Break-Out Session on Data Repositories

Repository Alchemy: Managing Public Access and Meeting BioMedical Researchers' Expectations

9th Annual University of Massachusetts and New England Area Librarian e-Science Symposium
Thursday, April 6, 2017
University of Massachusetts Medical School

Andrew Creamer, Data Management Librarian, Brown Library
Hope Lappen, Biomedical & Life Science Librarian, Brown Library
Neil Sarkar, Director, Brown Center for Biomedical Informatics

Goal for the Session

To understand the challenges related to developing/evolving the Library repository to leverage opportunities for public access and clinical and translational research as well as meet the data/publication/research needs of faculty and students

Interactive Component:

Identify directions/developments for your own repository to adapt to the demands of the current research and funding ecosystem

Develop use cases to capture researcher needs regarding necessary design and functionality enhancements

The Current Landscape...



Long-Term Research Data Retention and Sharing

- Federal funding agencies public access requirements
- Institutional, federal, state, and even publisher requirements for retaining data
- Growing number of publishers requiring data sharing
- Institutional interests in preservation and availability of the scholarly record
- Researcher interest in receiving credit for data publication/data analytics
- Movements to encourage data citation and data authorship
- Increased interest in clinical and translational data sharing

Tracking Publications and Compliance

- Federal funder public access requirements for final approved manuscripts
- Non-standard compliance models--each agency has its own requirements, its own repository
- Grant-funded centers and training grant administrators interested in partnering with library to track the output of these awards and those of their trainees post-award
- Institutions desire to preserve scholarly record, but may have several redundant systems
- Federal endorsement for the sharing of interim research products i.e., pre-prints

University Scholarship Retention (USR) Working Group

Formed in 2017 to find solutions for managing the Library's Scholarly Communications Issues

2017 Goals

- Advise on ways to help repository adapt
- Repository policies (terms of use, preservation, removing content)
- Doctoral dissertations and master's and senior theses archiving
- Plan effort to collect faculty publications
- Expand efforts to collect faculty and student research data
- Improve digital access to Special Collections and University Archives
- Support grant-funded initiatives

Brief Digital Scholarship at Brown Timeline

1960s Kučera and Francis's Brown Corpus of American English/ Andy Van Dam's Hypertext and Poetry/James Sakoda's DYSTAL

1990s Scholarly Technology Group (STG): Open eBook and Women Writers Project (founded in 1988 and now at Northeastern University)

2002: Brown Library's Special Collections images begin to appear online

2006: Center for Digital Initiatives (CDI) formed by Harriette Hemmasi

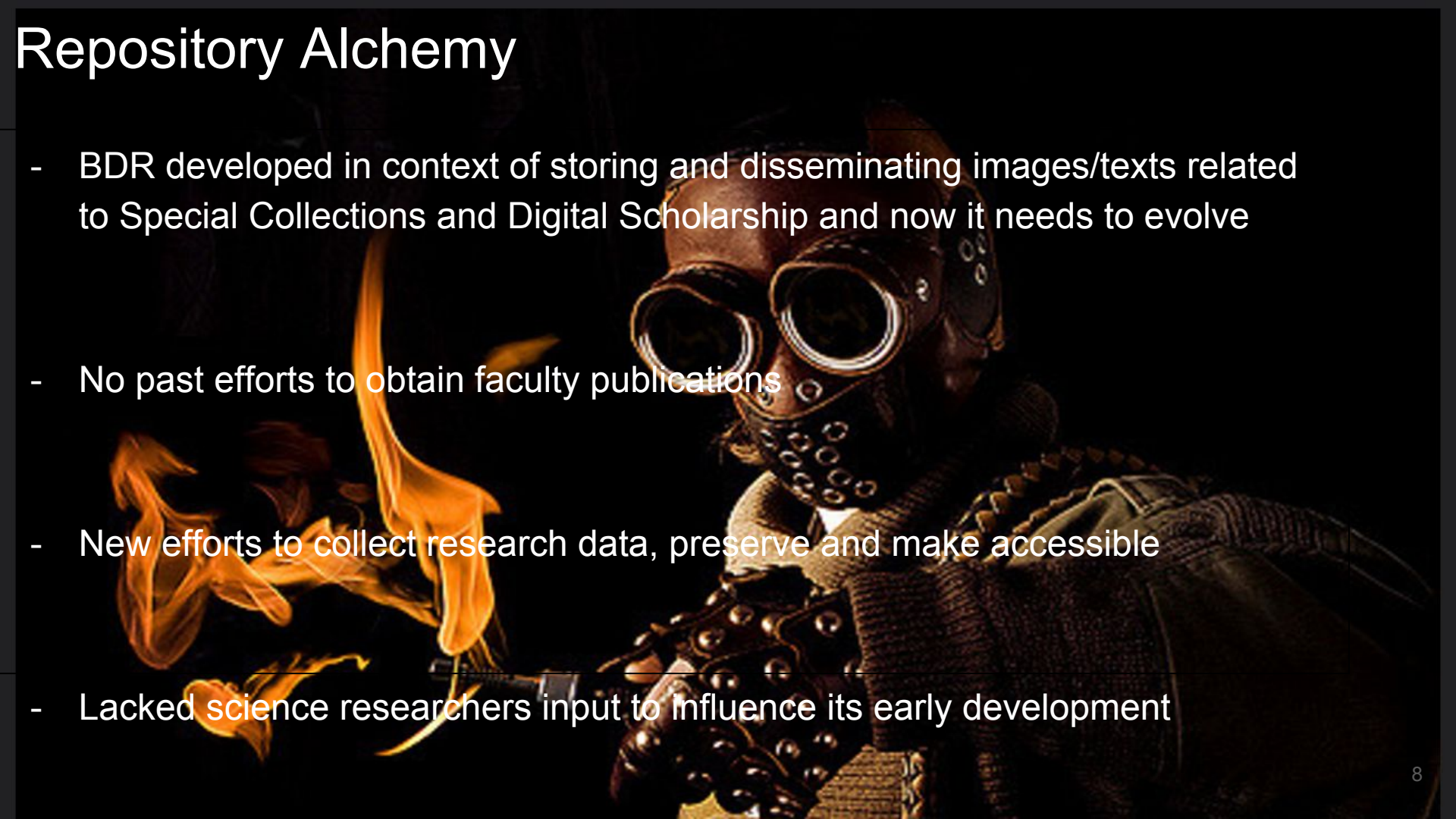
2008: STG moves from IT to the Library/Library ingests PhD dissertations

