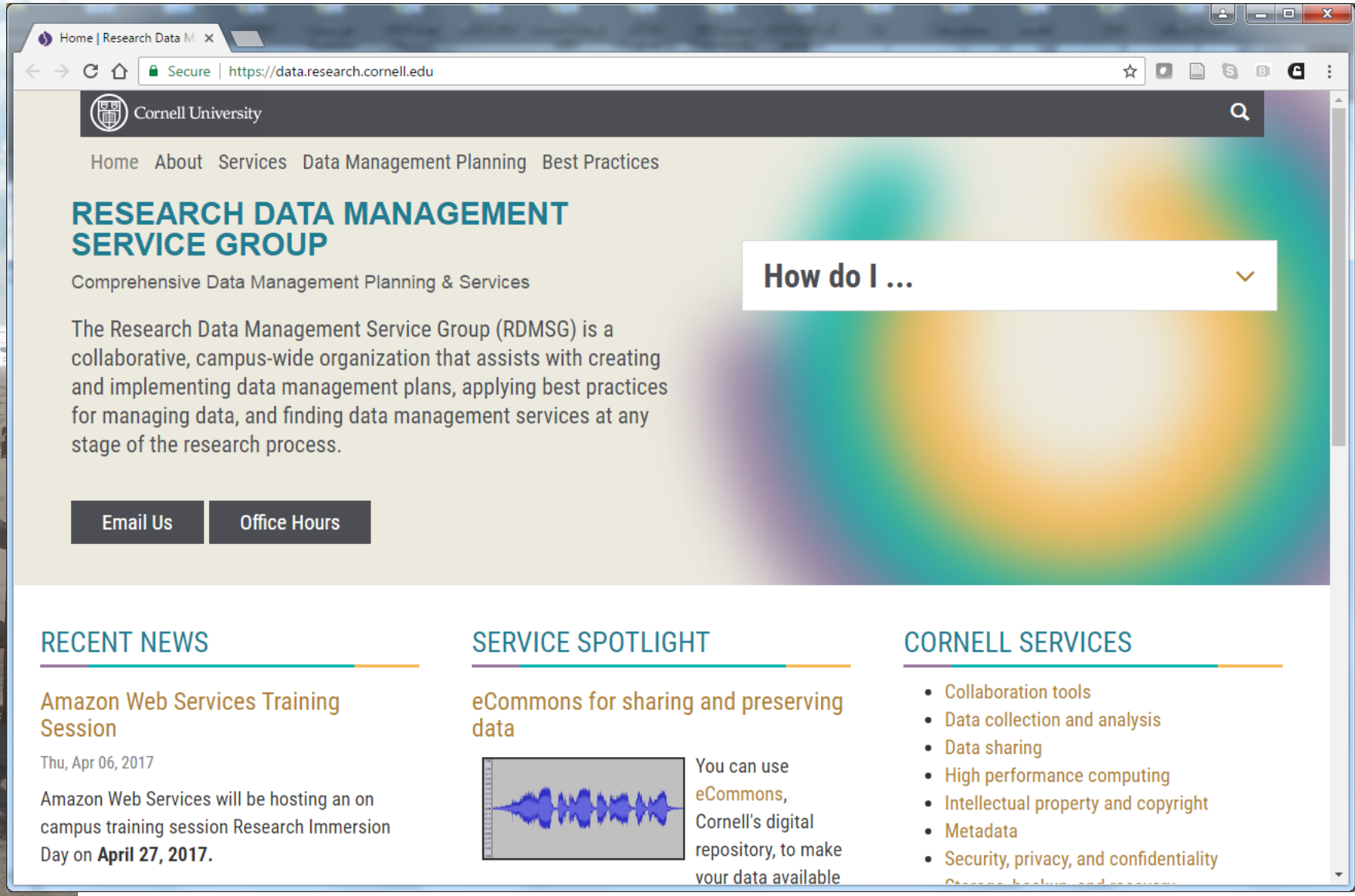

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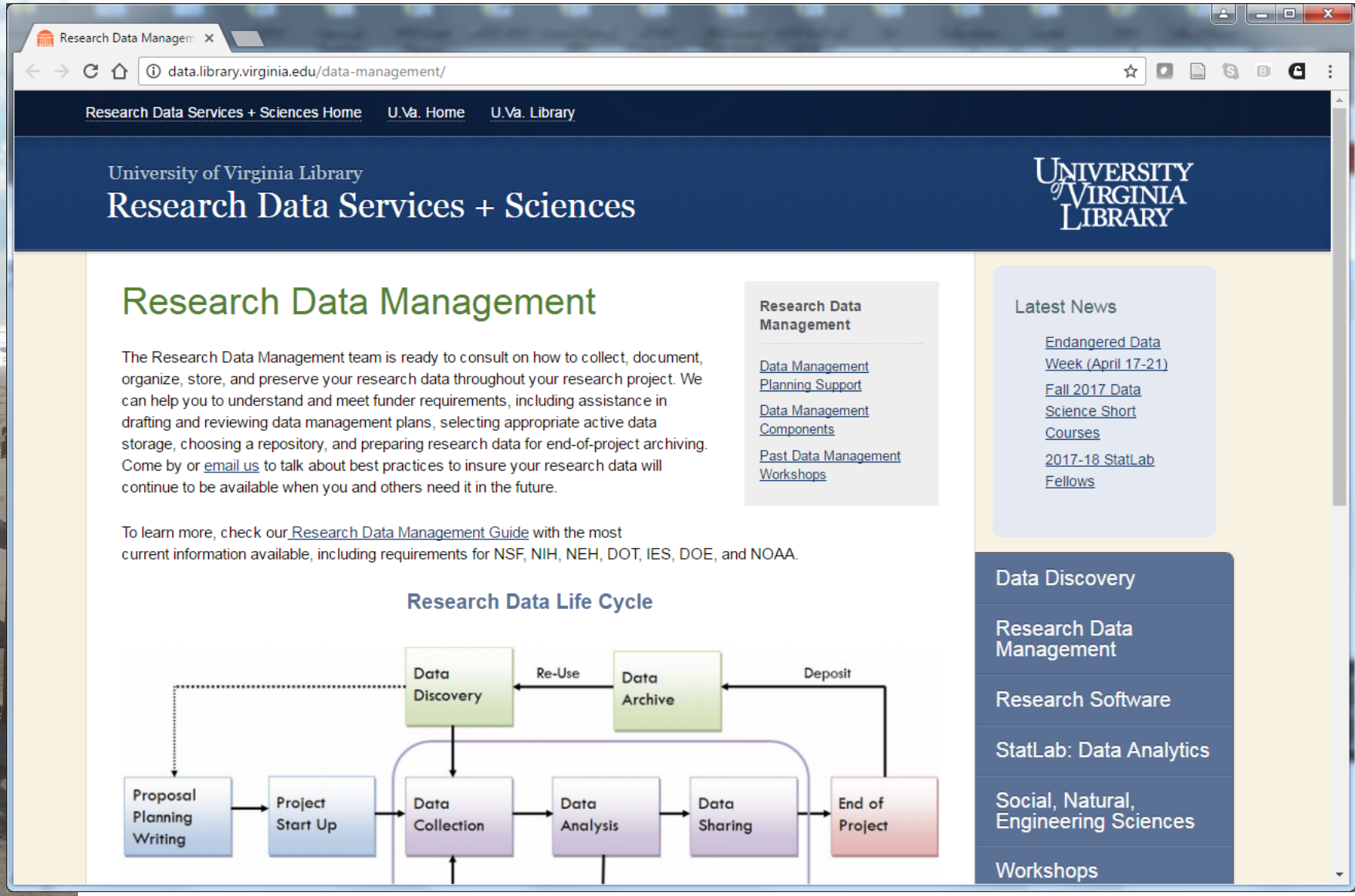

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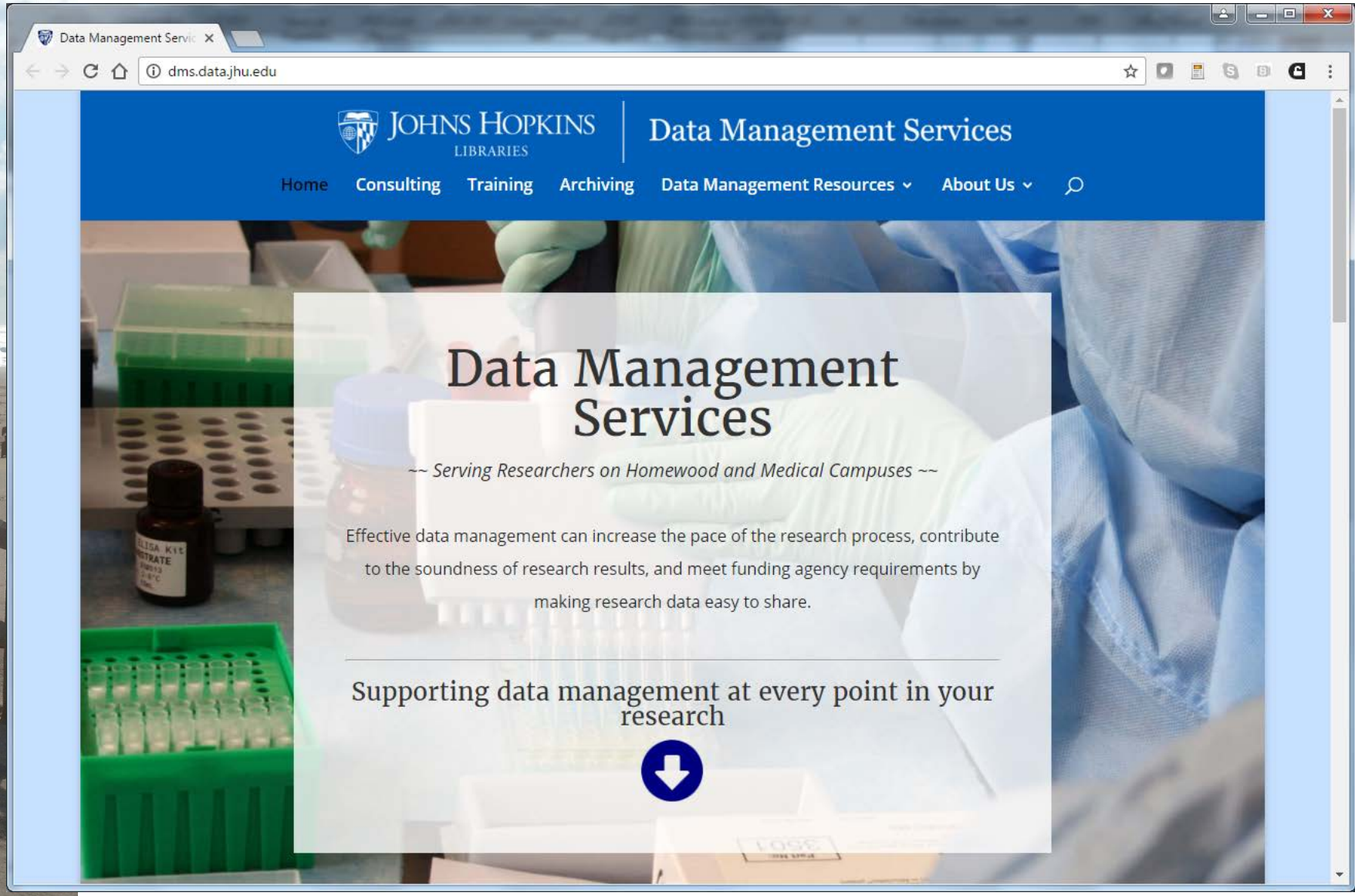
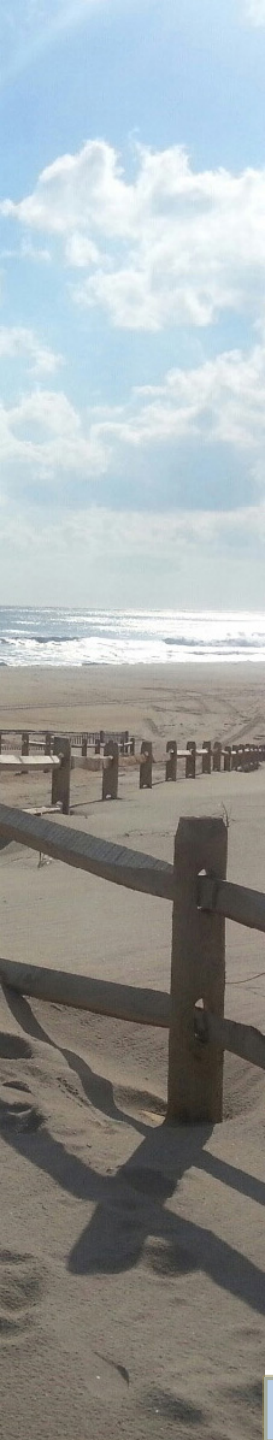
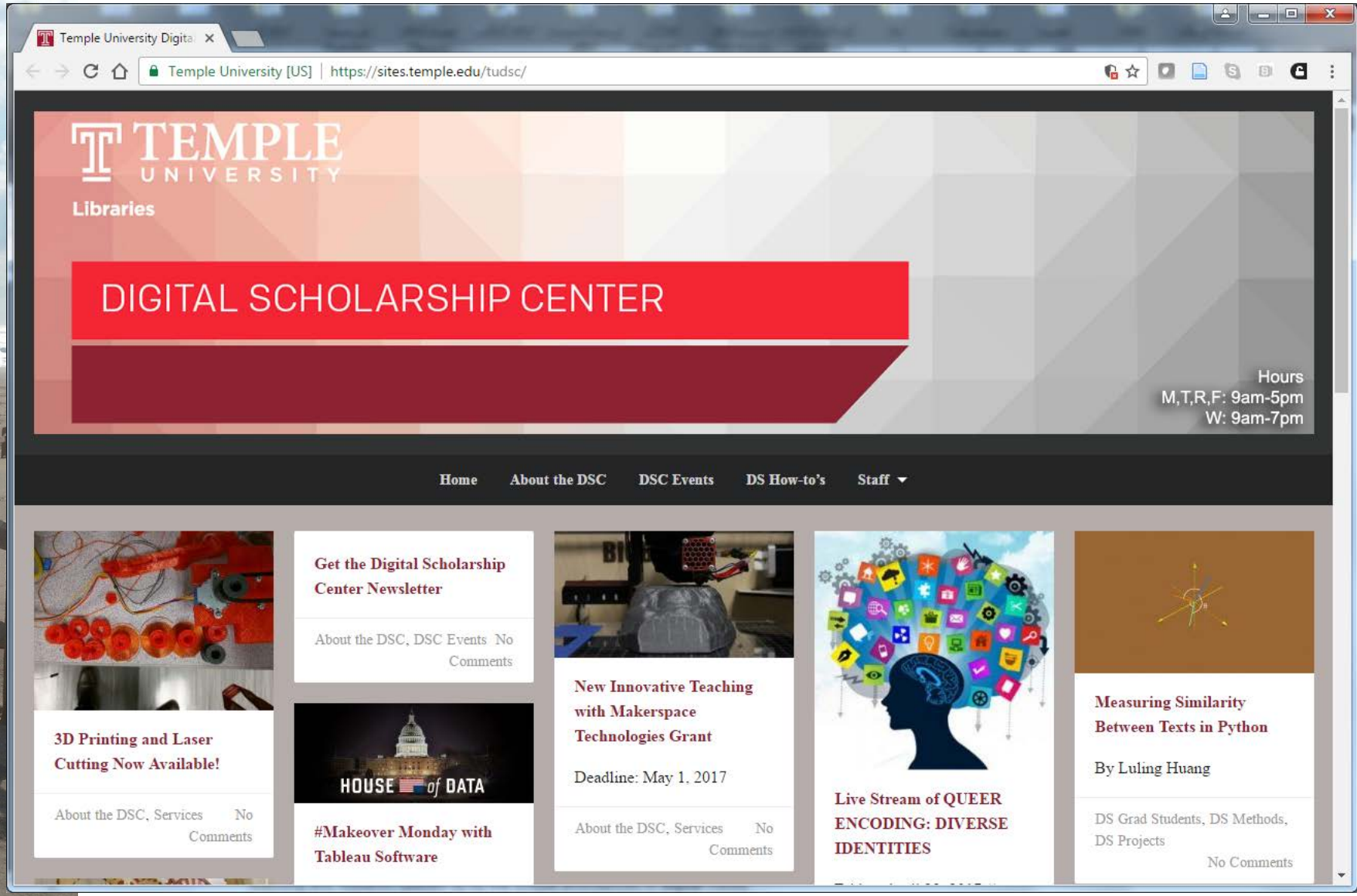




