# Diving into Data:

#### Implementing a Data Repository at the Texas Digital Library

TDL Dataverse Implementation Working Group



# Panel Outline





# Part 1:

The Introduction



"Sound, reproducible scholarship rests upon *a foundation of robust, accessible data*. For this to be so in practice as well as theory, data must be accorded due importance in the practice of scholarship and in the enduring scholarly record. In other words, *data should be considered legitimate, citable products of research...*"



Data Citation Synthesis Group: Joint Declaration of Data Citation Principles. Martone M. (ed.) San Diego CA: FORCE11; 2014 <u>https://www.force11.org/datacitation</u>.





## **TDL Mission Statement**

The Texas Digital Library is a consortium of Texas higher education institutions that *builds capacity* for preserving, managing, and providing access to unique digital collections of enduring value.





Maria Esteva (TACC); Colleen Lyon (UT Austin); Jeremy Donald (Trinity); Martha Buckbee (UT Southwestern); Christie Peters, Santi Thompson (UH); Kristi Park, Ryan Steans (TDL)

### Step 1: Put our heads together

### TDL Data Management Working Group

**Charge:** Help the TDL determine what kinds of data management services it could provide at a consortial level.

Develop criteria Evaluate proposed projects Investigate issues Document findings Make recommendations for services



... Dataverse provides the best combination of system performance and robustness, user ease, platform scalability, and an active open source community that responds to the evolving needs of the user community. The group recommends that TDL, through its membership, adopt Dataverse to facilitate the discovery of research data and its associated metadata.



#### Texas Digital Library

TDL Data Management Working Group Report Published August 28, 2015

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#### Introduction

The need for Data Management services is one of two large-scale needs consistently expressed by Texas Digital Library (TDL) members, a need driven in part by the February 2013 mandate from the White House's Office of Science and Technology Policy to make the results of federally funded research publicly accessible.<sup>1</sup> For more information on how federal agencies plan to implement this policy, please see Appendix D.

The TDL Data Management Working Group convened in Fall 2013 to begin to address this gap, with a particular focus on finding solutions for making research data accessible and reusable.

The charge of the group was to help the Texas Digital Library determine what kinds of data management services it could provide at a consortial level.

Its objectives included:

- Articulating criteria for selecting pilot projects
- Evaluating proposed projects based on that criteria
- Selecting no more than three projects to implement
- Investigating issues related to storage and accessibility of data sets
- Documenting findings and recommendations for services

<sup>1</sup> The February 2013 OSTP directive, entitled "Increasing Access to the Results of Federally Funded Research" mandated that, each Federal agency with over \$100 million in annual research and development expenditures develop a plan to support increased public access to the results of research.

# Step 2: Make it happen

TDL Dataverse Implementation Working Group

Charge: Pilot test, assess, and launch a consortial repository for research data archiving and management.

Members; Denyse Rodgers (Baylor); Bruce Herbert, Sean Buckner, Wendi Kaspar, Cecilia Smith (TAMU); Ray Uzwyshyn, Todd Peters (Texas State); Christopher Starcher (Texas Tech); Jeremy Donald (Trinity); Kristi Park, Ryan Steans, Nick Lauland, Laura Waugh (TDL)



# Part 2:

The Need



#### The Fourth Paradigm: Data-Intensive Scientific Discovery

"Jim Gray described his vision of the fourth paradigm of scientific research.

He outlined a two-part plea for the funding of tools for **data capture**, **curation**, and analysis, and for a **communication and publication infrastructure**.

He argued for the establishment of modern stores for data and documents that are on par with traditional libraries."

http://research.microsoft.com/en-us/collaboration/fourthparadigm/



#### The FOURTH PARADIGM

**DATA-INTENSIVE SCIENTIFIC DISCOVERY** 

TTED BY TONY HEY, STEWART TANSLEY, AND KRISTIN TOLL



# Use Case: Make Research Data Publicly Available

**Primary Actors**:

PIs of federally funded research

Researchers working on unfunded research or funded research with no retention requirements

Graduate students working on theses, dissertations, or other datagenerating projects.