2011-13: Center for Digital Scholarship (CDS) and Brown Digital Repository (BDR)

2014-15: BDR begins to ingest research posters and scientific data sets

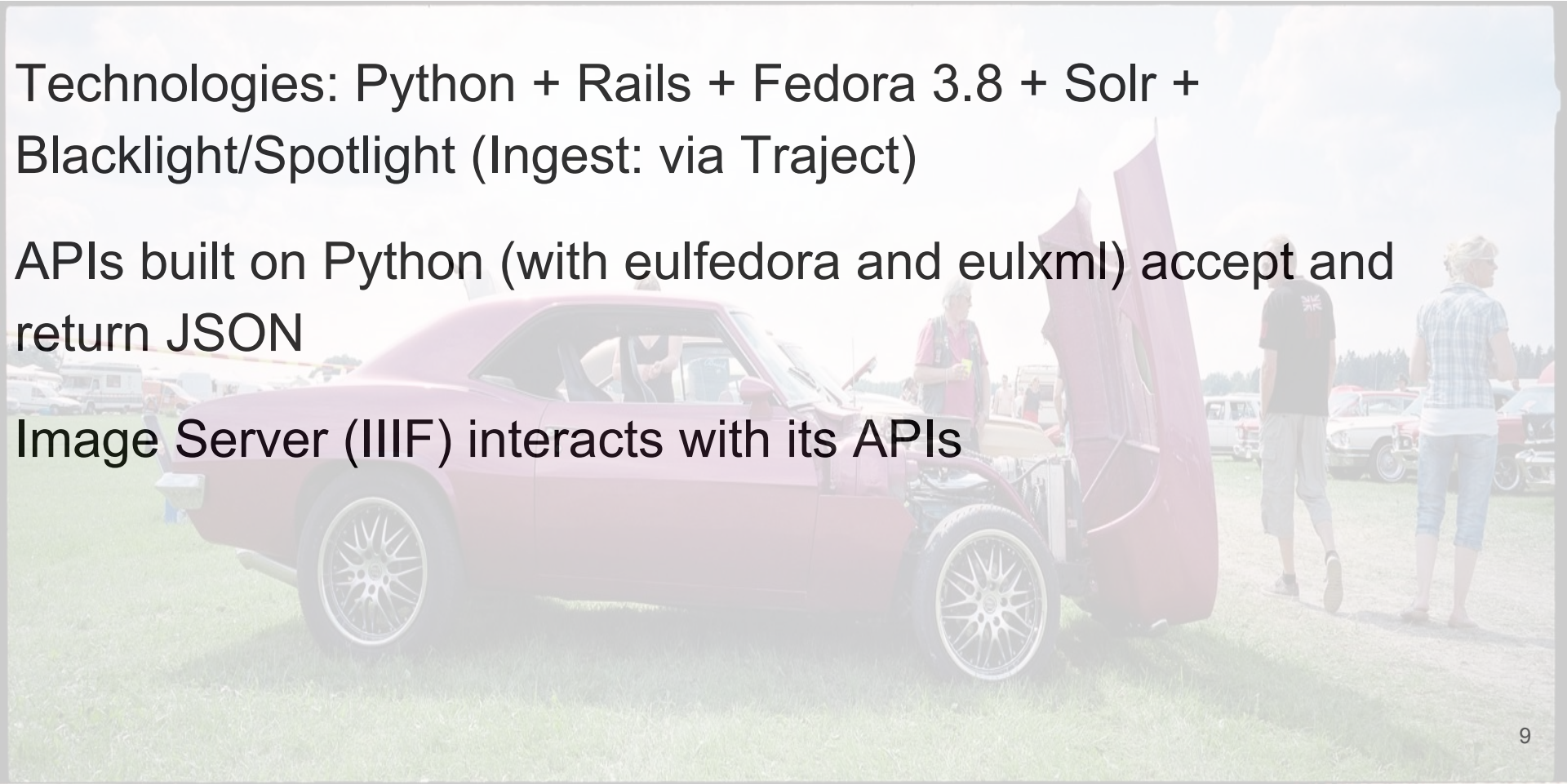
2016: Master and Senior Theses are ingested electronically for the first time

Repository Alchemy



- BDR developed in context of storing and disseminating images/texts related to Special Collections and Digital Scholarship and now it needs to evolve
- No past efforts to obtain faculty publications
- New efforts to collect research data, preserve and make accessible
- Lacked science researchers input to influence its early development

BDR Under the Hood



Technologies: Python + Rails + Fedora 3.8 + Solr + Blacklight/Spotlight (Ingest: via Traject)

APIs built on Python (with eulfedora and eulxml) accept and return JSON

Image Server (IIIF) interacts with its APIs

About the BDR

repository.library.brown.edu

As of summer 2016 it had ~26 TB of data

A little over 500K Fedora objects

DOI service

Uses MODS-METS Metadata Schema

Repository Manager, Joseph Rhoads

Repository Programmer, Ben Cail

Metadata Librarian, Ann C. Caldwell





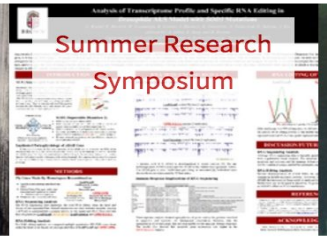
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Theses & Dissertations
Brown University dissertations since 2008

Deposited Collections
Scholar-created research collections, research data, posters, proceedings, and more.

I want to…

Upload something
Uploaded items can be kept private, shared at Brown, or shared with the public.

Digitize something
Digital Production Services can assist with digitization of materials in support of scholarship, research, and teaching.

Use an API
The BDR offers a complete set of Application Programming Interfaces (APIs) for using content in your own applications.

Assign a DOI
Digital Object Identifiers (DOIs) help publishers and scholars cite content stored in the BDR.

Consult on a project
The Center for Digital Scholarship works with scholars on digital projects across disciplines.

Read FAQ
Frequently Asked Questions may already answer your BDR-related question.