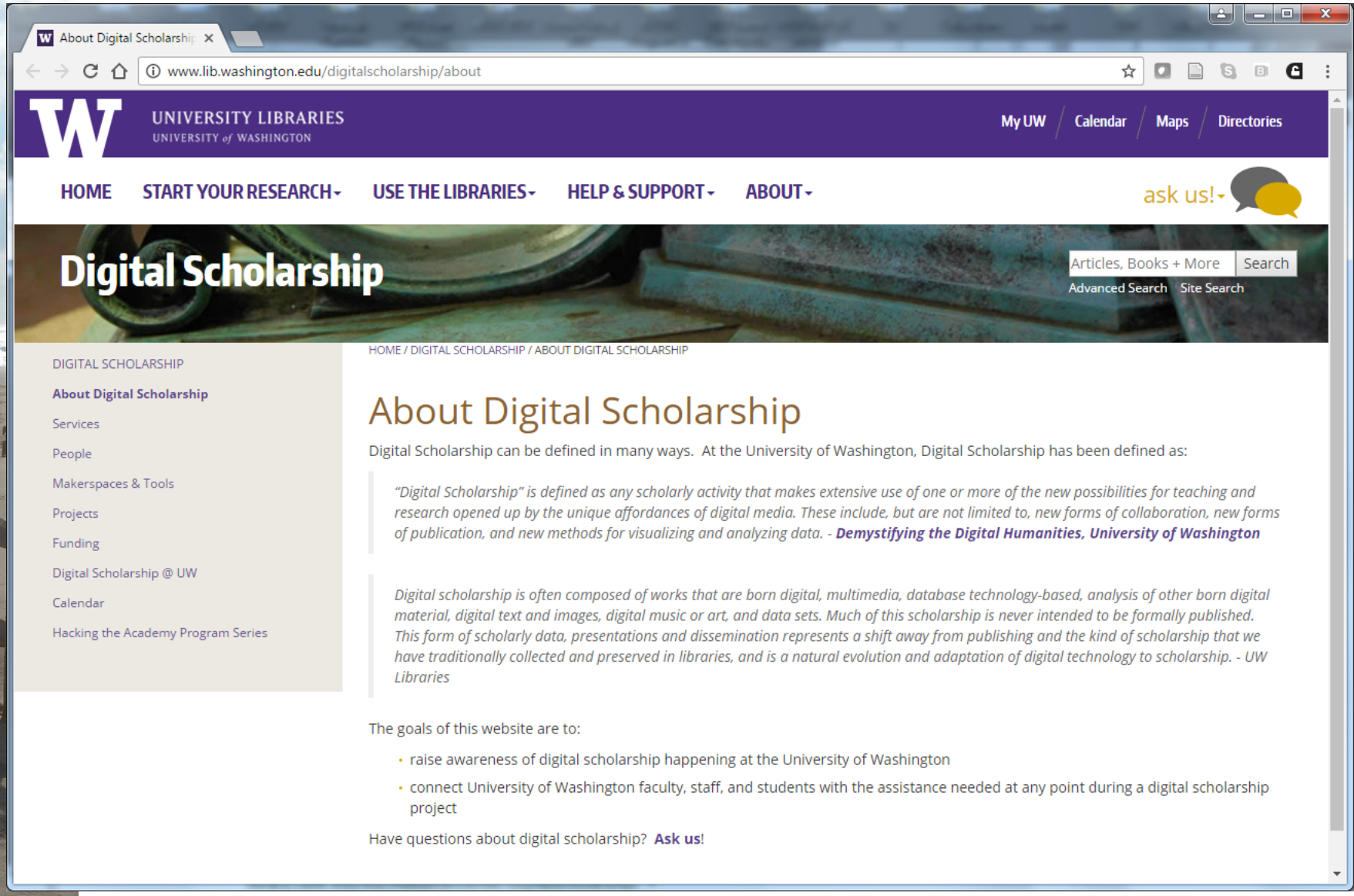
Digital Scholarship

- A thousand points of light
- High profile
- Active role in generation of scholarship
- Working without a net
- ALCTS program, "Creating the Future of Digital Scholarship Together: Collaboration from Within Your Library" (Saturday, 6/24, 8:30-10:00am, MCP, W185a)