### Federal Mandates For Public Access to Research



#### The Library Supports:

**Publication repositories** 

Tools to create data management plans

**TDL** Data repository

#### Workflows, standards, & policies

http://www.whitehouse.gov/blog/2013/02/22/expanding-public-access-results-federally-funded-research



					plos.org	create accoun	t sign in	
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### **ETDs in Institutional Repositories**

#### TEXAS A&M SCHOLARSHIP GLOBAL IMPACT

Since the 2007 launch of **OAKTrust**, Texas A&M's open access repository, its >71,000 articles, reports, theses, dissertations and other digital objects have been downloaded *more than* **36 million times** by users in **nearly every country** on Earth.



ATM LIBRARIES

spearheads campus-wide initiatives to open, share, and preserve scholarship

An ...

OAK

holarship and research of Texas A&A

Workflows, standards, & policies

**Enhance the Impact of our ETDs:** 

Co-publish data sets

Vireo ingestion

Links in metadata



Open Access Week is an international event promoting open access as the new default for peer-reviewed scholarship and research.

OPEN CACCESS

# Use Case: Share Data within a Trusted, Collaborative Network

**Primary Actors**:

Researchers involved in collaborative teams or networks





### Impact of Team Collaboration

**Fig. 2.** The relative impact of teams. (**A** to **D**) Mean team size comparing all papers and patents with those that received more citations than average in the relevant subfield. (**E** to **H**) The RTI, which is the mean number of citations received by team-authored work divided by the mean number of citations received by solo-authored work. A ratio of 1 indicates that team- and solo-authored work have equivalent impact on average. Each point represents the RTI for a given subfield and year, whereas the black lines present the arithmetic average in a given year.

Wuchty et al. (2007). Science 316(5827): 1036-1039.



### **Collaboration Across Institutions**



**Fig. 1.** The rise in multi-university collaboration. By comparing the incidence of papers produced by different authorship structures, we see that the share of multi-university collaborations strongly increases from 1975 to 2005. This rise is especially strong in SE (**A**) and SS (**B**), whereas it appears weakly in AH (**C**), in which collaboration of any kind is rare. The share of single-university collaborations remains roughly constant with time, whereas the share of solo-authored papers strongly declines in SE and SS.

Jones et al. (2008). Science 322: 1259-1262.



## Use Case: Seek Data to (Re)Use

**Primary Actors**:

Researcher is interested in conducting a meta study reusing data developed in earlier studies

Public using data for personal needs

Organizations seeking data for their needs.



#### Open Data Open Sharing of the Paper and the Data



Wiew all metrics + mentions on the Web





#### JOE'S RECONSTRUCTED SKULL



#### Open Data Open Sharing of the Paper and the Data

This reconstruction shows how the skull of "Joe" the baby Parasaurolophus might have looked when complete. The keratinous beak has been included here; its attachment to the bone is shown by a subtle line around the upper beak. The model was based upon CT scans of the fossil skull, with missing parts filled in from related dinosaurs.

Reconstruction copyright Ville Sinkkonen, used with permission.

Having trouble viewing the model? This 3D viewer works best on Firefox, Chrome, and Safari (no Internet Explorer, sorry!). Many of the files are viewable as 3D PDFs (via Adobe Acrobat) for download from the journal article at *PeerJ*, including a 3D pdf of the skull. A table with links to all of the raw data hosted at Figshare (including printable STL files) is available at *PeerJ*.

Copyright © 2015 aymond Alf Museum. All Rights Reserved. http://dinosaurjoe.org/joes-bones/digital-joe/joesskull-reconstruction/



Thanks

# Part 3:

### The Design



## **Researcher Use Cases**

Title: Researcher needs to make their research data publicly available

#### **Primary Actor**

Primary actors may include PIs of federally funded research, researchers working on unfunded research or funded research with no retention requirements, and graduate students working on theses, dissertations, or other data-generating projects.

**Title:** Researcher needs a virtual research environment to share active data, which may or may not be publicly accessible, within a prescribed collaborative network

#### **Primary Actor**

Researchers involved in collaborative networks.