Brown Digital Repository Feedback Discover... I Want to... Andrew_Creamer@brown.edu

Refine Your Search

Imaging Modalities
- Computed tomography 6
- Diffusion-weighted magnetic resonance 4
- Magnetic resonance 6

Scanning Preparation
- Brain in container 3
- Brain on foam 3

View
- Axial view 4
- Coronal view 8
- Sagittal view 4

Keywords
- Bactrian camel 16
- Neuroimaging 16
- Magnetic resonance 10
- Tomography 6
- Diffusion tensor imaging 4

Items

« 1 »

Items (1-16) out of 16 results

20 per page | View



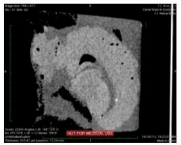
Bactrian camel neuroimaging: computed tomography, brain in container: axial view

Full Record



Bactrian camel neuroimaging: computed tomography, brain in container: coronal view

Full Record



Bactrian camel neuroimaging: computed tomography, brain in container: saggital view

Full Record



Bactrian camel neuroimaging: computed tomography, brain on foam: axial view

Full Record



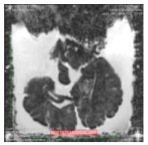
Bactrian camel neuroimaging: computed tomography, brain on foam: coronal view

Full Record



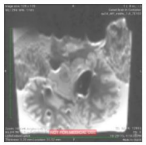
Bactrian camel neuroimaging: computed tomography, brain on foam: saggital view

Full Record



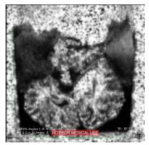
Bactrian camel neuroimaging: diffusion-weighted magnetic resonance (set 1): coronal view

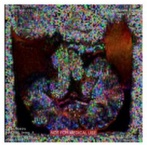
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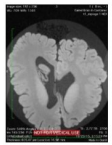


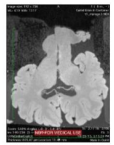
Bactrian camel neuroimaging: diffusion-weighted magnetic resonance (set 2): coronal view

Full Record









Genome-wide Transcriptome Analysis of Human Epidermal Melanocytes

Overview Full Metadata

Title
Genome-wide Transcriptome Analysis of Human Epidermal Melanocytes
Contributors
Haltaufderhyde, Kirk (creator)
Date Issued
01-01-2014
Abstract
Because human epidermal melanocytes (HEMs) provide critical protection against skin cancer, sunburn, and photoaging, a genome-wide perspective of gene expression in these cells is critical to understanding human skin physiology. In this study we performed high throughput sequencing of HEMs to obtain a complete data set of transcript sizes, abundances, and splicing. As expected, we found that melanocyte specific genes that function in pigmentation were among the highest expressed genes. We analyzed the receptor, ion channel and transcription factor gene families to get a better understanding of the cell signalling pathways used by melanocytes. We also performed a comparative transcriptomic analysis of lightly versus darkly pigmented HEMs and found 16 genes differentially

Content Views | Files

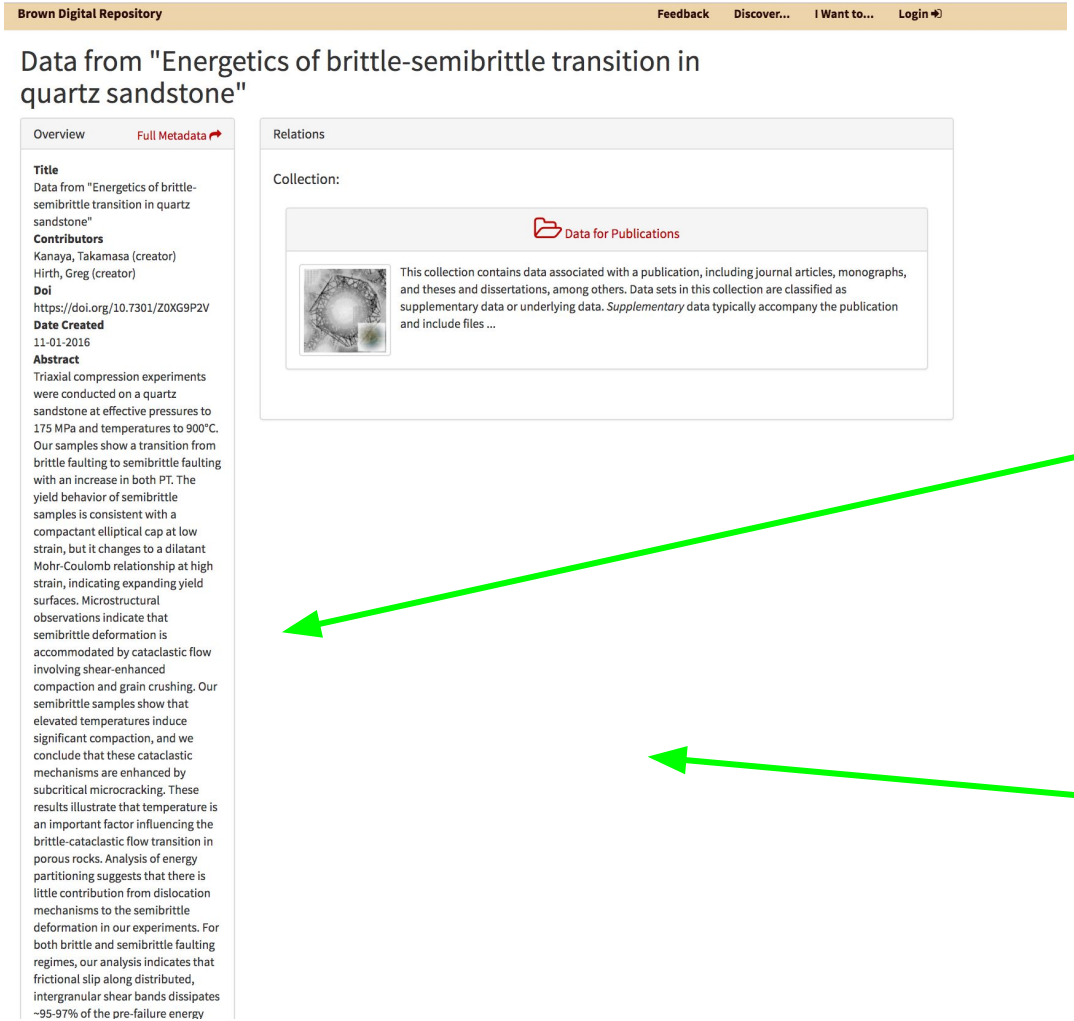
Abstract
Because human epidermal melanocytes (HEMs) provide critical protection against skin cancer, sunburn, and photoaging, a genome-wide perspective of gene expression in these cells is critical to understanding human skin physiology. In this study we performed high throughput sequencing of HEMs to obtain a complete data set of transcript sizes, abundances, and splicing. As expected, we found that melanocyte specific genes that function in pigmentation were among the highest expressed genes. We analyzed the receptor, ion channel and transcription factor gene families to get a better understanding of the cell signalling pathways used by melanocytes. We also performed a comparative transcriptomic analysis of lightly versus darkly pigmented HEMs and found 16 genes differentially expressed in the two pigmentation phenotypes; of those, only one putative melanosomal transporter (SLC45A2) has known function in pigmentation. Our melanocyte transcriptome study provides a comprehensive view and may help identify novel pigmentation genes and potential pharmacological targets. The dataset associated with this experiment-level metadata is located at the Sequence Read Archive, accessible at http://dx.doi.org/10.7301/Z0MW2F2N.
Note: *Ontology source*
ENCODEproject.org
Note: *Access*
SRP039354
Note: *No. of Samples*
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Note: *Read length*
50 bp