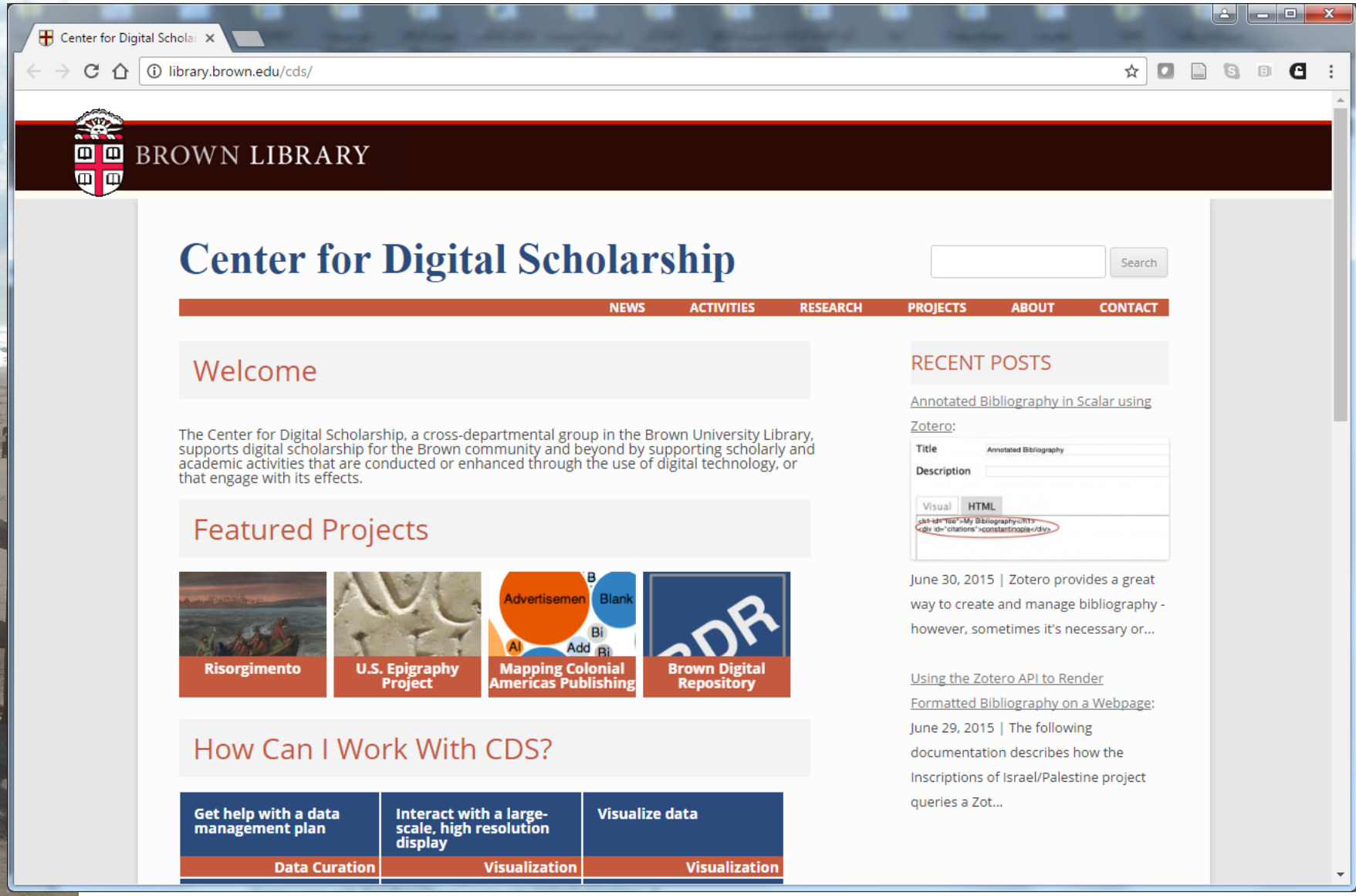
Digital Scholarship



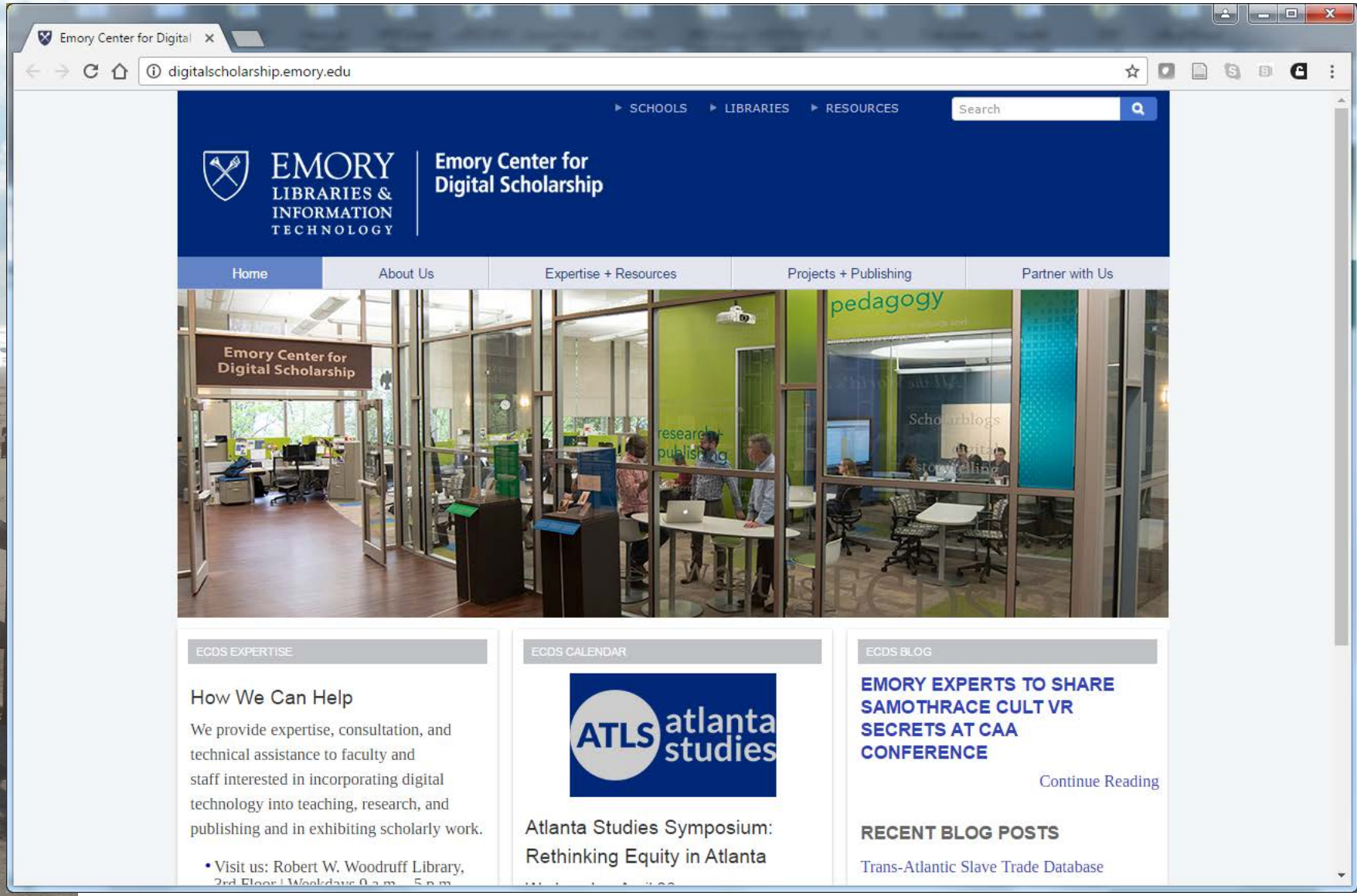
Digital Scholarship



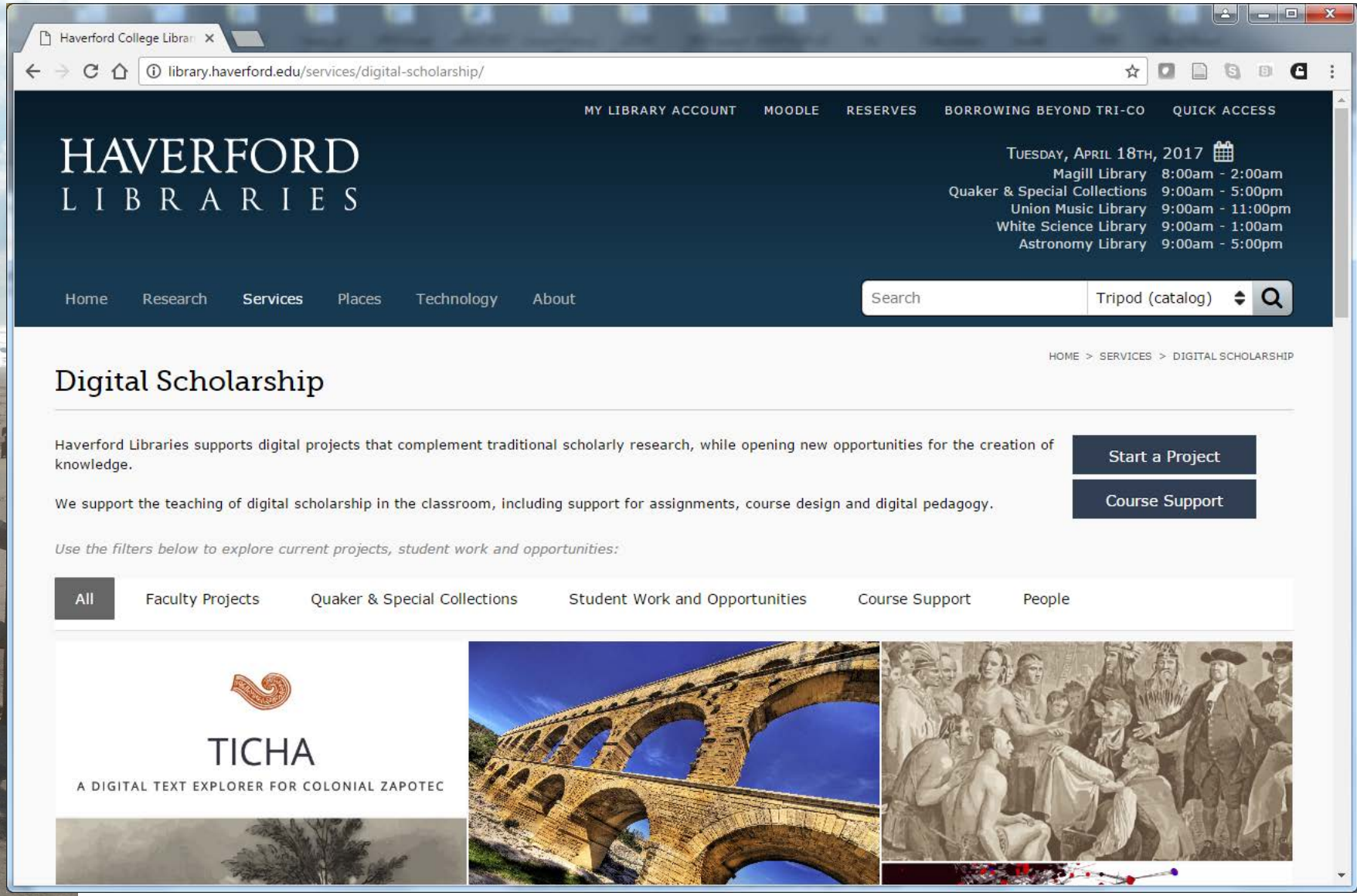
Digital Scholarship

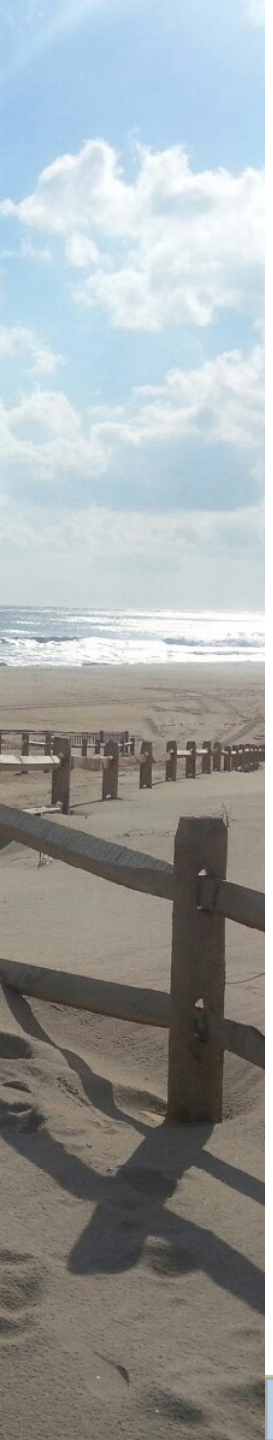


Digital Scholarship



Digital Scholarship





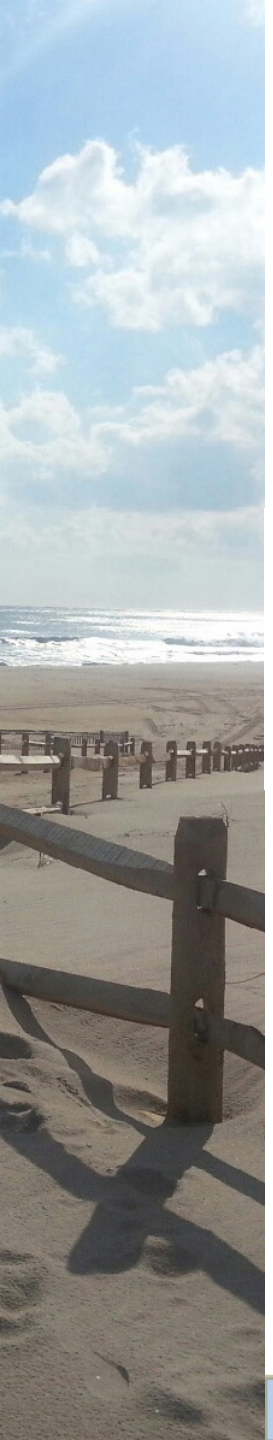
#OpenScience

- Transparency of method, data, and analysis to facilitate verification, replication, and extension of scientific findings

- Relationship of Open Science to Open Access & Open Source

"Making reproducibility of your work by peers a realistic possibility sends a strong signal of quality, trustworthiness, and transparency."

Sandve, et al. (2013). "Ten Simple Rules for Reproducible Computational Research." *PLOS Computational Biology*, 9(10).



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COS
CENTER FOR OPEN SCIENCE

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The Dataverse Project

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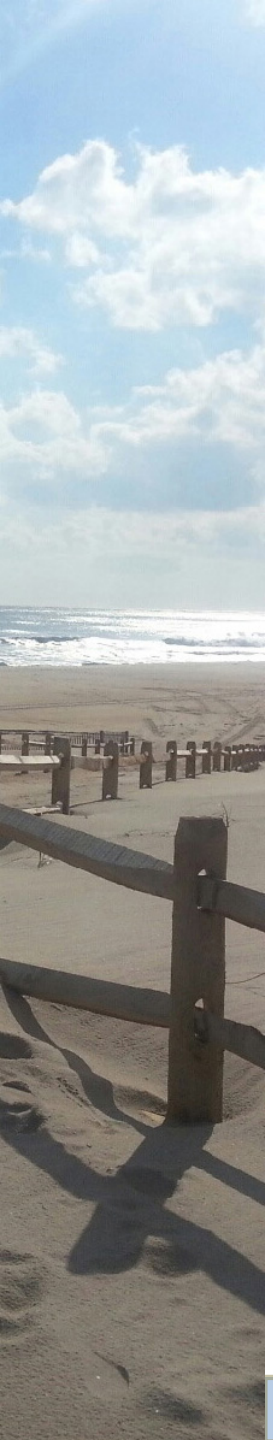

What problem is open science trying to solve?

→ Credibility crisis in science

How do we solve science's 'credibility problem'?

Tackling the 'credibility crisis' in science

January 4, 2016

Cancer Research Is Broken

There's a replication crisis in biomedicine—and no one even knows how deep it runs.

Psychology's Ongoing Credibility

How the Reproducibility Crisis in A
Affecting Scientific Research

About 40% of economics experiments fail replication survey

By John Bohannon | Mar. 3, 2016, 2:00 PM

The Credibility Crisis in Computational Science: An Information Issue

Science, Now Under Scrutiny Itself

By BENEDICT CAREY JUNE 15, 2013

Steering clear of the iceberg: three ways we can fix the data-credibility crisis in science

Retraction Watch - Track

retractionwatch.com

Retraction Watch

Tracking retractions as a window into the scientific process

Could bogus scientific results be considered false advertising?

with 2 comments

Could a scientific paper ever be considered an advertisement?

That was the question posed to a Tokyo court, in a criminal case where prosecutors argued — at the behest of Japan's ministry of health — that a peer-reviewed paper containing faked data should be considered "fraudulent or exaggerated advertising" under that country's laws.

In that case, however, the argument didn't work. In March, the court decided that a fraudulent paper was not false advertising, allowing a pharmaceutical researcher at a Novartis subsidiary to escape jail time. The decision also cleared Novartis of charges and helped the company avoid a ¥4 million ($35,373 USD) fine.

According to an article in *The Japan Times*, the presiding judge Yasuo Tsujikawa said:

Read the rest of this entry »

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Written by Andrew P. Han
May 17th, 2017 at 11:40 am

Posted in japan retractions, Legal Threats

Gender-based violence researcher now up to 10 retractions for plagiarism

with 7 comments

A publisher has retracted all of the papers it published by a researcher in Nigeria, citing plagiarism.

The papers, all about terrorism and gender-based violence, were written by Oluwaseun Bamidele. The journal editors and the publisher, Taylor & Francis, decided to retract nine papers by Bamidele because of the overlap to other works — which he also failed to reference.

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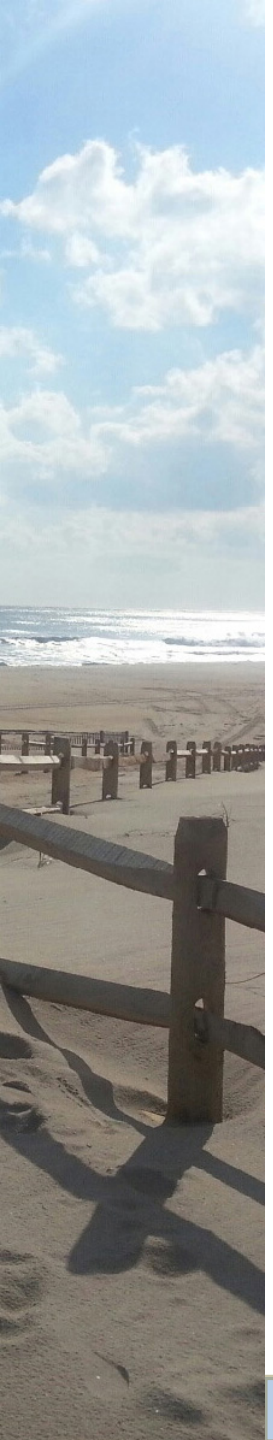


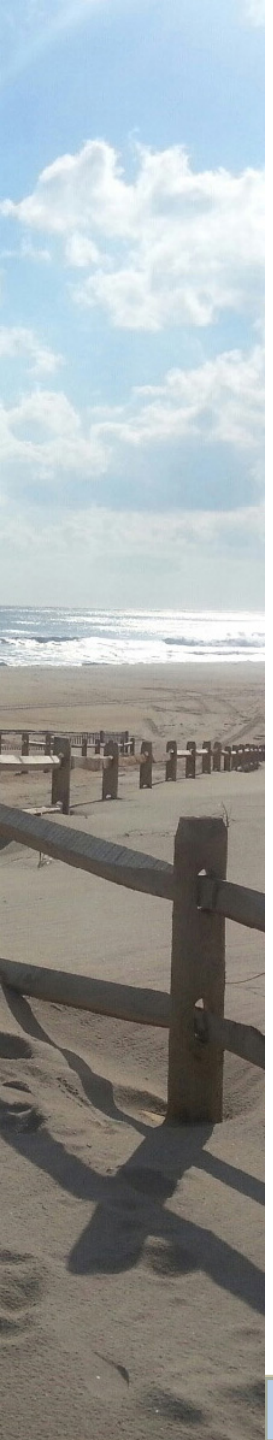
Reproducibility Project: Psychology

- 100 articles published in *Psychological Science*, *Journal of Personality and Social Psychology*, *Journal of Experimental Psychology: Learning, Memory, and Cognition* in 2008

- 39% found to replicate

"A large portion of replications produced weaker evidence for the original findings despite using materials provided by the original authors, review in advance for methodological fidelity, and high statistical power to detect the original effect sizes."