Title: Researcher seeks data to (re)use

#### **Primary Actor**





ID	Function	Use Case #	Evaluation Factor	How important is this feature? (Average Score 0-3)	How well does the system perform this function? (Average Score 0-3)	Summary
l.1	Ingest	1	Upload the system offers a simple ingest option for user	3	2.5	Platform offers user the ability to drag and drop files from their desktop. Unclear how it would interact with other file destinations (including drop box).
1.2	Ingest	1	Controlled vocabulary the system provides users with standardized lists of terms to describe their data (using drop down menus or other interfaces)	2.33	1.4	Controlled vocabulary terms are offered only as a broad list at the subject level.
1.3	Ingest	1	Copyright Permissions Verification/Notification the system requires the user to agree to a series of	3	0	The system does not alert user of copyright issues or policies prior to the ingest



View Full Evaluation Matrix

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### **TDL Dataverse Implementation Working Group**

### **Policy and Governance**

- Sean Buckner
- Santi Thompson
- Ray Uzwyshyn

### **Workflows and Outreach**

- Jeremy Donald
- Wendi Kaspar
- Cecilia Smith
- Chris Starcher

### **Budget/Business Model**

- Bruce Herbert
- Kristi Park
- Ryan Steans
- Santi Thompson

### **Technical Configuration**

- Nick Lauland
- Todd Peters
- Denyse Rodgers
- Ryan Steans

Marketing and Coordinator Extraordinaire: Laura Waugh

## Policy and Governance

Internal and external policies creation



Icon image from the "Basic Applications" icon set. http://www.flaticon.com/packs/basic-application. Designed by Freepik.<u>www.freepik.com</u>. Used under license



### Workflows and Outreach

Develop and test workflows for researchers and librarians

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## **Budget and Business Model**

Assess costs and identify potential funding models





## **Technical Configuration**

Setup, configure, and test system and its features

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Icon image from the "Basic Applications" icon set. <u>http://www.flaticon.com/packs/basic-application</u>. Designed by Freepik.<u>www.freepik.com</u>. Used under license





#### **User Guide**

#### Texas Research Data Repository Pilot Project

Participants in the Texas Research Data Repository Pilot Project are asked to complete the Required Tasks (steps 1 - 8) below. Participants are also welcome to spend as much time as they like in the repository and complete the Optional Tasks (steps 9 - 15).

After completing the Required Tasks (and Optional Tasks, if applicable), participants are asked to complete the follow-up survey and provide feedback and observations about using Dataverse for the Texas Research Data Repository: SURVEY LINK

#### **Required Tasks:**

- 1. Create a user account
- 2. Prepare data, code, and additional documentation files
- 3. Create metadata
- 4. Create a Dataverse (i.e., collection)
- 5. Upload information about the dataset
- 6. Share dataset
- 7. Publish dataset
- 8. Download dataset

#### **Optional Tasks:**

- 9. Use mapping and statistical analysis tool
- 10. Alter default Terms of Use
- 11. Make your dataset restricted
- 12. Create multiple versions of a dataset
- 13. Deaccession a dataset
- 14. Turn on the Guestbook feature
- 15. Add a logo to your Dataverse

#### Resources

- About the Repository
- User Guide
- Licensing
- Policies
- Frequently Asked Questions
- Texas Research Data Repository Metadata Guidelines
- Data Management Working Group Report
- Pilot Project Promotional Flyer



# **Pilot Survey Demographics**

Type of Respondent	Participation Percentage
Researchers	31%
Librarians	69%
Overall Rate of:	%
Response	59%
Completion	89%



# **Completing Required Tasks**

Answer	%
Create a user account	100%
Create a Dataverse (i.e., collection)	88%
Upload at least one dataset	100%
Provide metadata information for dataset(s)	100%
Publish dataset(s)	94%
Download a dataset	100%
	Texas Digital Libra

# **Completing Optional Tasks**

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Answer	%
Utilize the mapping analysis tool	17%
Utilize the statistical analysis tool	33%
Request access to a restricted dataset	17%
Utilize versioning of data	17%
Turn on the Guestbook feature in Dataverse	50%
Add a logo to the Dataverse instance that you created	17%



# Meet Disciplinary Data Needs?

Answer	%
Extremely well	13%
Very well	56%
Moderately well	6%
Slightly well	25%
Not well at all	0%



# Future Repository Services?

Answer	%
Assistance describing data	40%
Assistance setting up a location in the repository for research projects	20%
Assistance finding data in the repository for reuse	20%
Assistance managing data prior to submitting it to the repository	47%
Assistance applying digital preservation best practices with research data	53%
Texa	s Digital Library
# Future Repository Features?