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- No display for DOI
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- Or related items
- No icons for common science data types
- No suggested citation
- No display of the related publication citation
- No display of multiple versions

Pivoting the Repository Towards Scientific Data...





Metadata squeezed into this narrow column, elongating the page

Where the Content Viewer once was is now a cavernous space and now no one knows where to download file

A Diagnosis of Eddy Tracer Transport in a Global 0.1 Degree Ocean Model

Overview Full Metadata

Title
A Diagnosis of Eddy Tracer Transport in a Global 0.1 Degree Ocean Model
Contributors
Bachman, Scott D. (creator)
Fox-Kemper, Baylor (creator)
Bryan, Frank O. (creator)
Dennis, John (creator)
Doi
https://doi:10.7301/Z0R20Z96
Date Created
01-01-2016
Abstract
Nine passive tracers were released in a global 0.1 degree ocean model forced with normal year forcing for 23 years. A diagnosis of these tracers using the method of Bachman & Fox-Kemper (2015) is stored here. Some of these results, using a more primitive form of the diagnosis, were reported in Fox-Kemper et al. (2013). Error estimates, based on the seasonal variability of the tracer fluxes, the short duration of the eddy statistics averaging, the number of tracers used, and other factors are estimated and detailed in the included description file. The format of the data set is designed for ease of incorporation and manipulation in

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Diagnosis of Eddy Tracer Transport in a Global 0.1 Degree Ocean Model

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- GLOBAL_INVERSION_RESULTS/cumulative_errors/t21_3d_cumulative_error.mat

Notes

This research was funded by the National Science Foundation Grant IDs: 1350795 and 0825614

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Files

METS

MODS

ZIP

Views

Archive Contents

Archive Default

Relations

Has Parts:



Technical README for Dataset: "A Diagnosis of Eddy Tracer Transport in a Global 0.1 Degree Ocean Model"

Type: Pdf

Order:

View

Collection:

Data for Publications

This collection contains data associated with a publication, including journal articles, monographs, and theses and dissertations, among others. Data sets in this collection are classified as supplementary data or underlying data. *Supplementary* data typically accompany the publication and include files ...

Title
Analysis code from "Hypertrophy changes 3D shape of hiPSC-cardiomyocytes: Implications for cellular maturation in regenerative medicine

Contributors
Rupert, Cassady (author)
Chang, Heidi (author)
Coulombe, Kareen (author)

Doi
https://doi.org/10.7301/Z0WS8R5F

Date Created
02-26-2016

Notes
This research supported by funding from the National Institutes of Health, National Heart, Lung and Blood Institute, grant ID HL115123

Extent
MATLAB script, CellProfiler pipeline

Access Conditions
Available under a GNU General Public License

License

Relations

Has Parts:



CellProfile analysis code from "Hypertrophy changes 3D shape of hiPSC-cardiomyocytes: Implications for cellular maturation in regenerative medicine"

Type: Undetermined
Order: 1
View



MATLAB analysis code from "Hypertrophy changes 3D shape of hiPSC-cardiomyocytes: Implications for cellular maturation in regenerative medicine"

Type: Undetermined
Order: 2
View

Collection:

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This collection contains data associated with a publication, including journal articles, monographs, and theses and dissertations, among others. Data sets in this collection are classified as supplementary data or underlying data. *Supplementary* data typically accompany the publication and include files ...

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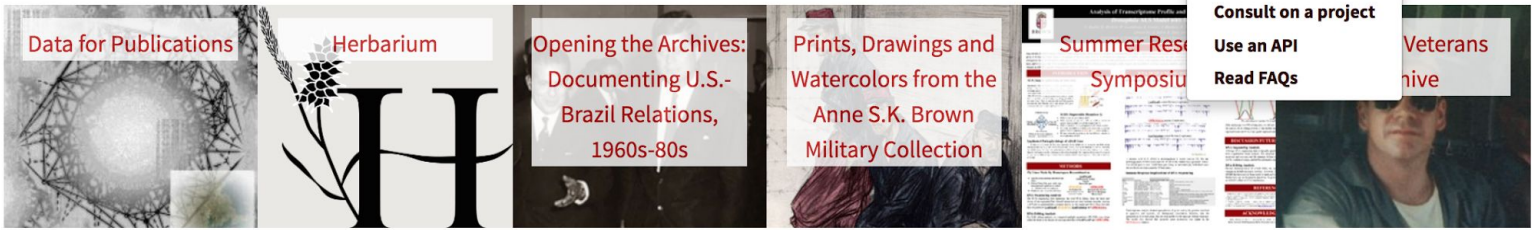
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Uploaded items can be kept private, shared at Brown, or shared with the public.

Digitize something
Digital Production Services can assist with digitization of materials in support of scholarship, research, and teaching.

Use an API
The BDR offers a complete set of Application Programming Interfaces (APIs) for using content in your own applications.

Assign a DOI
Digital Object Identifiers (DOIs) help publishers and scholars cite content stored in the BDR.

Consult on a project
The Center for Digital Scholarship works with scholars on digital projects across disciplines.

Read FAQ
Frequently Asked Questions may already answer your BDR-related question.