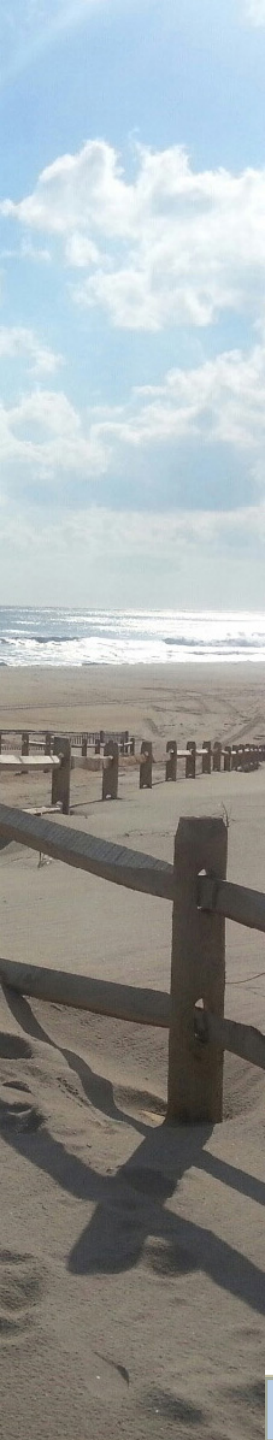
-Open Science Collaboration (2015). Estimating the reproducibility of psychological science. *Science, 349*, aac4716-1-8.



Reproducibility Project: Cancer Biology

- 50 articles published in *Nature, Science,* and *Cell* published between 2010 and 2012

- Early returns: 2 replicated, 1 failed, 2 inconclusive



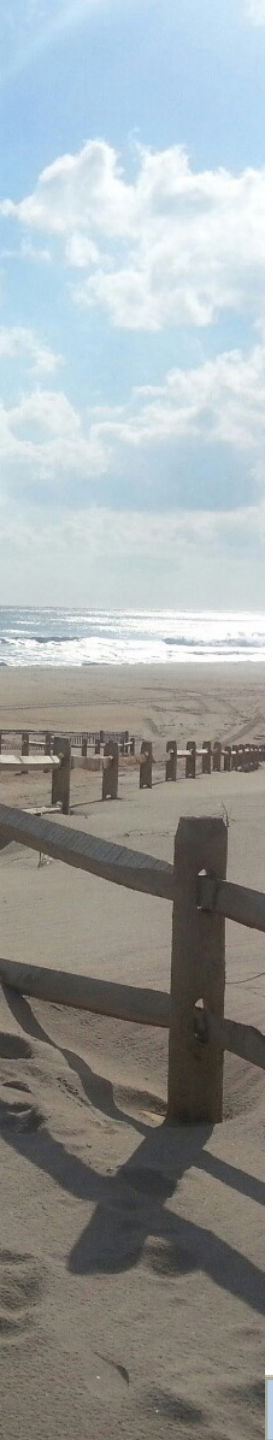
Social Sciences Replication Project

- 21 experimental studies published in *Nature* and *Science* in 2010-2015; have clear hypotheses, statistically significant results, and convenient samples (frequently students)

- Replication criteria: Effect in the same direction and p-value < 0.05

- To be completed in September 2017

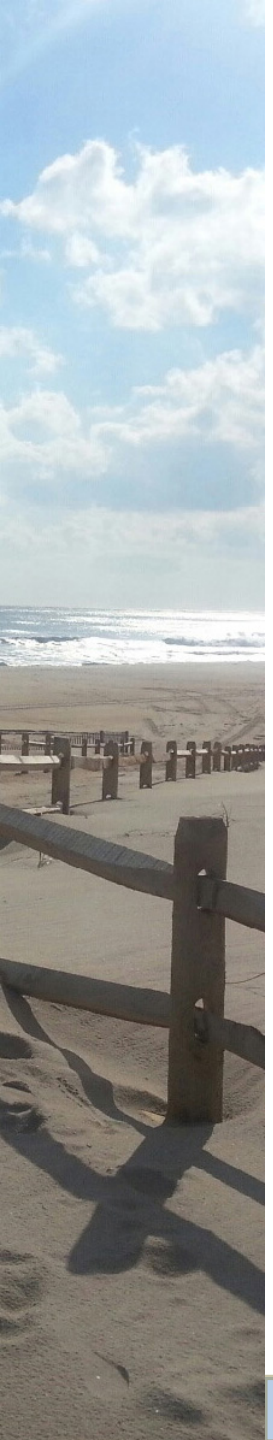
- Replication reports will be posted on the SSRP web site: www.socialsciencesreplicationproject.com

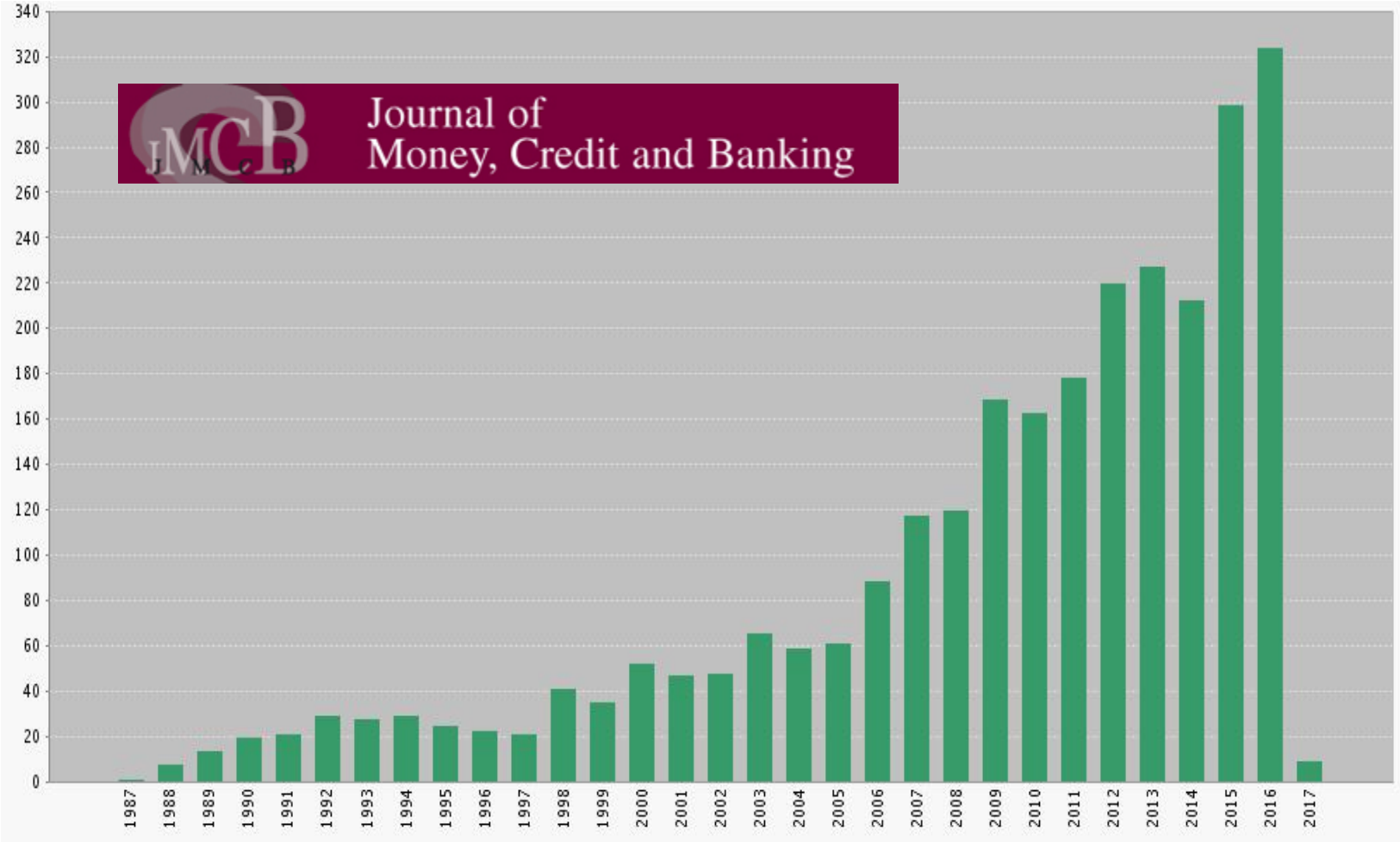


Is Economics Research Replicable?

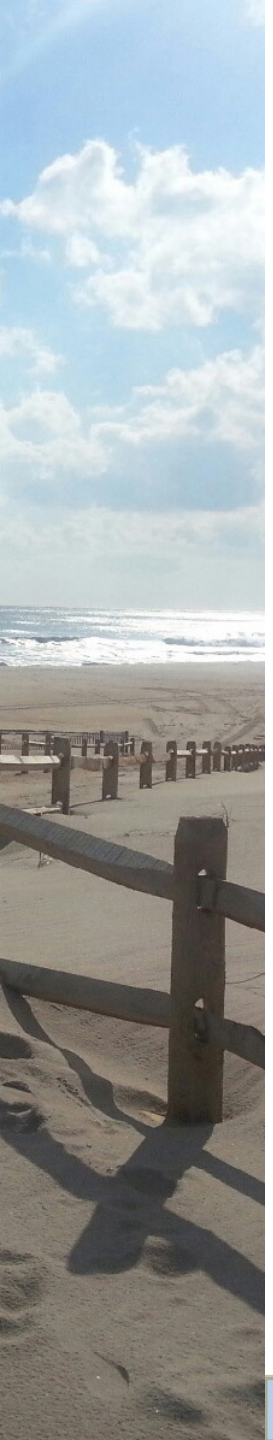
- 59 articles from 13 leading journals
- same data and code (!)
- 49% found to replicate, *even after author assistance;* worse rate (33%) without author assistance

-Chang A.C., Li, P. (2015). Is Economics Research Replicable? Retrieved from https://www.federalreserve.gov/econresdata/feds/2015/files/2015083pap.pdf





Replication in Empirical Economics: The Journal of Money, Credit and Banking Project / William G. Dewald, Jerry G. Thursby and Richard G. Anderson. *The American Economic Review*, Vol. 76, No. 4 (Sep., 1986), pp. 587-603



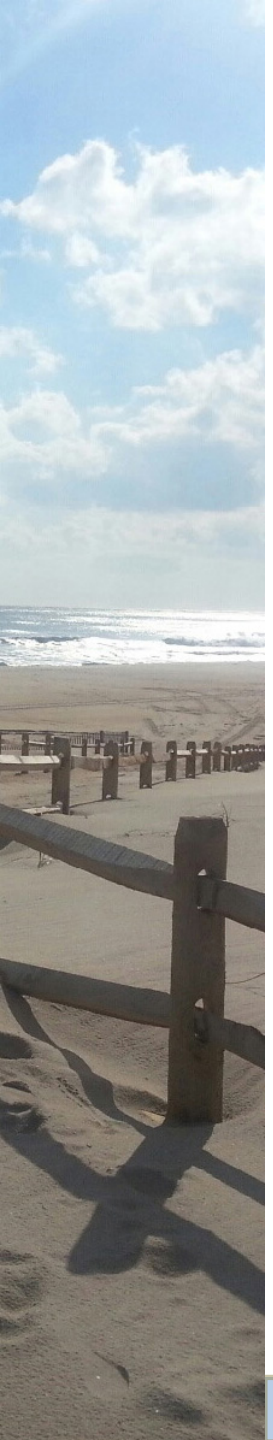
Reproducibility vs. Replication

- **Reproducibility**

  Verification that identical inputs (data & method of analysis) yield identical results; commonly referred to as "computational reproducibility"

