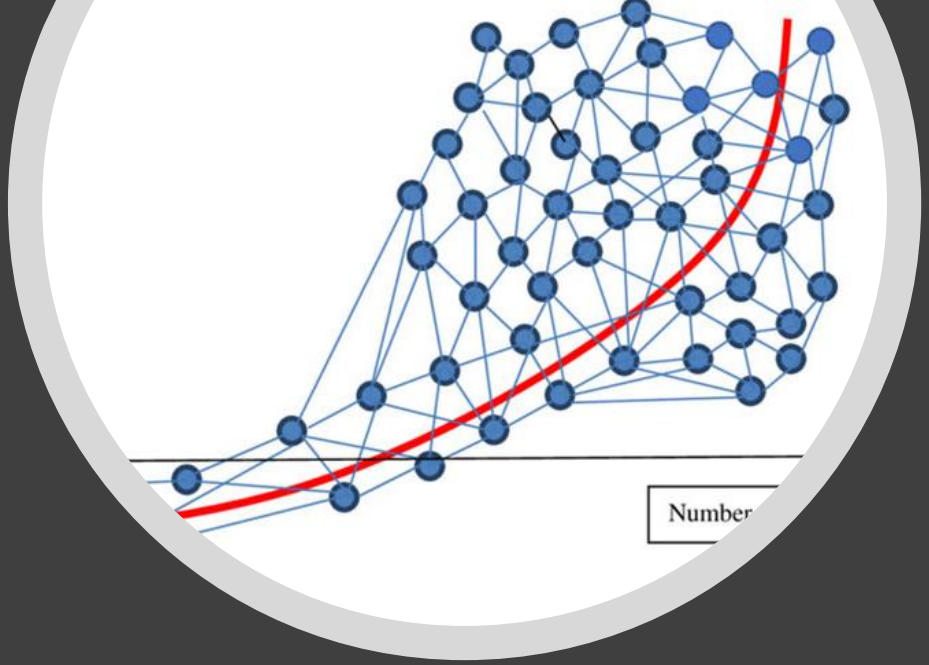


Ray Uzwyshyn, Ph.D. MLIS
Director, Collections and Digital Services
Texas State University Libraries

Developing an Open Source Digital Scholarly Research Ecosystem Local and Global Possibilities