Self-Upload Issues

Omitting important metadata for data

Can only upload one file at a time so multiple files must be zipped up

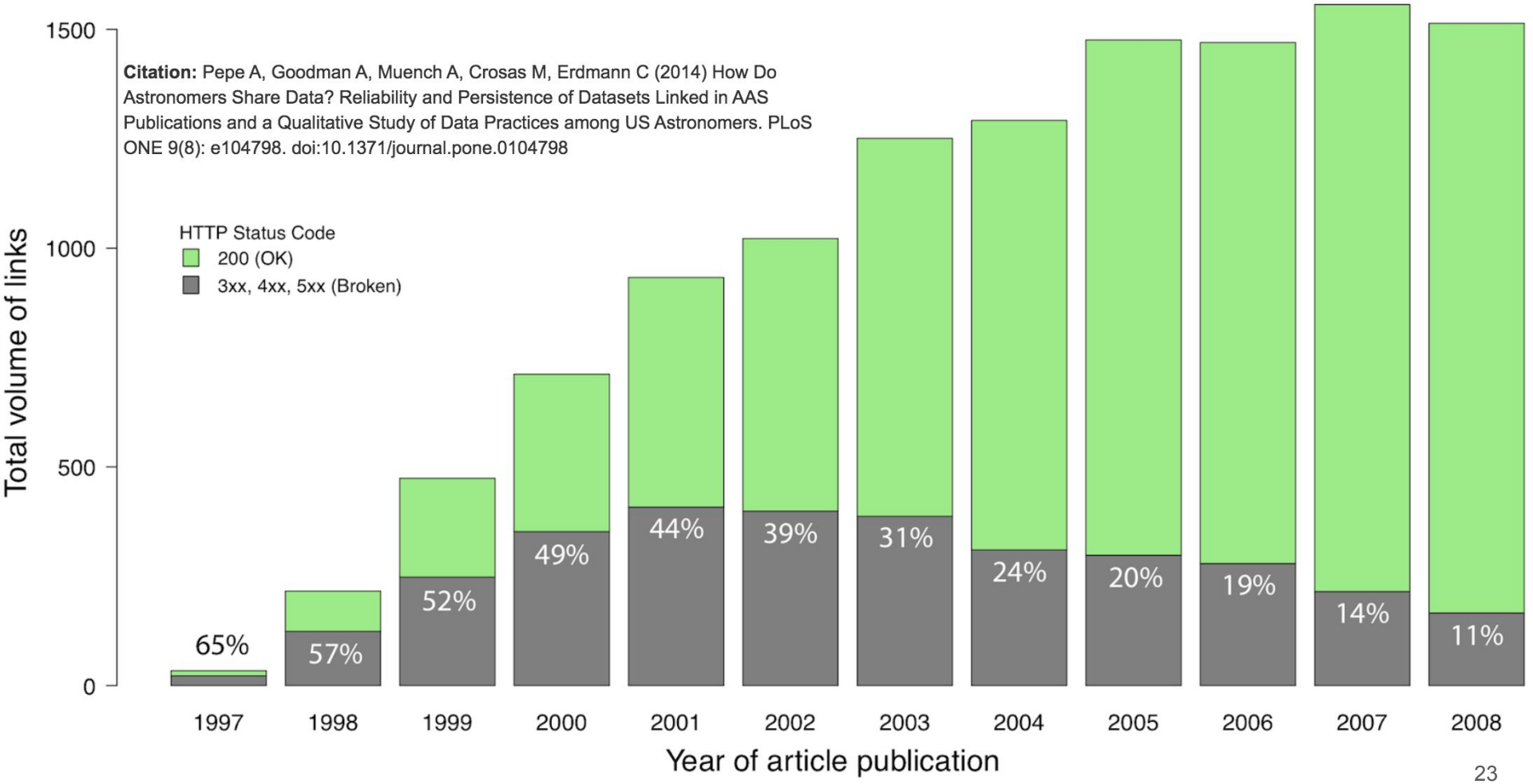
If upload more than one file it creates a separate record for each file so user has to re-enter the same metadata multiple times

Users cannot edit or access their deposits after they have left the University

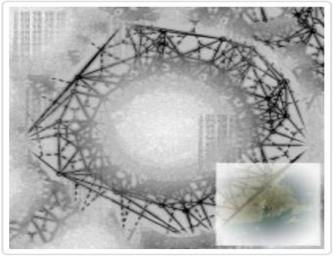
No policy for allotted storage/arbitrary file size upload

Users have to enter another system to request DOI, so they have to repeat much of the metadata they just entered to ingest the dataset


OPEN


Citation: Pepe A, Goodman A, Muench A, Crosas M, Erdmann C (2014) How Do Astronomers Share Data? Reliability and Persistence of Datasets Linked in AAS Publications and a Qualitative Study of Data Practices among US Astronomers. PLoS ONE 9(8): e104798. doi:10.1371/journal.pone.0104798
HTTP Status Code
200 (OK)
3xx, 4xx, 5xx (Broken)
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Year of article publication

Data for Publications



This collection contains data associated with a publication, including journal articles, monographs, and theses and dissertations, among others. Data sets in this collection are classified as supplementary data or underlying data. *Supplementary* data typically accompany the publication and include files such as tables, figures, or other files that the authors were unable to include in their publication or files that their publisher was unable to include on its website. Supplementary data are not necessary for the replication or reproduction of research results reported in the publication. *Underlying* data are files that contain the results reported in the paper as well as the files that are necessary for the interpretation, replication, and reproduction of the results, such as analysis software and metadata.

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All Fields | Search

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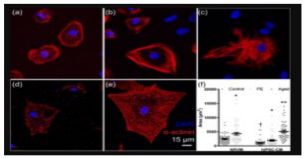
Keywords

- Climatology 4
- Oceanography 3
- Turbulence 3
- Aging 2
- Bats 2
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Items

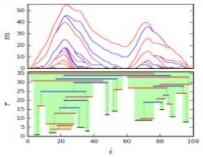
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Analysis code from "Hypertrophy changes 3D shape of hiPSC-cardiomyocytes: Implications for cellular maturation in regenerative medicine

Full Record



Code library and video from article "Depinning as a coagulation process"

Full Record

Code library and video from article "Depinning as a coagulation process"

Full Record



A collection of Paleoclimatic data for comparison to orbitally-forced climate models, version 1.0

Full Record

Citation: Gerhard F, Deger M, Truccolo W (2017) On the stability and dynamics of stochastic spiking neuron models: Nonlinear Hawkes process and point process GLMs. PLoS Comput Biol 13(2): e1005390. doi:10.1371/journal.pcbi.1005390

Editor: Jeff Beck, Duke University, UNITED STATES

Received: July 6, 2016; **Accepted:** January 28, 2017; **Published:** February 24, 2017

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Data Availability: All relevant data files are available from the Brown Digital Repository: DOI: 10.7301/Z0K0726H.