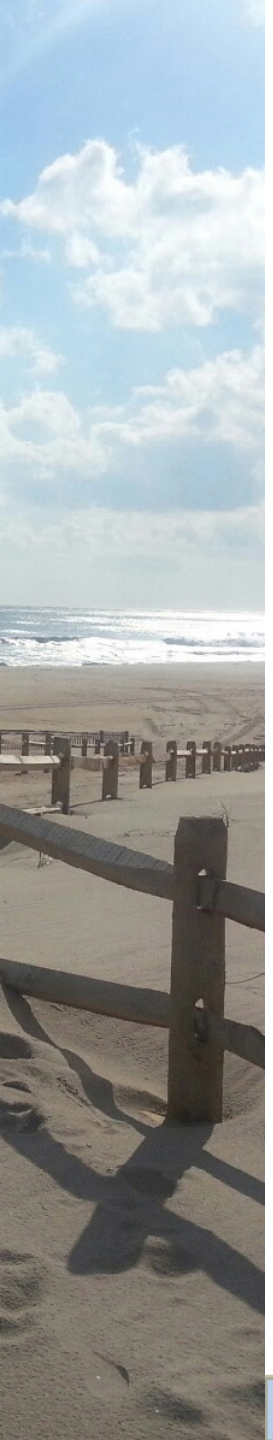
- **Replication**

  Testing effect using same methodology on a different sample



A Frequent Scenario

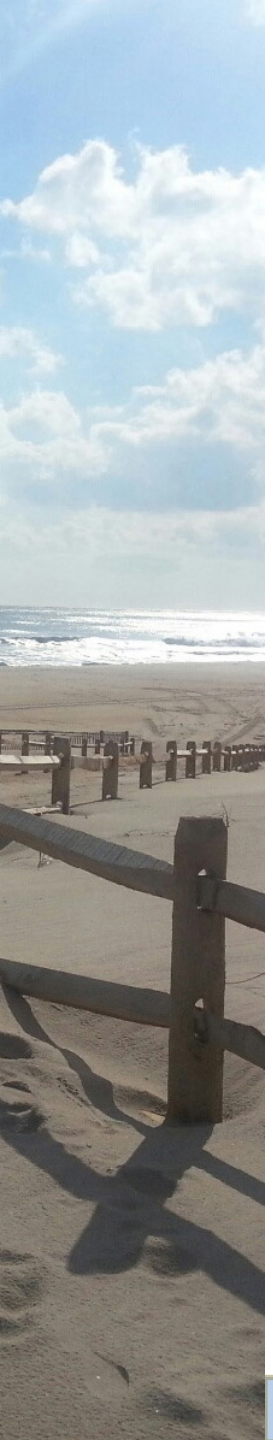
"*everything you need to know is in the article*"



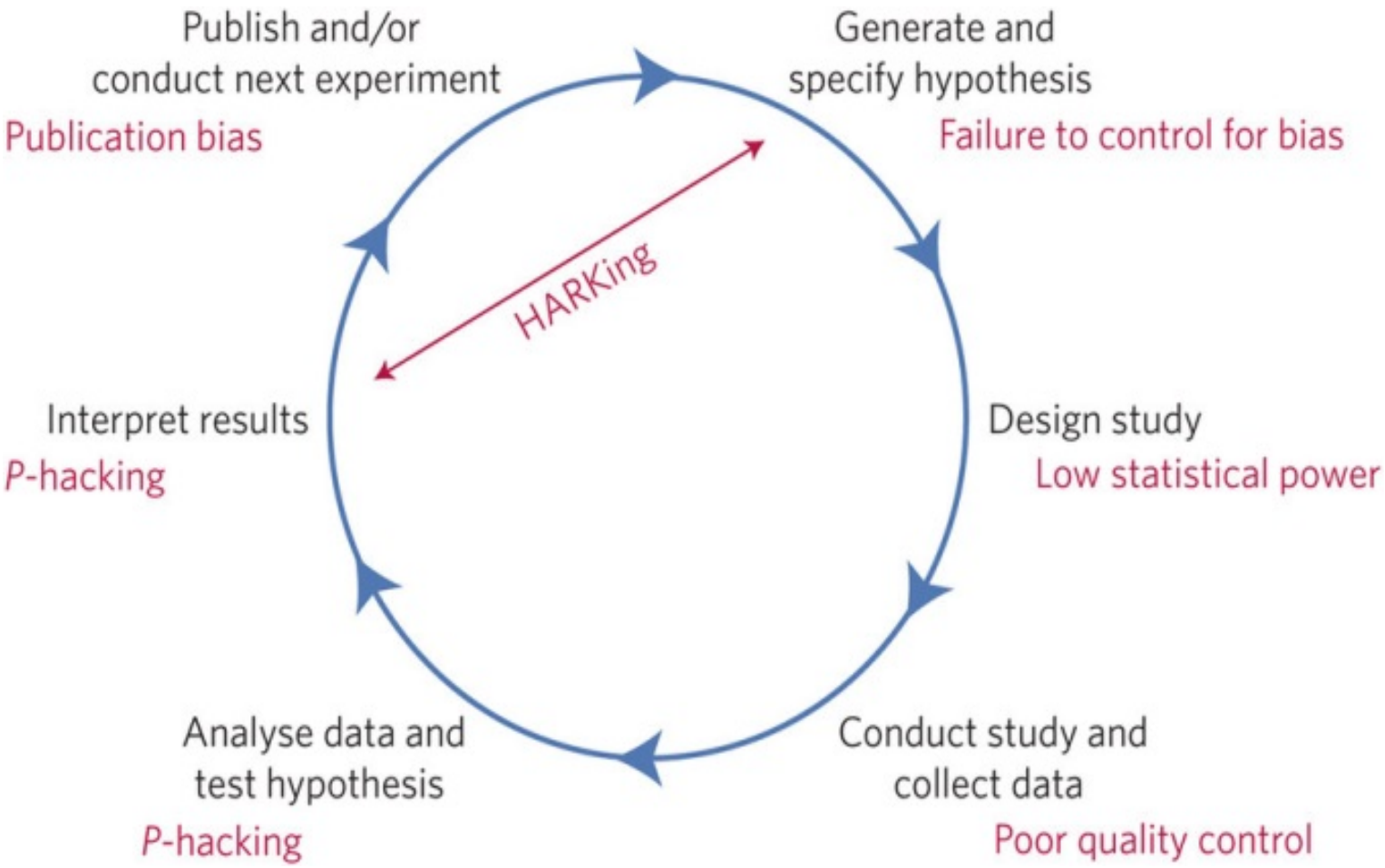
Scientific Value vs. Scientific Reward (truth seeking) (funding, tenure)

→ Incentive to publish is powerful

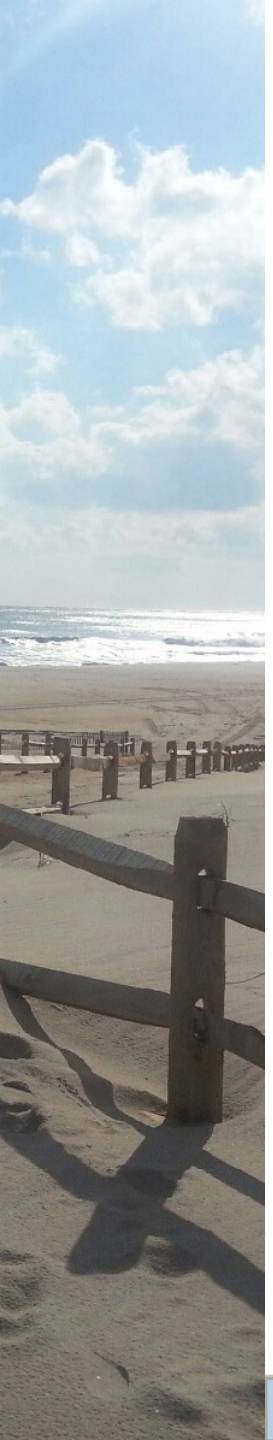
- Drive funding, promotion, acclaim
- The need for significant results ($p < .05$)
- Most prestigious journals will not publish insignificant results



Threats to reproducible science



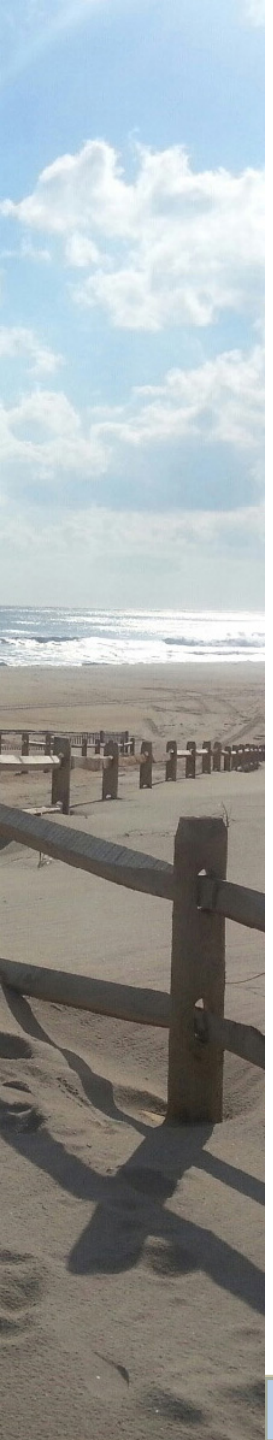
A Manifesto for Reproducible Science / Munafo, et al. *Nature Human Behaviour*, 1 (2017)



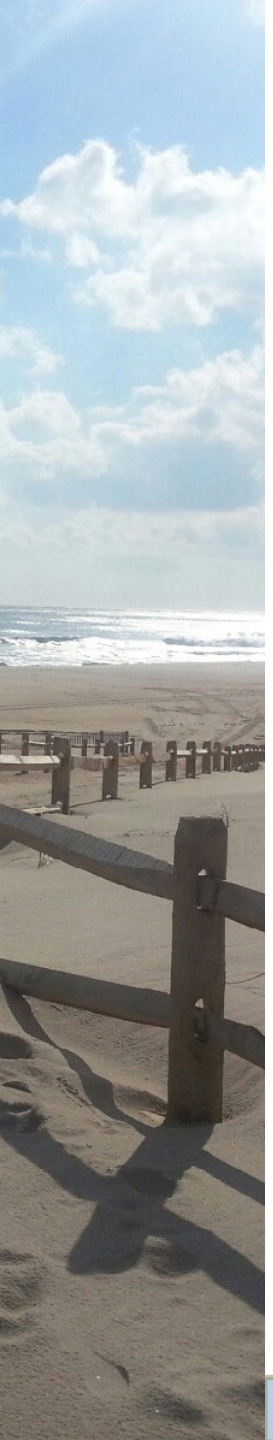
P-hacking

→ Manipulating data to achieve a positive effect

- Confirmatory (Hypothesis testing) vs. Exploratory (HARKing; data dredging)
- Results in false positives (type I error)
- Contributes to "file drawer" problem
- *Researcher degrees of freedom*: Dropping observations/variables; cutting short data collection; testing different analytical techniques



Let's learn more about P-hacking from John Oliver

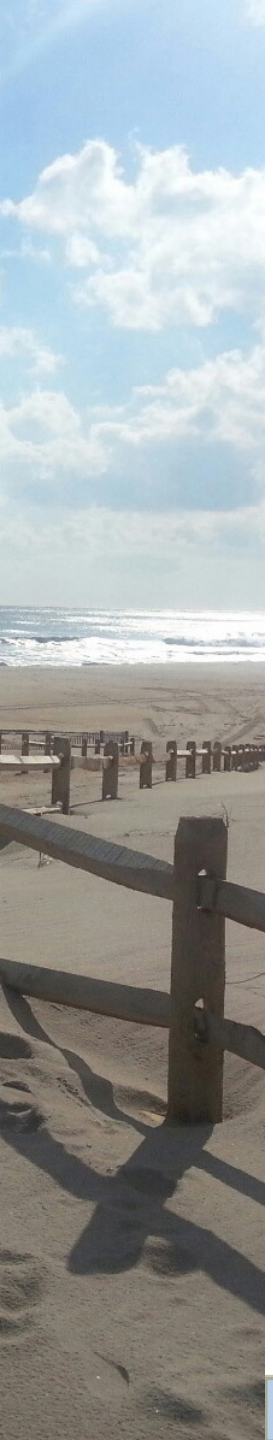


(Pre-)Registration/Pre-Analysis

- Making available hypotheses, study design, materials, and methodological plan before data collection begins
- Decreases HARKing and dredging for significance
- Also decreases file drawer problem

"The strongest form of pre-registration involves both registering the study … and closely pre-specifying the study design, primary outcome and analysis plan in advance of conducting the study or knowing the outcomes of the research."

-- A Manifesto for Reproducible Science



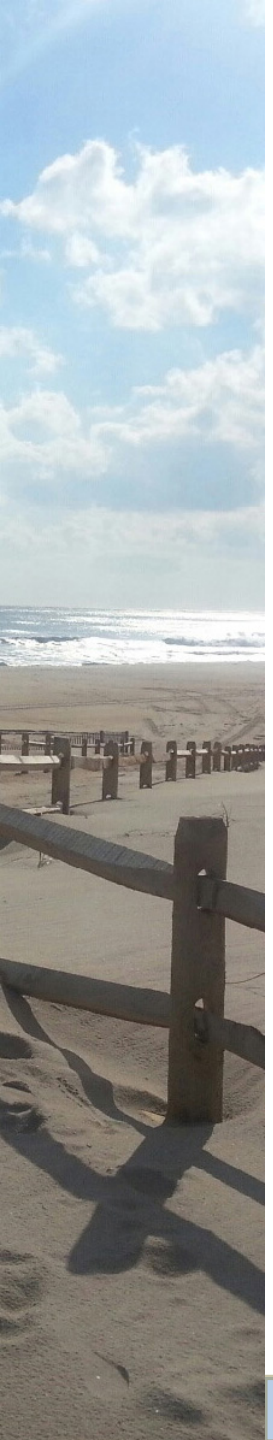
A New Publishing Paradigm?

- Publication agreements based on hypothesis and planned analysis, not results -- similar to grant awards

- Removes motivation to manipulate significance tests

- Transparency and Openness Promotion (TOP) Guidelines (over 3,000 journals & organizations)

"Transparency, open sharing, and reproducibility are core values of science, but not always part of daily practice. Journals, funders, and scholarly societies can increase reproducibility of research by adopting the Transparency and Openness Promotion (TOP) Guidelines and helping them evolve to meet the needs of researchers and publishers while pursuing the most transparent practices."