ORCID iD DISPLAY

Identity Management Syste

Elect

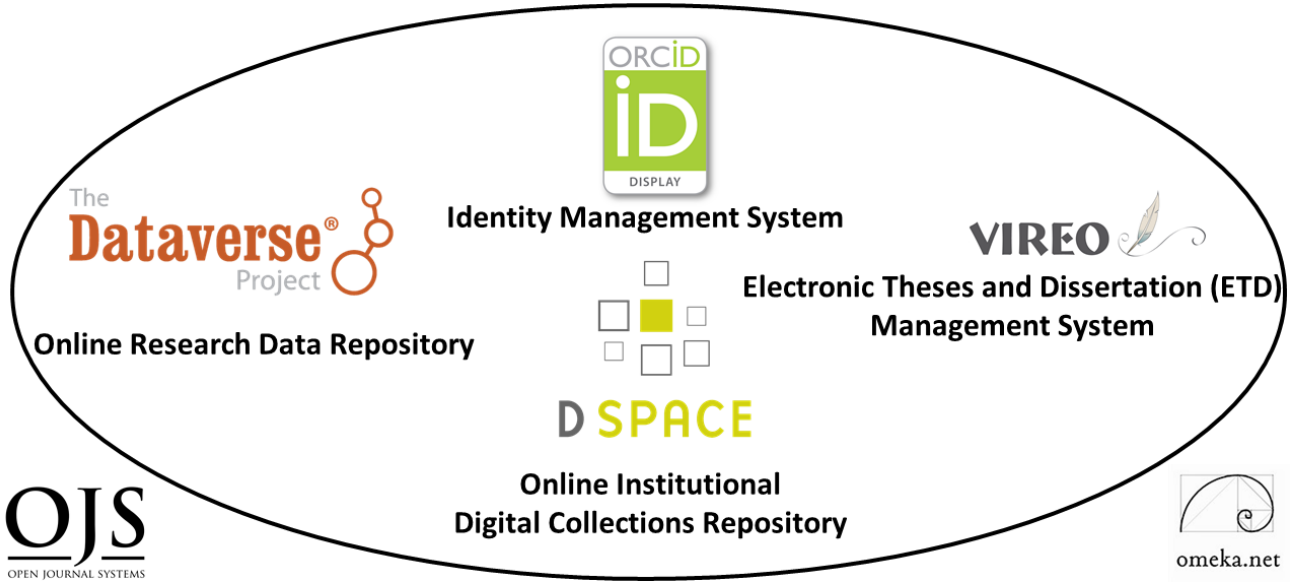
Repository

D SPACE

Online Institutional
Digital Collections Reposit

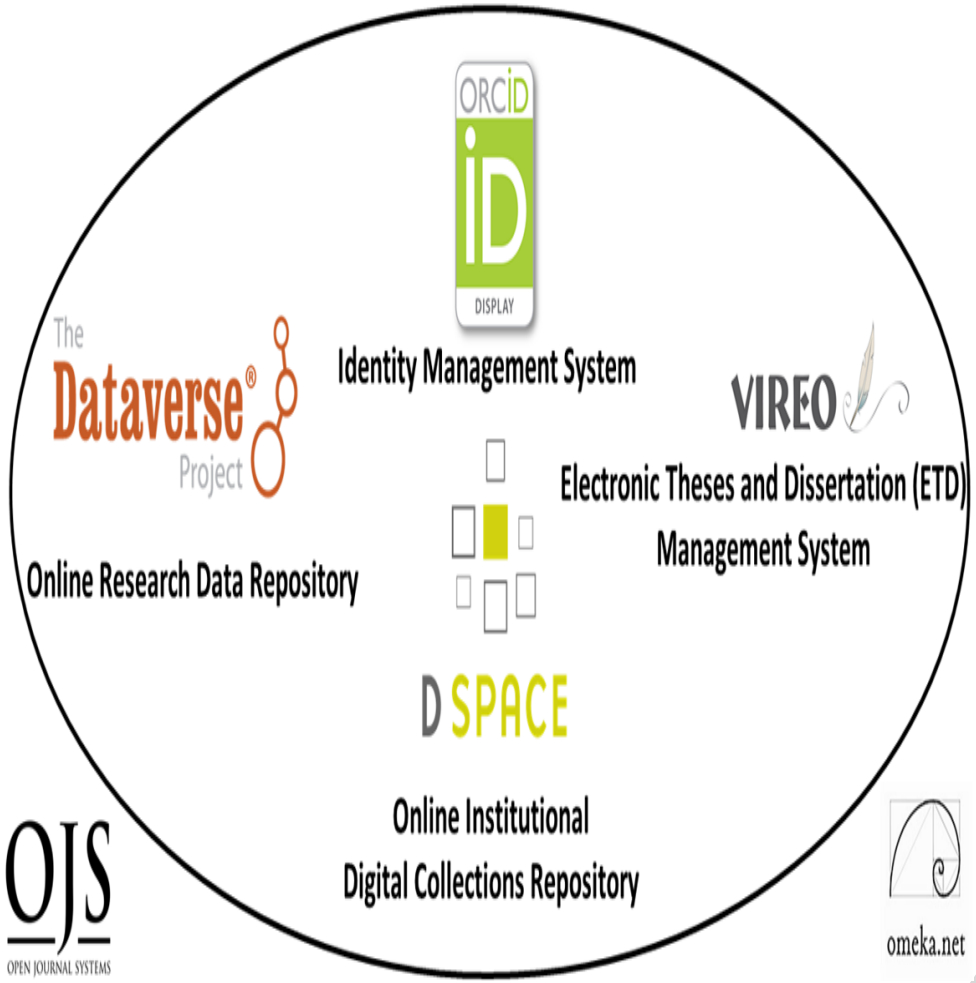
What is a Digital Scholarly Research Ecosystem?

Ecosystem of Several Software Components to Enable Faculty and Student Research



Ecosystem Metaphor Look at Relationships in the Digital Environment

Specifically Focuses Upon the Discrete Component Relationships with the Networked Digital Environment