SFHERE Project



SFHERE (**S**ocial and **F**amily **H**istory - **E**xtraction, **R**epresentation, and **E**valuation) is a multi-site project involving a transdisciplinary team of investigators from Brown University, University of Minnesota, and University of Vermont. The overall goal of this project is to use electronic health record (EHR) data and computational approaches to study the interactions among social, behavioral, and familial factors (e.g., tobacco use, alcohol use, drug use, and family history) for conditions such as pediatric asthma and adult epilepsy. The SFHERE project is funded by National Library of Medicine/National Institutes of Health grant R01LM011364.

The SFHERE Digital Library includes annotation schema, annotation guidelines, datasets, models, publications, presentations, and links to software (e.g., NLP and data mining tools) associated with different factors. For more information about the types of documents, please see the SFHERE Digital Library Documentation.

If any resources in the SFHERE Digital Library are used, please include the DOI for the resource as well as a link to this site and cite any corresponding publications. The DOI for the SFHERE Digital Library is: 10.7301/Z04T6G9P.

SFHERE Project Team Members

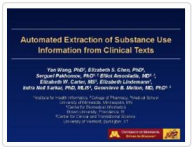
Subcollections (2)

SFHERE Products



This collection contains annotation guidelines, annotation schema, sample datasets, models, and tools.

SFHERE Publications and Presentations



This collection houses journal articles, conference papers and presentations, and abstracts and posters authored by members of the SFHERE team.

Schaulust: A Study in Light and Sound

Overview Full Metadata

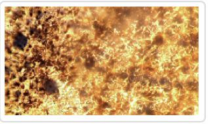
Title
Schaulust: A Study in Light and Sound
Contributors
Cetilia, Mark J (creator)
Rovan, Joseph (Director)
Winkler, Todd (Reader)
Osborn, Ed (Reader)
Greenlee, Shawn (Reader)
Brown University. Music: Computer Music and Multimedia (sponsor)
Doi
https://doi.org/10.7301/Z0WM1BBB
Copyright Date
01-01-2016
Abstract
"Schaulust: A Study in Light and Sound" is an investigation into the development of a new audiovisual performance platform called Schaulust. This platform pairs custom hardware and software designed specifically for use in real-time improvisation with stroboscopic light, robotically-controlled mirrors, and large, optical-quality cast-glass prismatic lenses. The resulting performances are full-body experiences that embrace the base pleasures afforded by the generation and manipulation of light and sound as physical objects, evolving over time from the hypnotic to the chaotic. The work is grounded in a firm foundation of experimental film, video, and the performance of

Content Views | Files

Has Parts:



Apathy and Steel
Type: Mp4
Order:
View



Pulse Shape 22
Type: Mp4
Order:
View



Schaulust: Ctrl+Alt+Repeat Ten Year Anniversary Performance
Type: Mp4
Order:
View



Schaulust: Dissertation Performance
Type: Mp4
Order:
View



Schaulust: Sonic Focus Performance 3.5
Type: Mp4
Order:
View

Collection:

Computer Music and Multimedia Composition Dissertations

Dissertations for the Computer Music and Multimedia Composition department.

Frictional properties of the chiropteran tendon locking mechanism

Overview Full Metadata

Title
Frictional properties of the chiropteran tendon locking mechanism
Contributors
Quinn, Max M. (author)
Swartz, Sharon (advisor)
Roberts, Thomas (reader)
Doi
https://doi.org/10.7301/Z0HD7SKN
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05-06-2016
Abstract
In many flying bats there is a unique anatomical structure present in the foot that is thought to facilitate bats' roosting behavior of hanging upside down. This structure, known as a digital tendon locking mechanism (TLM), consists of the digital flexor tendon and its surrounding sheath at the region of the metatarsophalangeal joint. The unique microanatomy of these tissues--specifically, tubercles on the tendon and plicae on its sheath--creates a ratchet-like mechanism that locks the digits into a flexed

Content Views | Files

This is a large file

ID: bdr:659529/PDF

Size: 34.4 MB

Type: application/pdf

Relations

Has Parts:



Data for "Frictional properties of the chiropteran tendon locking mechanism"
Type: Txt
Order: 1
View



Images for "Frictional properties of the chiropteran tendon locking mechanism"
Type: Zip
Order: 2
View

The Long Road Ahead...



Goals for BDRs Research Data Services

- Less mediated upload process
- Improve PIDs- ORCID IDs, ISNIs,
- Provide analytics
- Improve item view and file discovery
- Display suggested citations and related publication citations
- Display versions
- Create and improve existing policies
- Improved self-upload (able to upload multiple files, request DOI upon ingest)
- Data catalog capacity for tracking output
- Integration with existing internal and external systems
- Put more BDR tools in the hands of librarians to improve workflow