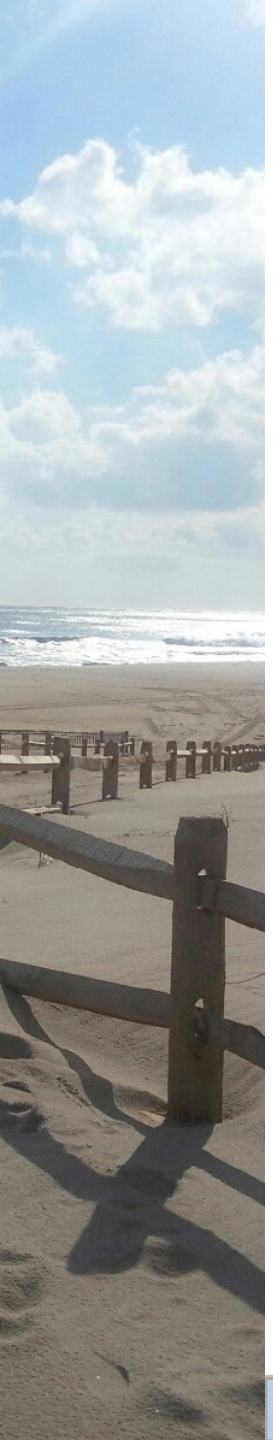


Pre-Registration Challenge

- $1,000 to 1,000 researchers who agree to submit a registration on OSF and subsequently publish their findings in a participating journal (780 registered thus far)

- Sponsored by Center for Open Science

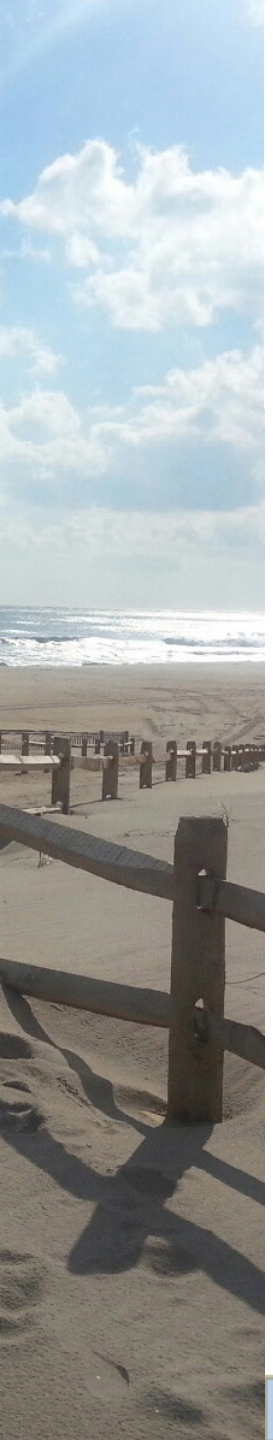
- A registration on OSF



CENTER FOR OPEN SCIENCE

- **Mission:** increase openness, integrity, and reproducibility of research

- **Product:** OSF (Open Science Framework) Platform for pre-registration/pre-analysis, data management, collaboration, and publication

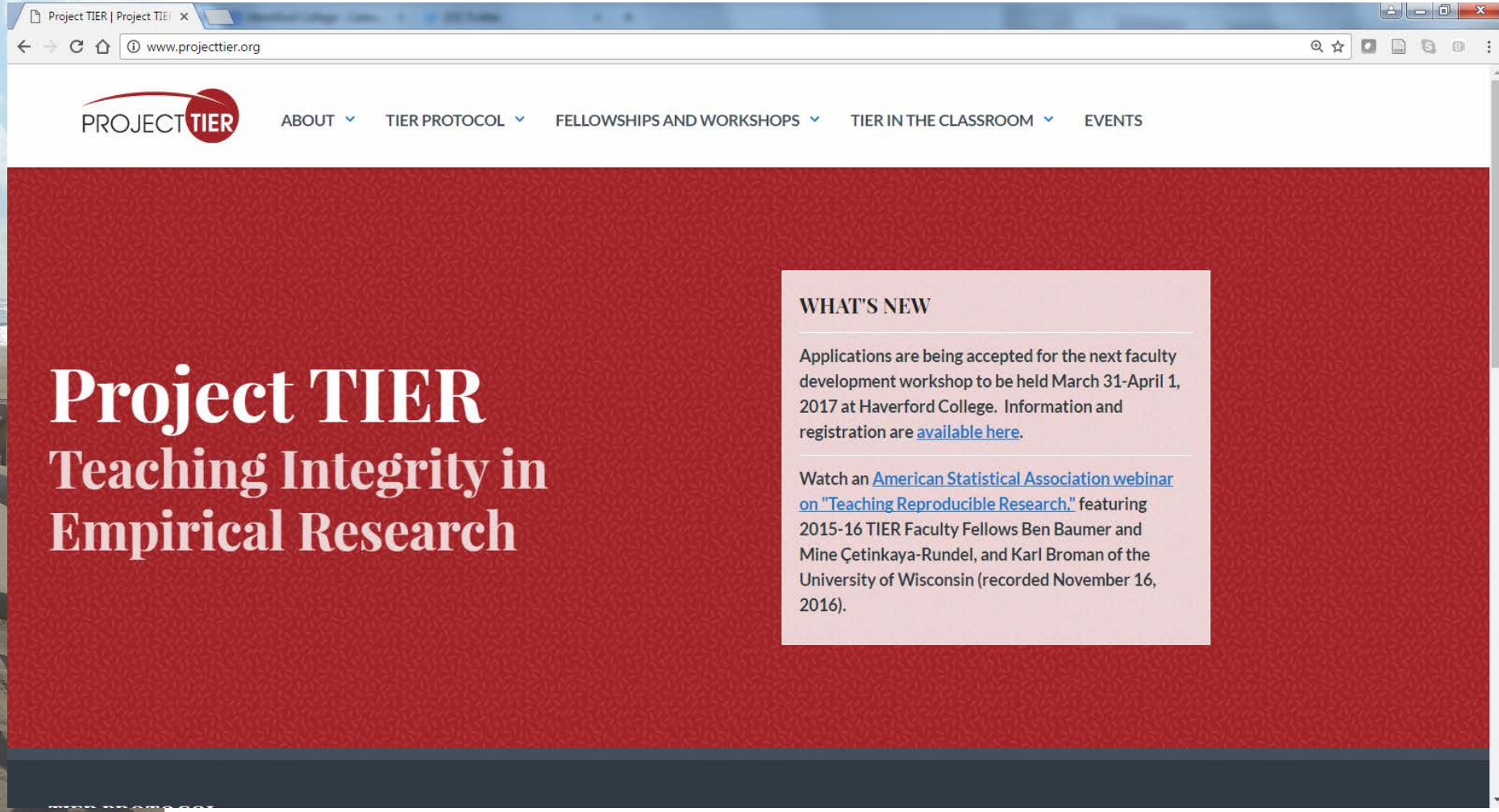


PROJECT TIER
TEACHING INTEGRITY IN EMPIRICAL RESEARCH

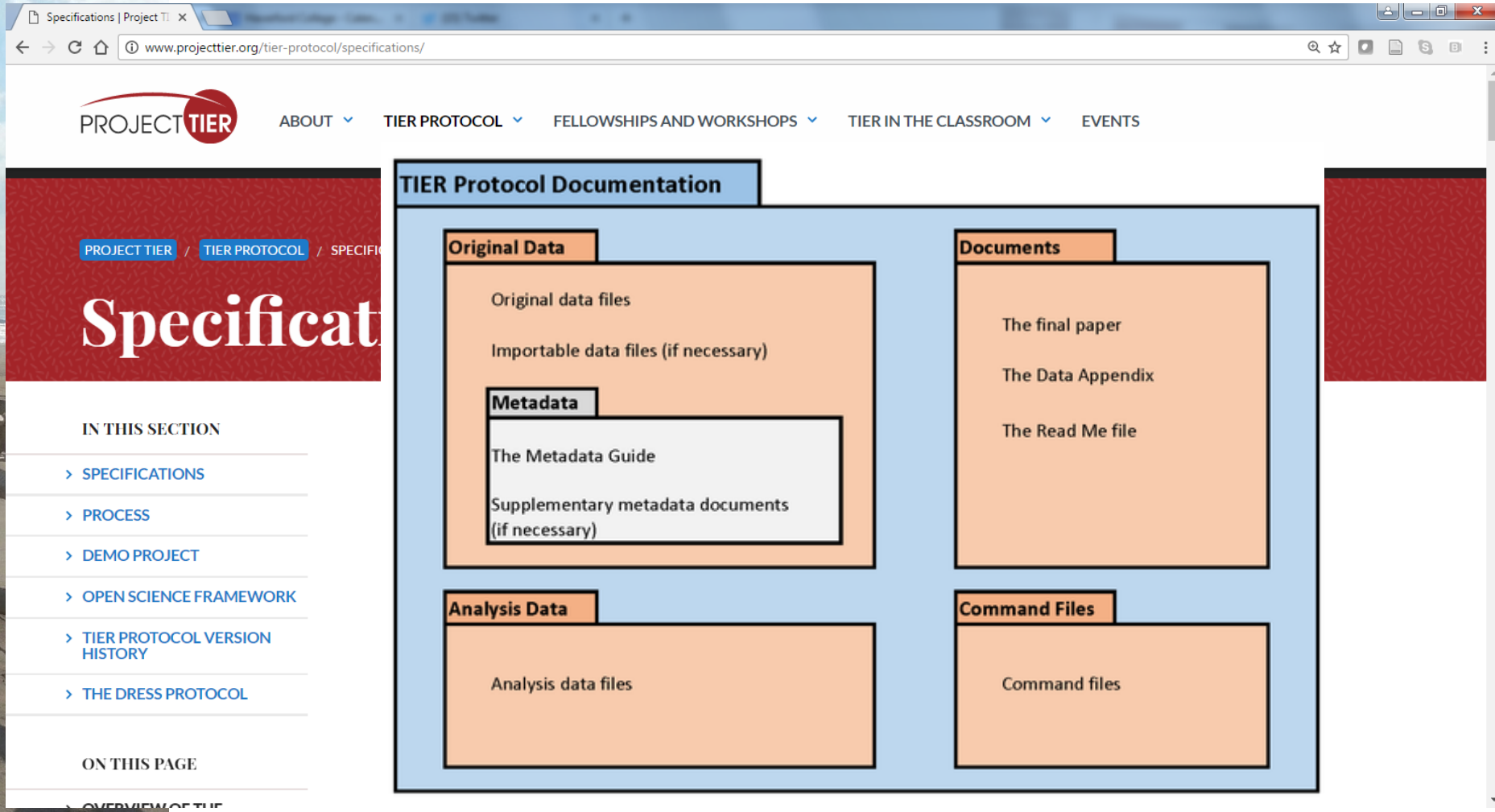
Project TIER: Teaching Integrity in Empirical Research

- Promote a systemic change in professional norms related to transparency and reproducibility of empirical research in the social sciences
- Providing comprehensive replication documentation for research involving statistical data should be as ubiquitous and routine as providing a list of references
- Authors should view this documentation as an essential component of how they communicate their research to other scholars
- Readers should not consider a study to be credible unless such documentation is available

Project TIER: Teaching Integrity in Empirical Research



Project TIER: Teaching Integrity in Empirical Research



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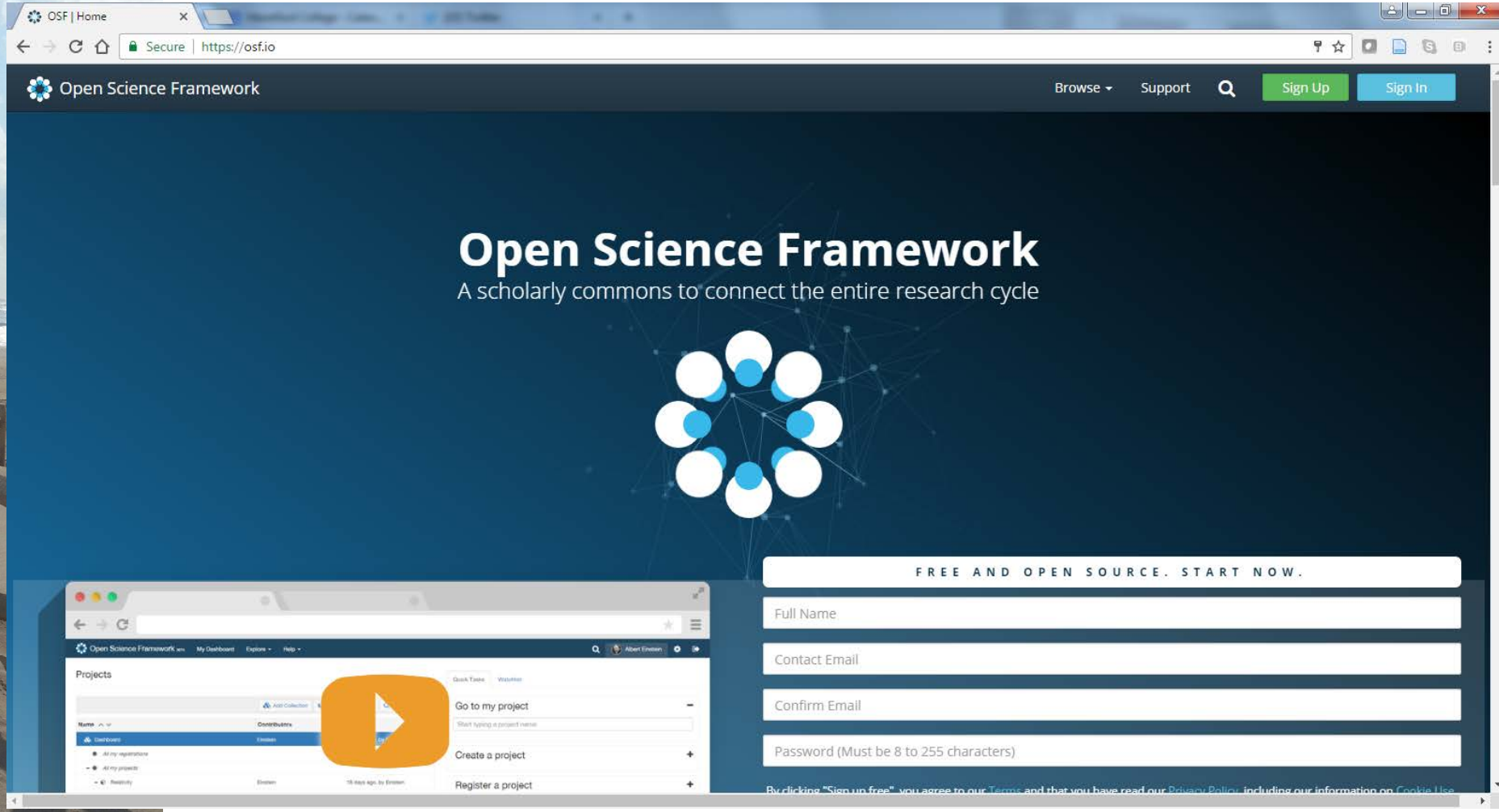