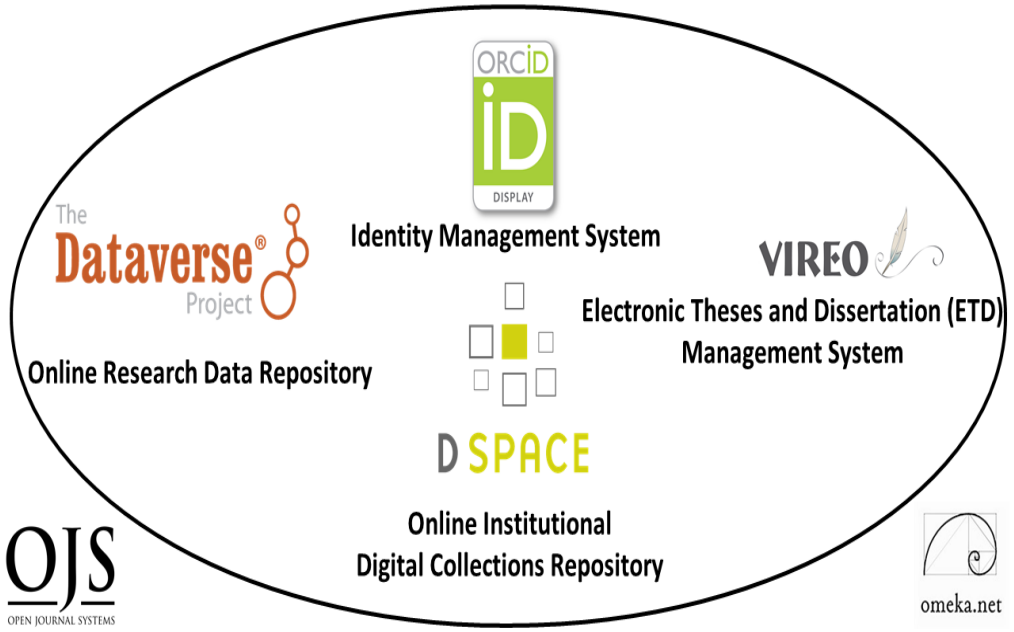


Six Main Software Components

- Digital Collections Repository (Dspace)
- Research Data Repository (Dataverse)
- Identity Management System (ORCID)
- ETD Management System (VIREO)
- User Interface Software (OMEKA)
- Open Journal Software (OJS3)

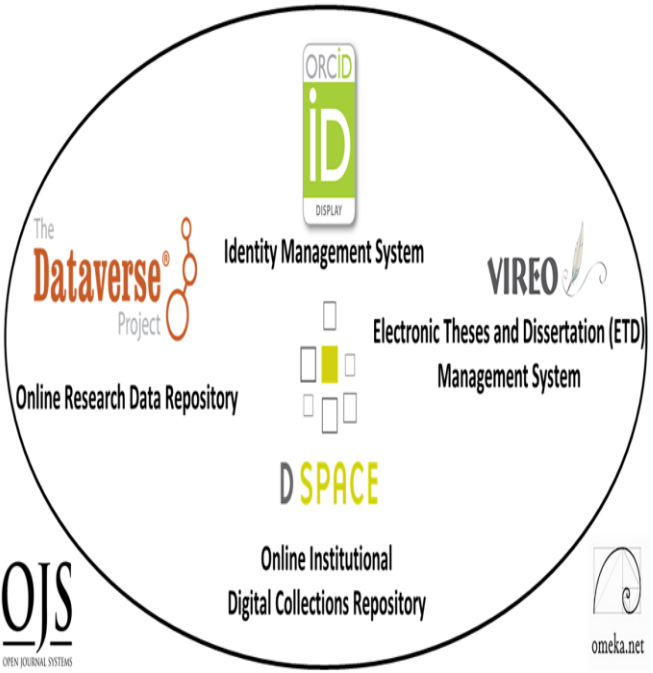
Hardware: Digitization Lab

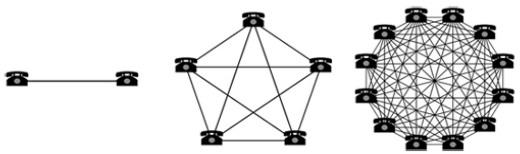
Developed and Implemented
Texas State University Libraries, 2014-2019