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Answer	%
Linking research data with an existing publication	100%
Linking supplemental data with an electronic theses or dissertation	50%
Management of collaborative teams within the data repository	13%
Customizable submission screen with instructions	6%
Development and growth of interdisciplinary research data related to Texas geographic regions and topics	13%



## Most Important Benefits?

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Answer	%
Fulfill federal mandates for sharing publications and research data	56%
Make your research data more widely available	50%
See statistics on downloads and citations of my data	31%
Make my data citeable through the assignment of a DOI (digital object identifier)	44%
Save versions of your dataset	31%
Collecting all my data in one place	63%



# Part 4:

The Benefits







# Part 5:

#### **Texas Research Data Repository Demonstration**



## What we'll cover

- 1. What is a Dataverse versus a Dataset?
- 2. Uploading Data
  - a. Creating a Dataverse
  - b. Creating a Dataset
- 3. Visualizations
- 4. Re-Using and Sharing your data



#### **Dataverse and Datasets**

A Dataverse is a home for your research project, your community, etc...
 OYou can easily build a Dataverse within a Dataverse (Ex: University Dataverse > Archaeology Dataverse)
 OYou can stack Dataverses within one another (Ex: University Dataverse > Archaeology Dataverse > Roman Archaeology Dataverse) to create sub-sub Dataverses

 Datasets live within a Dataverse - you can associate multiple datasets within a Dataverse (Ex: Different dig site datasets from different locations may all be under one Dataverse for a single researcher archaeologist)

## A Dataverse Demo (Uploading Data)



#### Add a New Dataverse (a home for your datasets)



#### Add Metadata and Settings to your Dataverse

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	S Dataverse		٩	About Guides - Support 💄 Dataverse Admin 🧧	*
	New Dataverse Texas Digital Library Test Dataverse > New	A statewide collaboration of higher	education institution	ns in Texas	
	Dataverse * Enter name	Dataverse	Affiliation	Dataverse.org	
Basic Information	Identifier * https://dataverse-clo	ne.tdl.org/dataverse/	Host Dataverse	Texas Digital Library Test	
	Category * Select one	×	Description	O This field supports only certain HTML tags.	
	Email * Support@tdl.org	+			
	Metadata Fields	Choose the metadata fields to use in	n dataset templates and v	when adding a dataset to this dataverse.	
Metadata Fields ———	•	<ul> <li>Use metadata fields from Texas Dig</li> <li>Citation Metadata (Required) [+] \</li> <li>Geospatial Metadata [+] View field</li> <li>Social Science and Humanities Meta</li> <li>Astronomy and Astrophysics Metad</li> </ul>	ital Library Test Datavers /iew fields ds adata [+] View fields ata [+] View fields	se	
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	Browse/Search Facets	Choose the metadata fields to use a	as facets for browsing dat	tasets and dataverses in this dataverse.	
Search Facets —	•	Use browse/search facets from Texa	as Digital Library Test Da	taverse	
		All Metadata Fields	Selected		
		Author Affiliation	Author Name		
		Language	Keyword Term		

#### Now - add a dataset to your Dataverse



#### First, add Metadata for each dataset

fexas Digital Library Test Datave	rse > TCDI 2016. Test: Dataverse Dataverse > <b>New Dat</b>	aset		
Host Dataverse				
HUST Dataverse				
*Asterisks indicate required fie	lds			
Citation Metadata 🛧				
Title *	Enter title			
	Add "Replication Data for" to Title			
Author*	Name*	Affiliation*		
	Admin, Dataverse	Dataverse.org	+	
	Identifier Scheme	Identifier		
	Select	•		
Contract *	Mana			
Contact	Admin. Dataverse	Dataverse.org		
	E-mail*			
	Support@tdl.org			
Description *	This field supports only certain HTML t	ags.		
	Text*		+	

#### Adding data files requires only a simple upload

Files					
File upload limit is 2GB per	file. For more informatior	about supported file for	rmats, please refer to th	e User Guide.	
+ Select Files to Add					
		Draç	g and drop files he	re.	