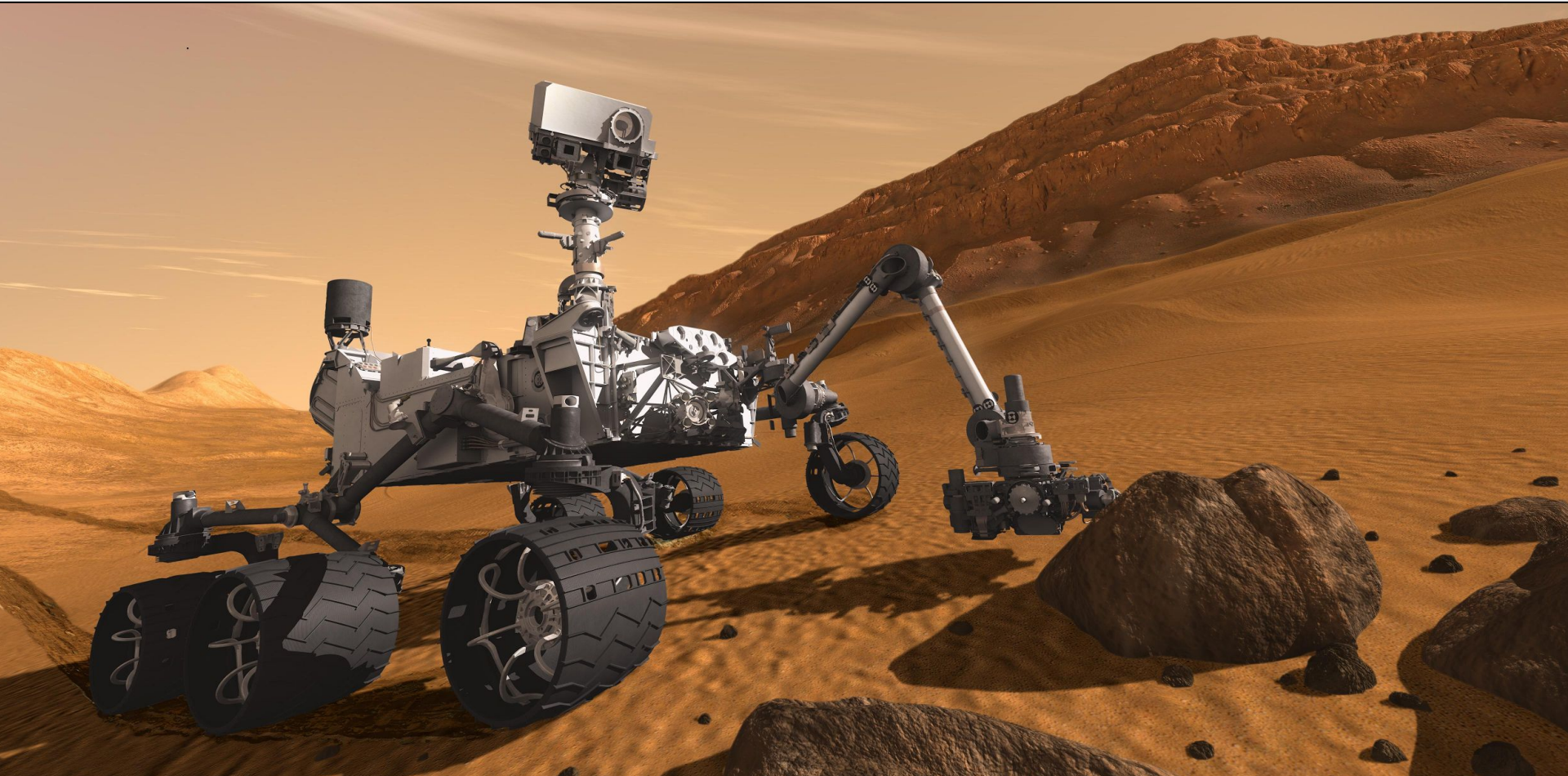

Do we need separate systems
for scientific data?

"I'm Givin' Her All She's Got, Captain!"

- Programmer colleagues need our input
- Repository pulled in many directions
- May be new to dealing with scientists and their expectations/timelines for deliverables
- Downside is we are always reacting, but...
- Patience is key



Pivoting the Repository Towards Publications...



Technical Issues with Adding Publications

- Lack of relevant metadata in self-upload tool about: other versions, licensing, embargo, grant funding
- Formatting of metadata on record is not great for including abstracts.
- Google Scholar indexing.
- Providing metrics views/downloads is a nice feature for many types of materials, but especially publications.
- No way to push to any other campus or funder research system



More Important!!

- Author **incentives** to deposit
- **Workflows** for mediating those deposits


Once upon a time...

Use Cases

Use cases describe an interaction between the system and the user that documents a function of the system

- Can help define what functionality is required without specifying how it will be implemented.
- Helps to define scope and priorities.
- Allows you to base decision-making on real life scenarios rather than hypotheticals (or just what other projects are doing).

Use Cases

- “Business” level - what do we, the library, want out of this system?
  - Includes project vision and stakeholders
- User level - how do users interact with the system and what do they want from it
  - This is where the use cases come in!
- Technical level - what can actually be done based on the existing system and available resources.

Dr. Cooper is an astrophysicist. Each paper he writes typically has data files that range from 5 gigs to a terabyte in size as supplementary materials. He would like to be able to self-deposit his next dataset in the repository so that he can cite it in his manuscript and published article. Since he is so busy, having to upload each file to the repository would be a time-consuming burden. He would prefer to be able to **upload multiple files and have to enter metadata about the files only once**, instead of having to enter the same information for each file uploaded several times. Ideally he would like to be able to **drag and drop** his files and not worry about size constraints. Once he completes his upload, he would like to **automatically generate a DOI for his deposit** using the metadata that he already has entered instead of having to log back into another platform and re-enter metadata to get his DOI. Once his data files have been uploaded, then he would like to be able to go to his data set record in the repository and be able to select and download any one of the files he has uploaded without having to download all the files at once.

Use case → Requirements

The upload tool should allow user to upload multiple files for which they will enter a single set of metadata.

Upload tool should support drag-and-drop loading of files.

Upload tool should include option to mint DOI based on metadata entered there.

Use Cases

Ways to generate

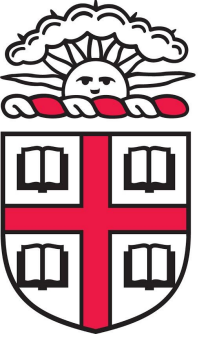
- Best to start with a list of stakeholders
- From own knowledge/interactions with users
- Focus groups, interviews, and workshops
- Can also plan something more elaborate using a prototype

Researcher Perspective

(1) What should academic libraries have in mind when adapting their repositories?

(2) How can libraries develop infrastructure to partner with their faculty on research projects and grant-funded initiatives, such as informatics and clinical and translational science?

Q & A: What informatics perspectives are you interested in hearing?



BROWN *Center for* Biomedical Informatics

Founded in July 2015 to lead the development and application of informatics approaches in biomedicine and health care.