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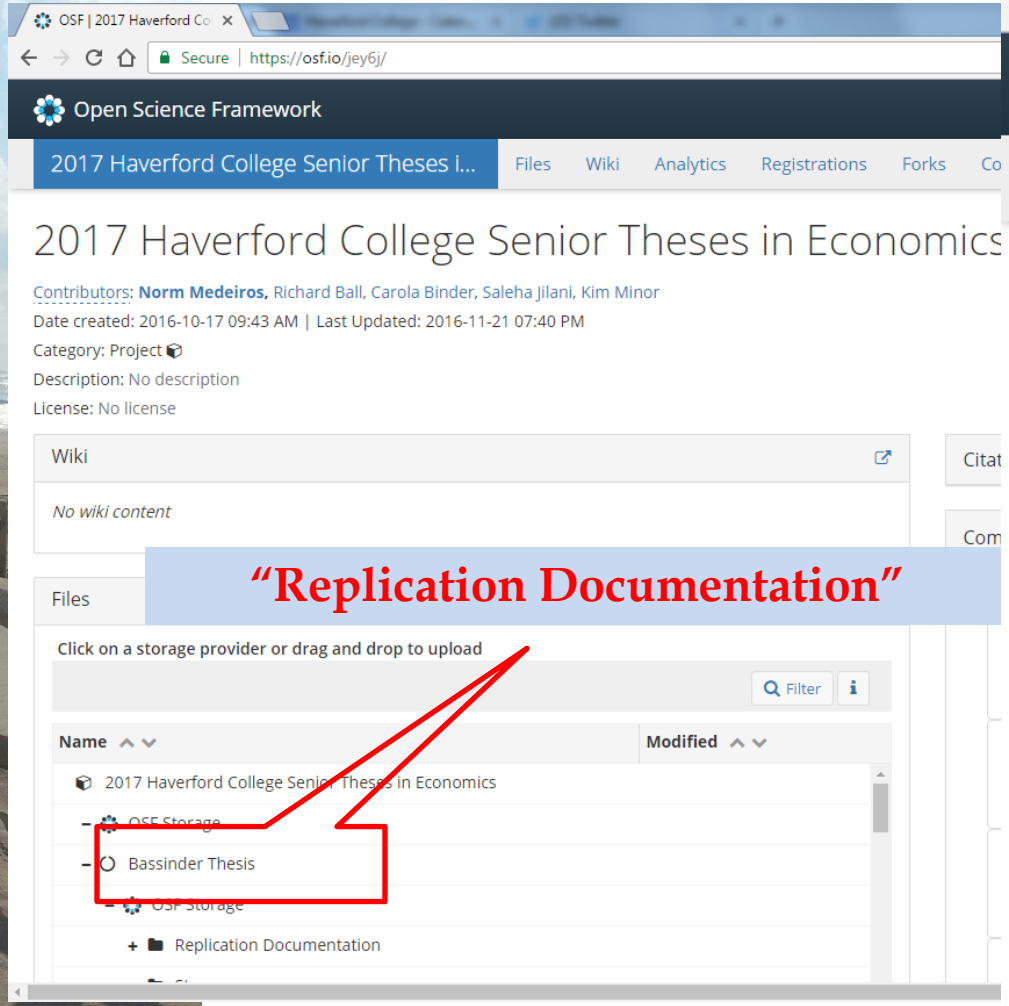
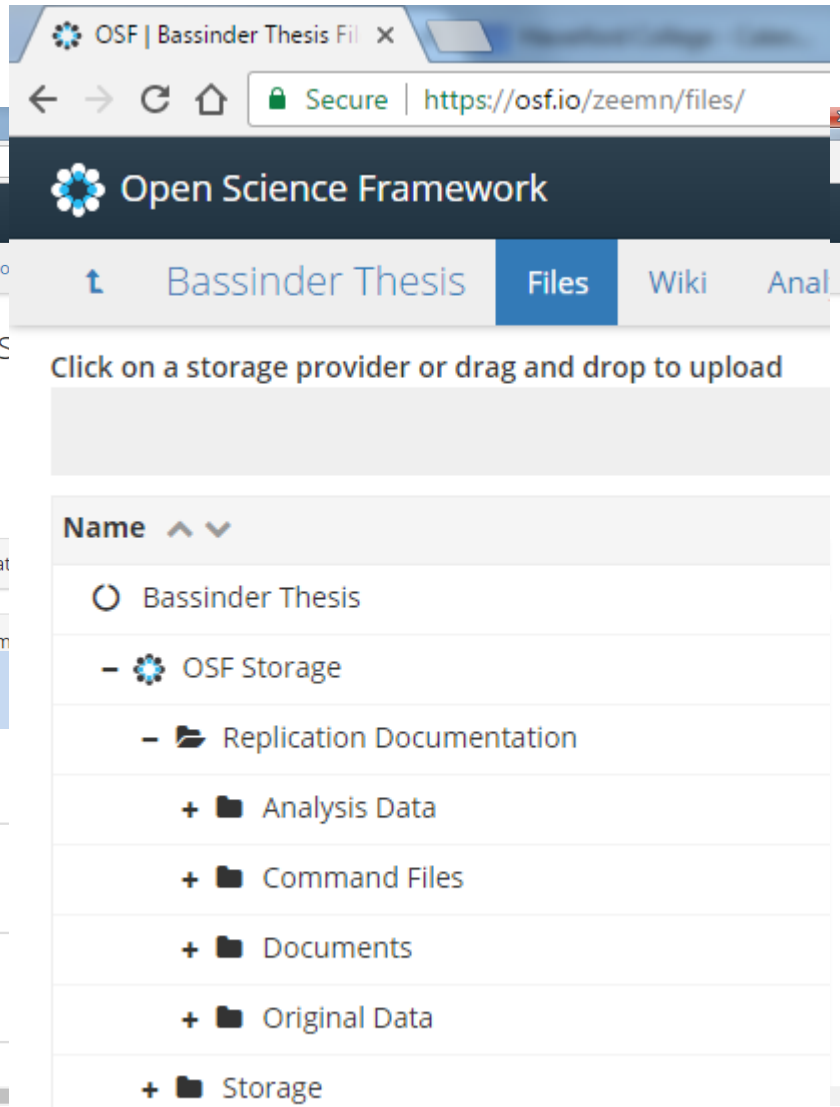
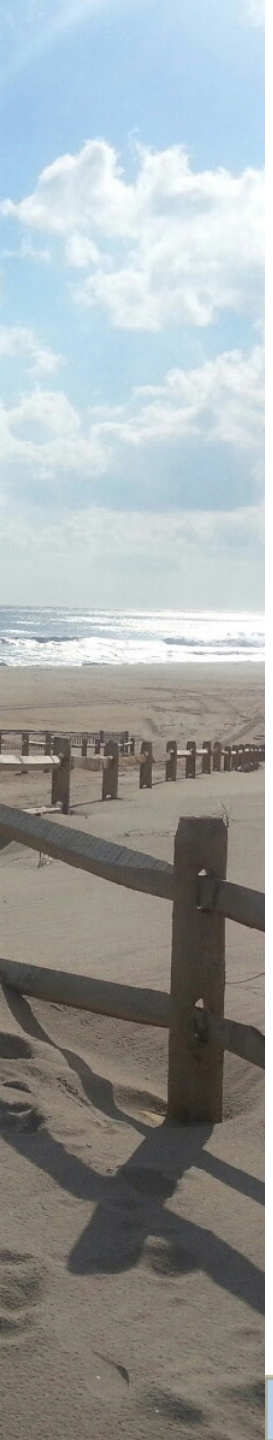