Files you upload will appear here.	

## Your files will appear inside the dataset

Metrics 0 Downloads		×	S	C	<b>Q</b> Publish	🖍 Edit 🗸
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you use these data, please add	this citation to your scholarly resources. Learn about Data Citation Standards.					
Description	This is a test Dataset for TCDL 2016 Demo					
Subject	Earth and Environmental Sciences; Other					
Keyword	Earth Science Stuff					
Search this dataset	Q Find	+ Upload	Files	🖍 Edit	Files 🗸 🔒	Ł Download
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#### Users can manage Metadata and Terms





### Add to and Edit the full Metadata record

Metadata Terms	Versions	
		Add + Edit Metadata
Citation Metadata 🔺		r
Dataset Persistent ID	doi:10.5072/FK2/QL4Q3T	
Title	TCDL 2016 Test Dataset	
Author	Admin, Dataverse (TDL.org)	
Contact	O Use email button above to contact.	
	Admin, Dataverse (TDL.org)	
Description	This is a test Dataset for TCDL 2016 Demo (2016-03-03)	
Subject	Earth and Environmental Sciences; Other	
Keyword	Earth Science Stuff	
Producer	TDL Science Labs (Texas Digital Library) http://tdl.org	
Depositor	Admin, Dataverse	
Deposit Date	2016-05-09	

### Specialized metadata can be expanded

Geographic Coverage *	Country / Nation*		State / Province*	
	United States	•	Texas	+
	City*		Other	
	Austin			
Geographic Unit				+
Geographic Unit Geographic Bounding Box	West Longitude		East Longitude	+
Geographic Unit Geographic Bounding Box	West Longitude		East Longitude	+
Geographic Unit Geographic Bounding Box	West Longitude		East Longitude	+

#### Users can manage Terms of Use

nin, Dataverse, 2016, "TCI AFT VERSION [UNF:6:0fw	DL 2016 Test Dataset", http://dx.doi.org/10.5072/FK2/QL4Q3T, Texas Digital Library Test Dataverse, mGJPw+0VwSEggG+fx/g==] 3	tion 👻
u use these data, please add th	is citation to your scholarly resources. Learn about Data Citation Standards.	
escription	This is a test Dataset for TCDL 2016 Demo	
Subject	Earth and Environmental Sciences; Other	
Keyword	Earth Science Stuff	
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Terms of Use A	Versions         Image: Community Norms as well as good scientific practices expect that proper credit is given via citation. Please use the data citation above, generated by the Dataverse.         CC0 - "Public Domain Dedication"	ments a
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#### Users may alter their license and terms of access

Waiver	Datasets will default to a CC0 public domain dedication . CC0 facilitates reuse and extensibility of research data. Our Community Norms as well as good scientific practices expect that proper credit is given via citation. If you are unable to give datasets a CC0 waiver you may enter custom Terms of Use for datasets. • Yes, apply CC0 - "Public Domain Dedication" • No, do not apply CC0 - "Public Domain Dedication"
Terms of Use	If you are unable to use CC0 for datasets you are able to set custom terms of use. Here is an example of a Data Usage Agreement for datasets that have de-identified human subject data.
Additional Information [+] Restricted Files + Terms of Acces	s *
Terms of Access	
Terms of Access	