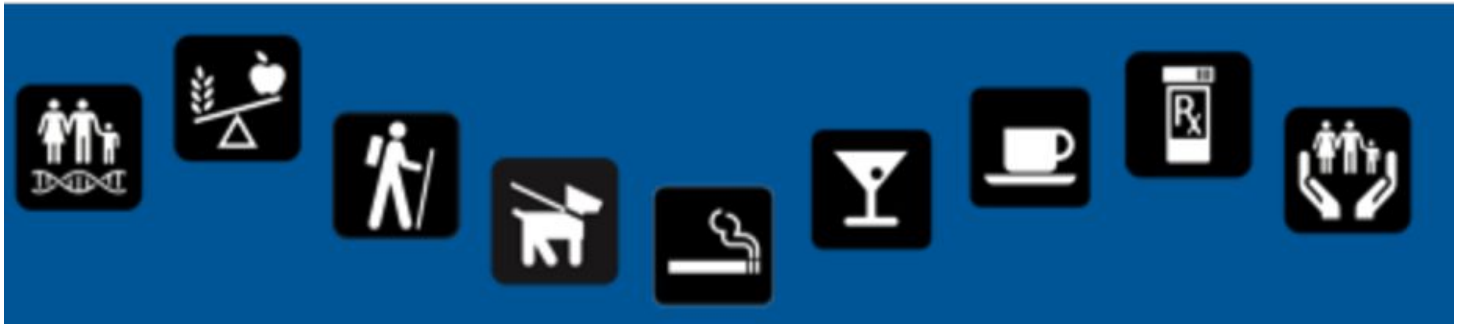
The three-fold mission of BCBI is to:

(1) ***Innovate*** how electronic biomedical and health data are used

(2) ***Implement*** solutions for improving biomedical research and healthcare delivery, and

(3) ***Inspire*** the next generation of biomedical researchers and clinicians in partnership with collaborators in existing areas of excellence at Brown, its hospital affiliates, and statewide healthcare organizations.

Current BCBI-Library Partnerships

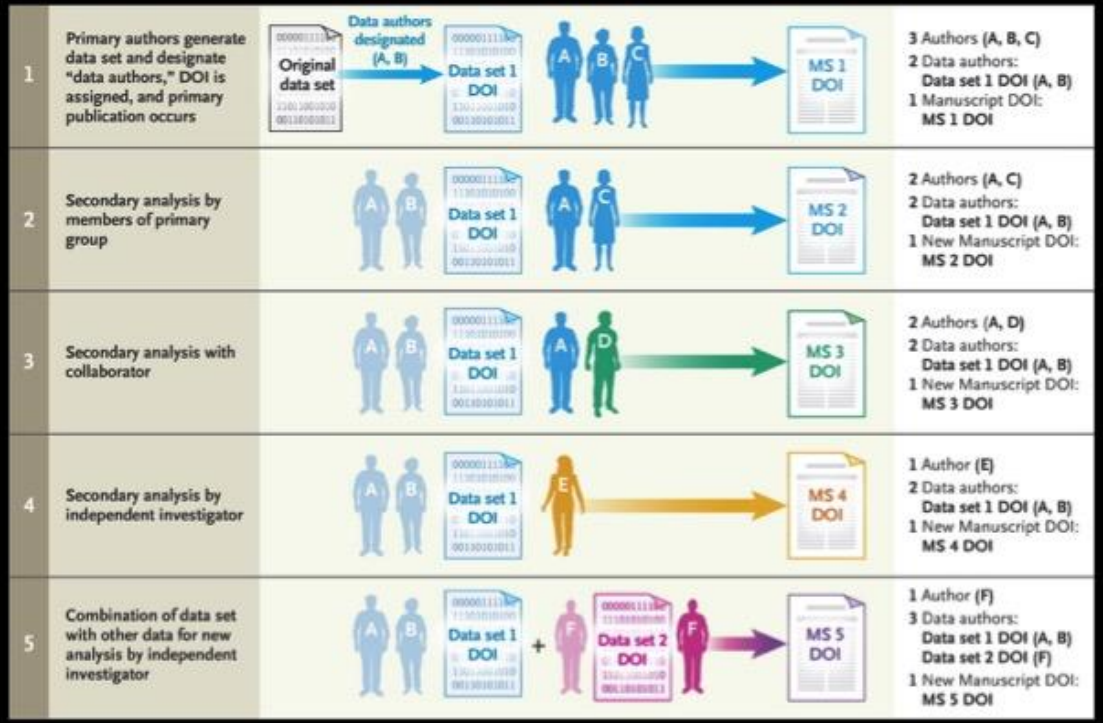


Herbarium

- In Silico Identification of Phytotherapies*
- Leveraging the EHR to Collect and Analyze Social, Behavioral & Familial Factors

*Also has a NLM Administrative Supplement for Informationist Services

Credit for Data Sharing and Tracing the Data Set.

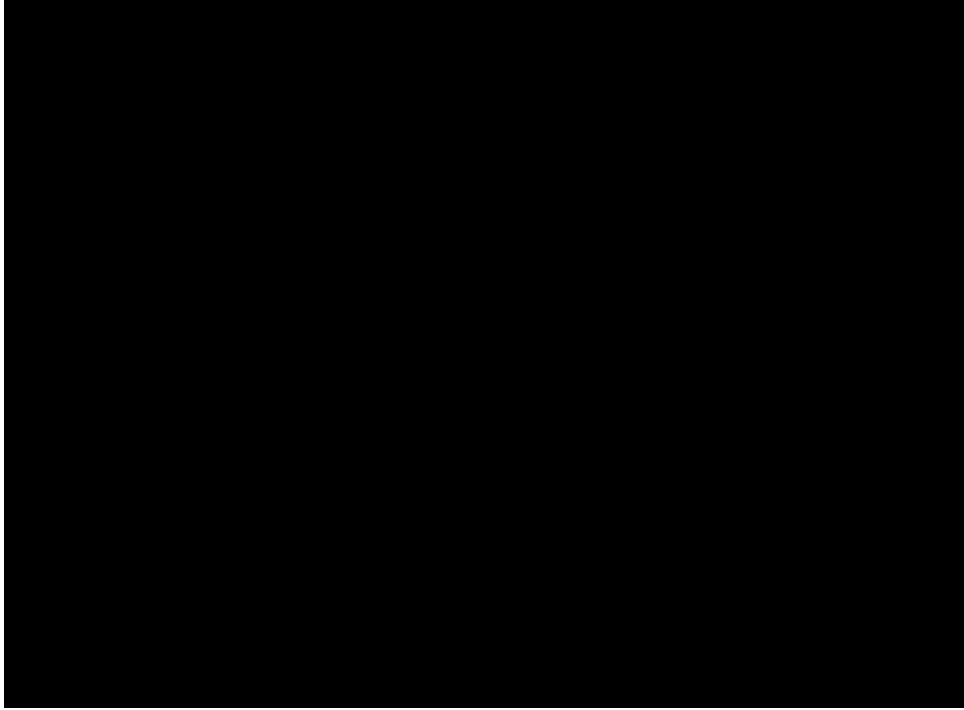


Bierer BE et al. N Engl J Med 2017. DOI: 10.1056/NEJMsb1616595

The NEW ENGLAND JOURNAL of MEDICINE

Q & A

Thank you!



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