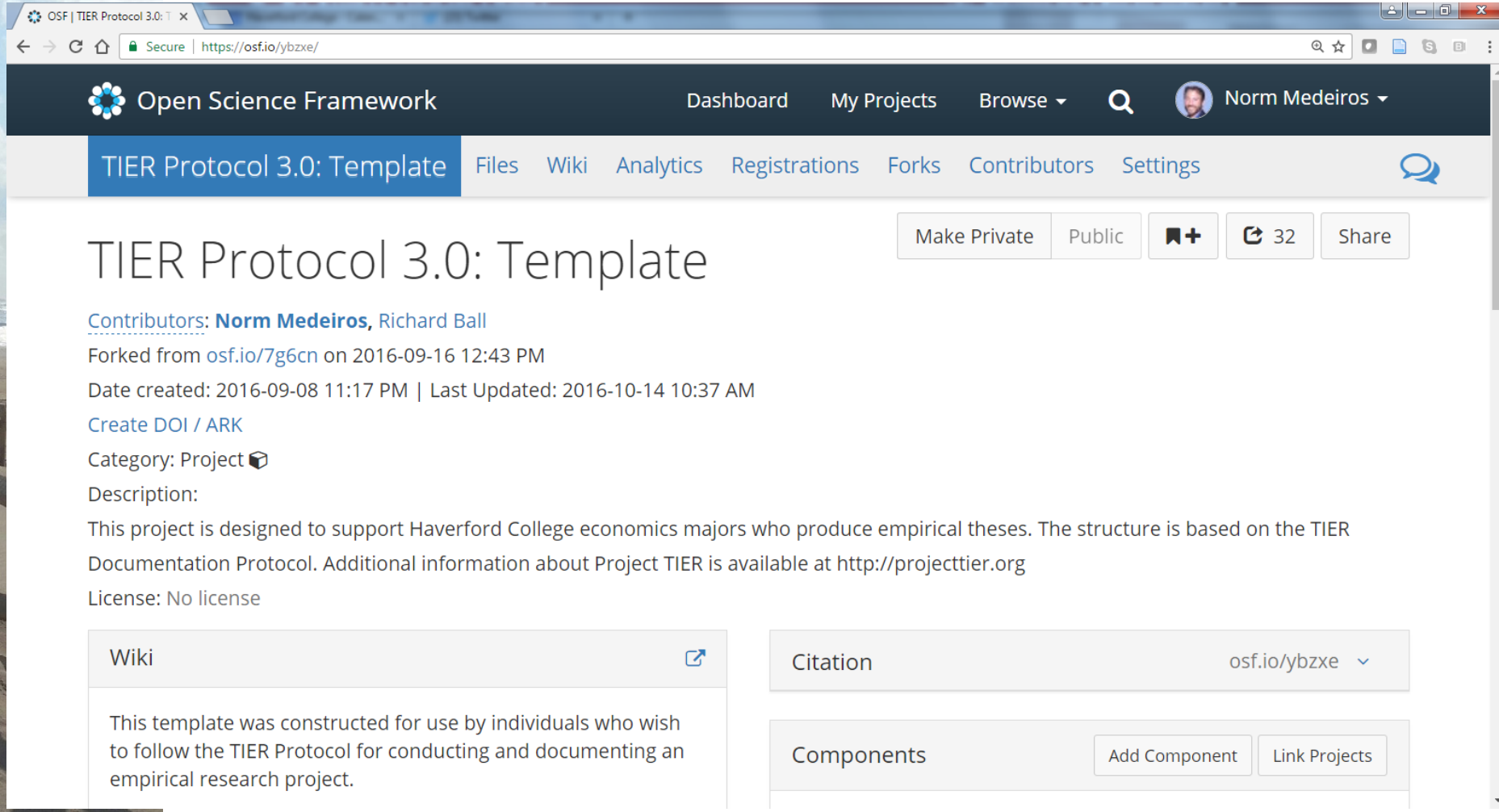


Project TIER: Teaching Integrity in Empirical Research

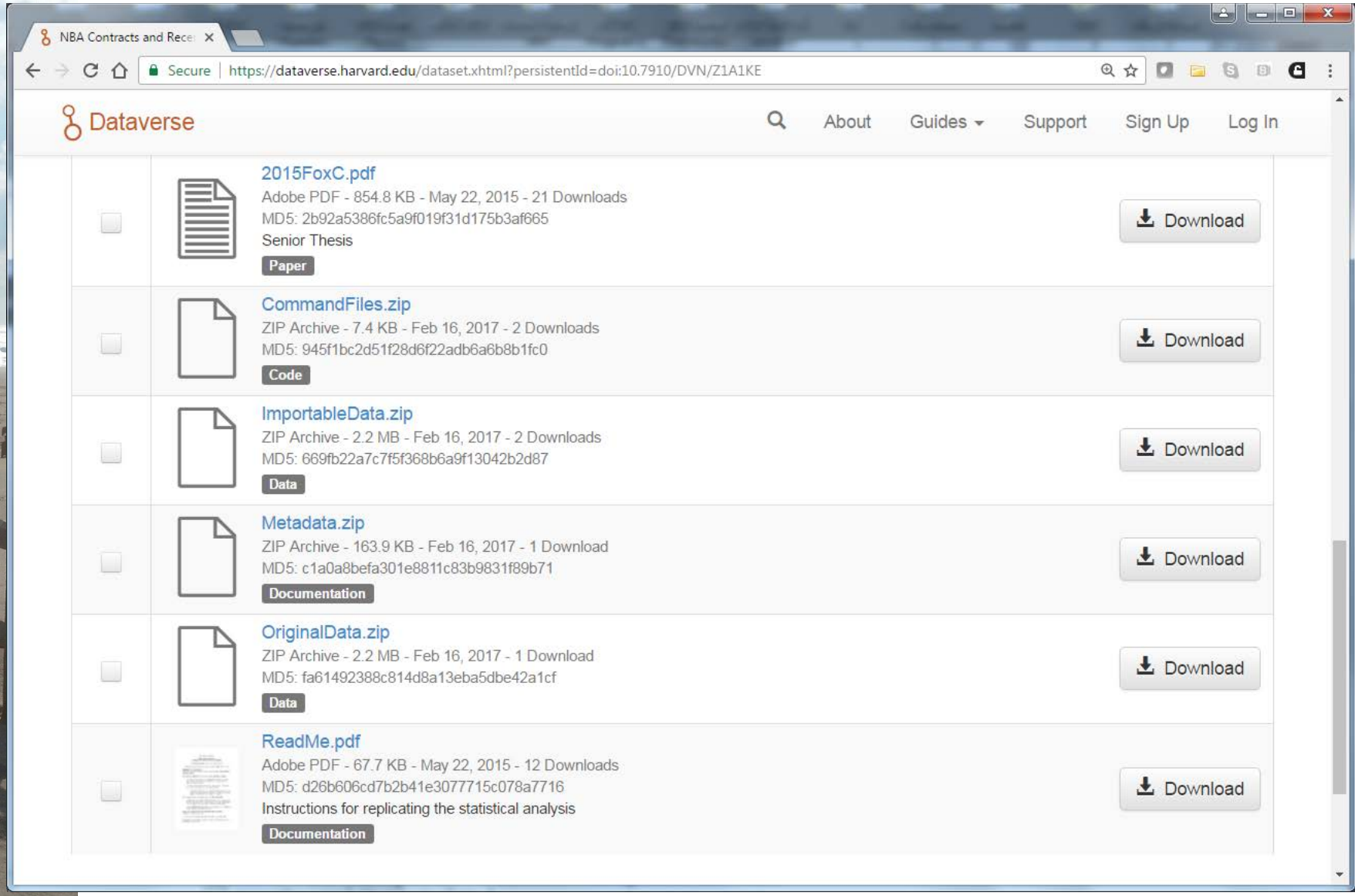
Name

- Replication Documentation for Midlife Crisis Paper
  - Analysis Data
    - country-analysis.dta
    - individual-analysis.dta
  - Command Files
    - 1-import-wdi.do
    - 2-import-pew.do
    - 3-processing.do
    - 4-data-appendix.do
    - 5-analysis.do
  - Documents
    - 1-ReadMe.pdf
    - 2-Midlife-Crisis-paper.pdf
    - 3-data-appendix.pdf
  - Original Data
    - importable-pew.dta
    - original-pew.sav
    - original-wdi.xlsx

Project TIER: Teaching Integrity in Empirical Research



Project TIER: Teaching Integrity in Empirical Research



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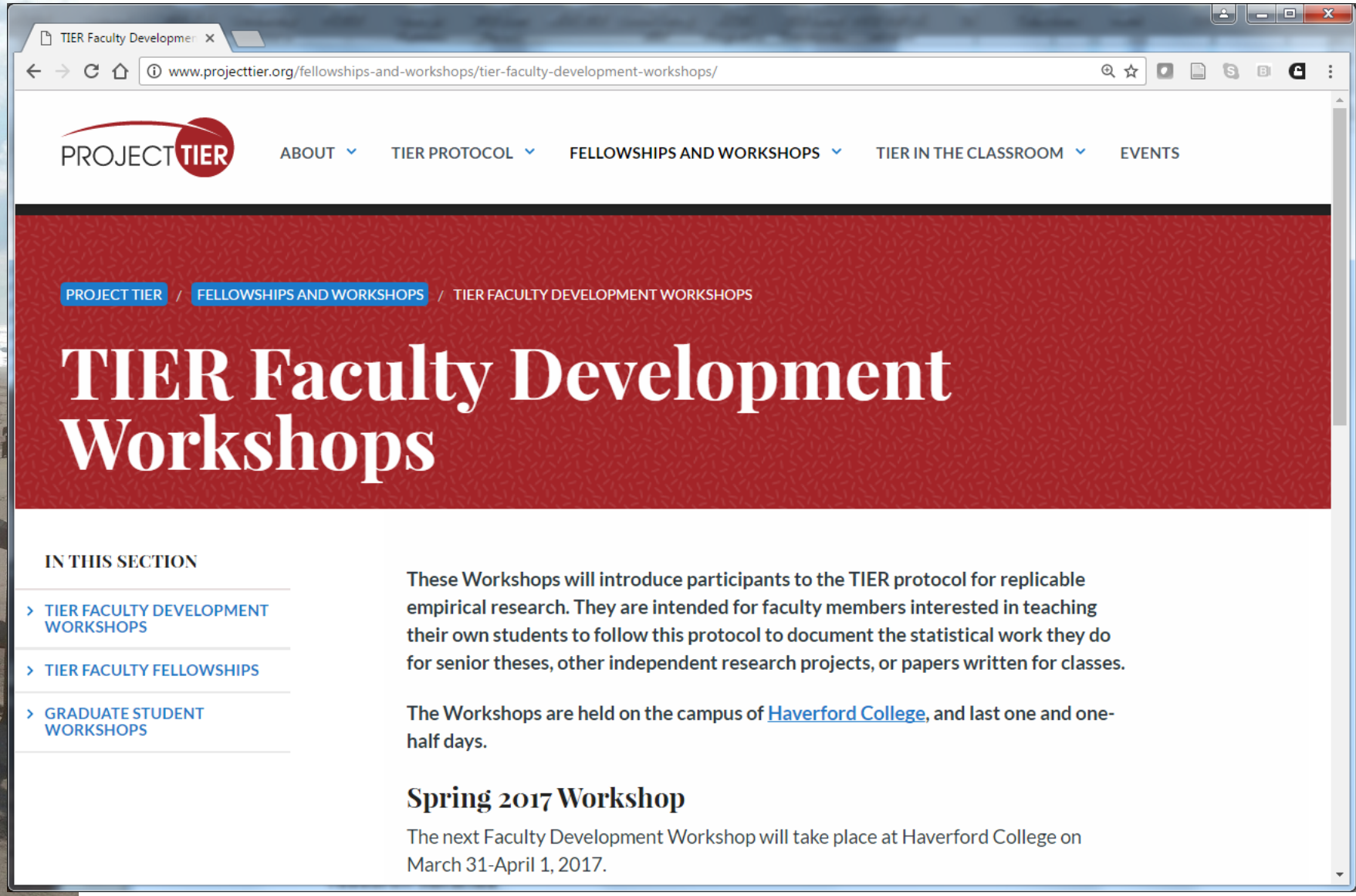

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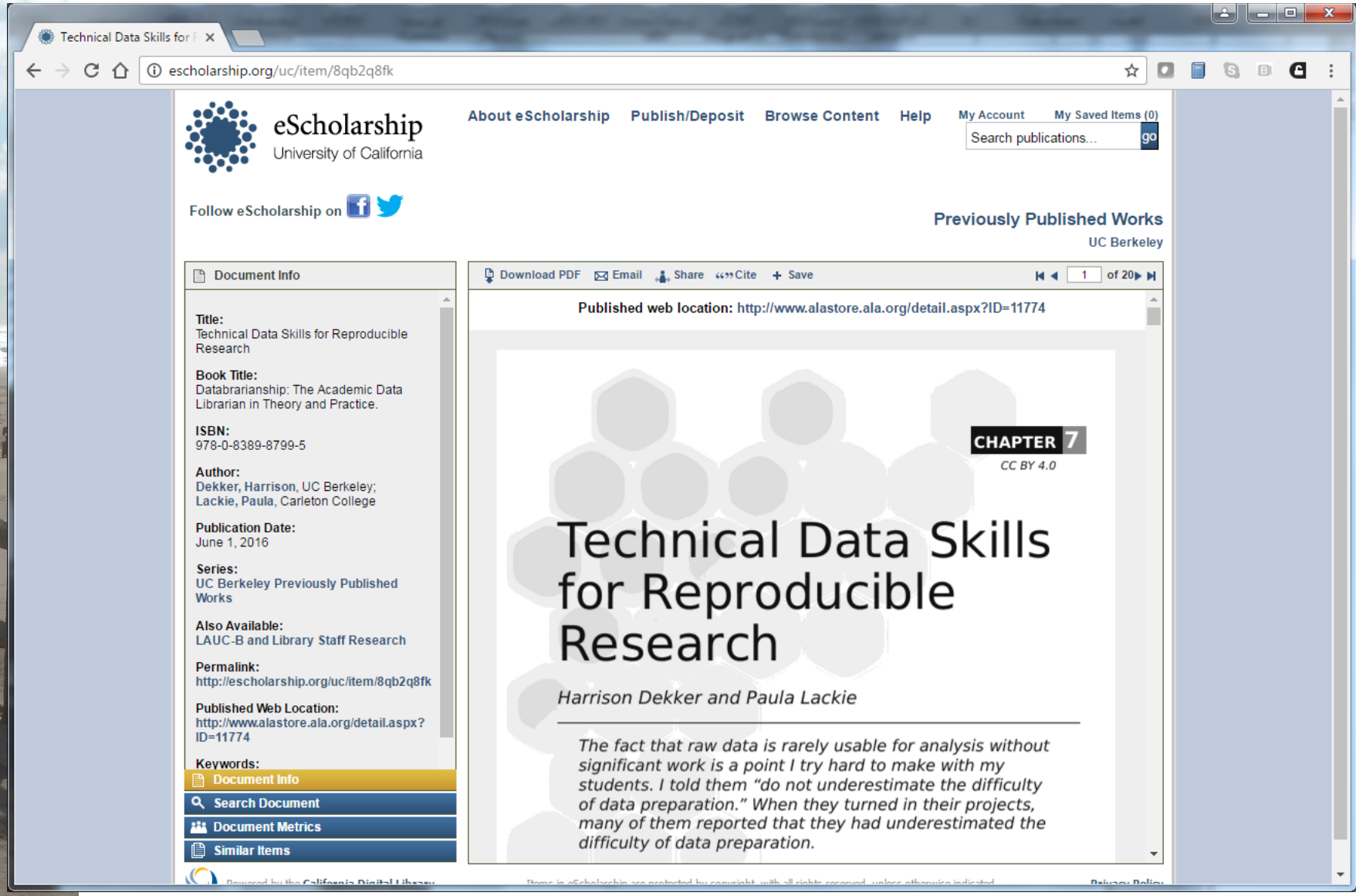

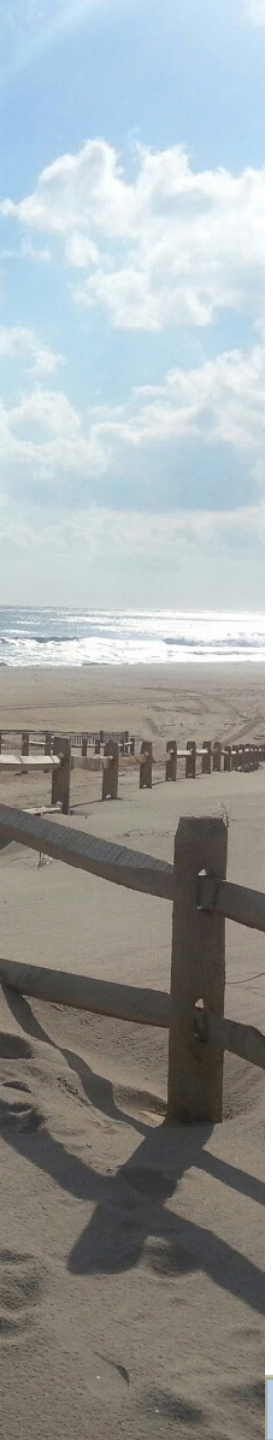

Promoting Open Science Throughout the Research Lifecycle: The Integrative Role of Libraries

Norm Medeiros

Associate Librarian for Collection Management & Metadata Services
Haverford College

Co-Director, Project TIER

16 June 2017

HAVERFORD COLLEGE

PROJECT TIER
TEACHING INTEGRITY IN EMPIRICAL RESEARCH

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Alfred P. Sloan FOUNDATION