#### Publish Data with one button



## You have now published your data!

O Dalaverse	About Guides - Support Z Dataver	se Admin 🛄 🔻
Texas Digital Library	Test Dataverse A statewide collaboration of higher education institutions in Texas	
A Metrics 22 Downloads		💉 Edit 🗸
Share, publish, and Welcome to the Texas Digital Library Test I IMPORTANT: This Dataverse server is for	archive your data. Find and cite data across all research fin Dataverse! TESTING only.	elds.
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Search this dataverse	Q Find Advanced Search	🕈 Add Data 🗸
Dataverses (34)	1 to 10 of 59 Results	↓↑ Sort -
Datasets (25) Files (17) Publication Status Published (37) Deaccessioned (13)	TCDL 2016 Test Dataset         May 9, 2016 - TCDL2016_Test_Dataverse Dataverse         Admin, Dataverse, 2016, "TCDL 2016 Test Dataset", http://dx.doi.org/10.5072/FK2/QL4Q3T, Texas Digital Library Test         [UNF:6:0fwmGJPw+0VwSEggG+fx/g==]         This is a test Dataset for TCDL 2016 Demo	Dataverse, V1
Draft (7) Unpublished (6) Dataverse Category Organization or Institution (21)	May 9, 2016       May 9, 2016         This is a test for a live demo dataverse	8

## Visualization of Data

#### TCDL 2016 Test Dataset

dmin, Dataverse, 2016, "TCDL JNF:6:0fwmGJPw+0VwSEggG	Download Citation -				
rou use these data, please add this	s citation to your scholarly resources. Learn about Data Citation	n Standards.			
Description	This is a test Dataset for TCDL 2016 E	Demo			
Subject	Earth and Environmental Sciences; Ot	ntal Sciences; Other			
(eyword	Earth Science Stuff				
Files Metadata Term	ns Versions				
Search this dataset	Q Find				
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Catdata.t Tabular Da 3 Variables UNF:6:0fw	<b>.tab</b> ata - 21.5 KB - May 9, 2016 - 0 Downloads ⊧s, 1000 Observations - vmGJPw+0VwSEggG+fx/g==		Explore 上 Download 🗸		
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# TwoRavens allows users to dynamically view data



#### Maps and Shape Data may work with WorldView

estin	g geoco	nnect to	worldm	ap c	on this server					
Admin, Dataverse, 2016, "Testing geoconnect to worldmap on this server", http://dx.doi.org/10.5072/FK2/3YFPD3, Texas Research Data Repository Dataverse, V1								i D	Download Citation -	
you use t	these data, plea	ise add this citat	tion to your s	holarly	resources. Learn about Data Citation	Standards.				
Descrip	ption			A conn	nector between Dataverse and W	orldMap. Contribute <mark>t</mark> o	geoconnect de	evelopment by o	creating an account	on GitHub
Subjec				Agricu	itural Sciences					
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## World Map



#### Reuse of Data via Download

Files	Metadata Terms Versions	
Searc	th this dataset Q Find	
3 Files		+ Upload Files - Lownload
	catdata.tab         Tabular Data - 21.5 KB - May 9, 2016 - 0 Downloads         3 Variables, 1000 Observations -         UNF:6:0fwmGJPw+0VwSEggG+fx/g==	Le Explore Le Download -
	Climate_data.xls MS Excel - 183.0 KB - May 9, 2016 - 0 Downloads MD5: d7ff4f3a6fa5197dff4de8e85a1501d1;	L Download
	german.data-numeric.txt Plain Text - 99.6 KB - May 9, 2016 - 0 Downloads MD5: dd6d1bd8f4bcc4555b900b9c00955c33;	L Download

#### Some files have multiple download options



#### Easy to share on social media



#### **Citation Options**



# Part 6:

#### Upcoming Dataverse Developments





## **Community & Future Work**

Elizabeth Quigley User Experience Lead

#### The Dataverse Community



#### Dataverse Installations



#### Dataverse Installations



#### Future Work

#### Upcoming Releases:

- 4.4: Widgets Updates & Remote Authentication
- 4.5: Metadata Harvesting & Exporting, Private URL

File Level Metadata:

- Provenance
- Richer support for file level metadata

Sensitive Data Support:

- Secure Data Storage for Harvard Dataverse (hosting set up)
- DataTags compliant version of Dataverse

Large Data Support:

- Streaming social sciences data, e.g.billions of GeoTweets
- Biomedical large scale data (SBGrid Repository)

#### **Funding Agencies**









# Welcome to the Dataverse Community!


## Questions and Discussion