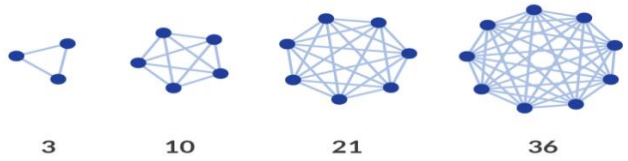


General Characteristics Digital Scholarly Research Ecosystem

- Open Source Software
- Customizable Components
- Active Developer Communities





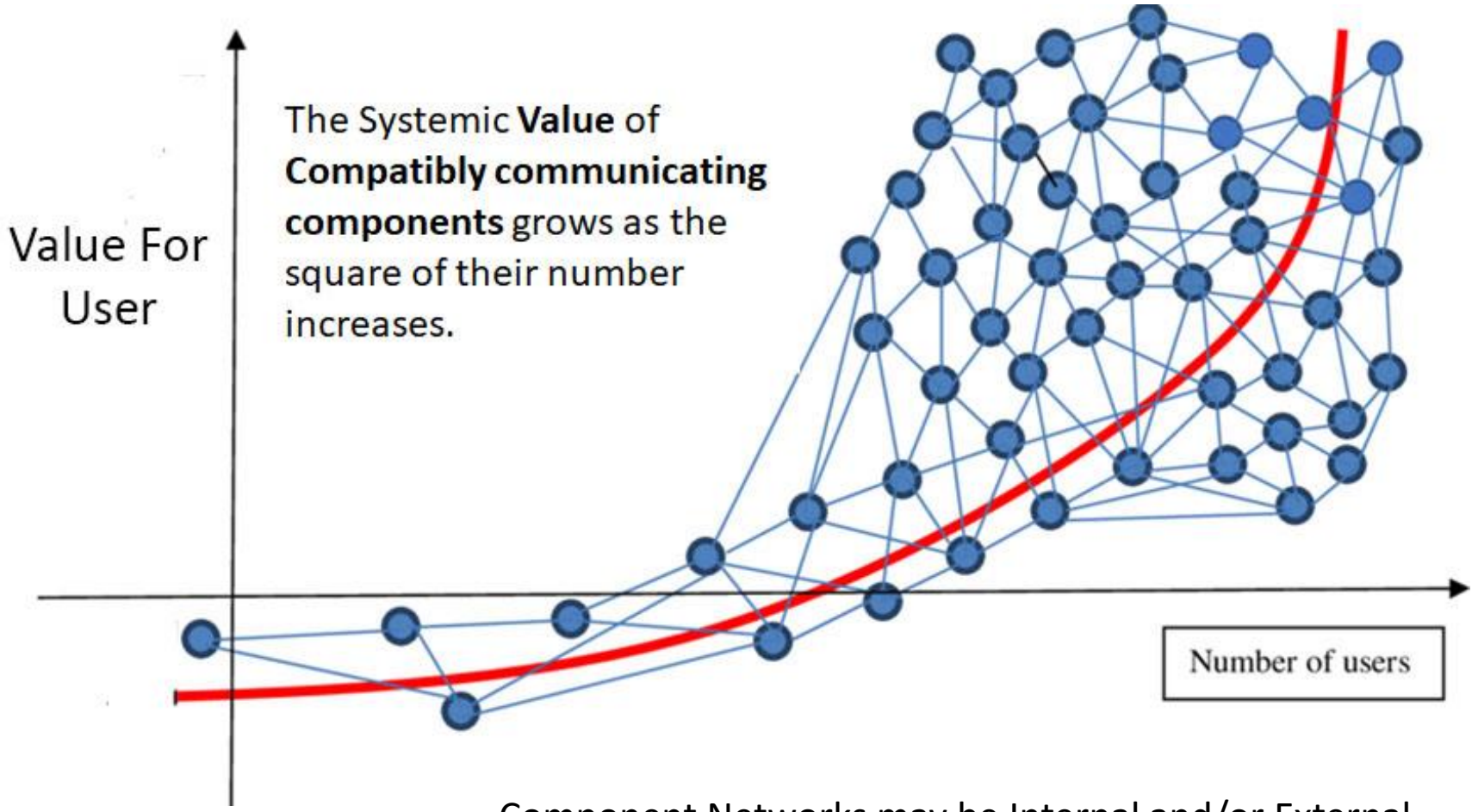


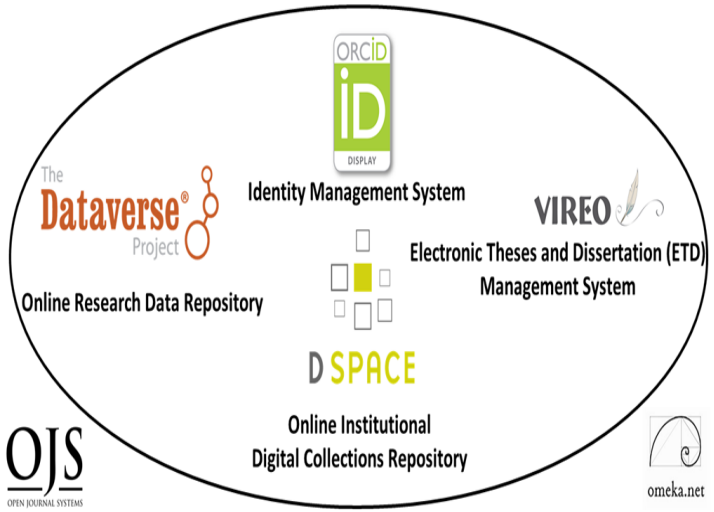
Larger Idea

Collocating Digital Components in Networked Research Ecosystem Enables Connections and/or Larger Network Effects

Network Effects: Metcalfe's Law

Early Telecommunications Law for Ethernet (1993)

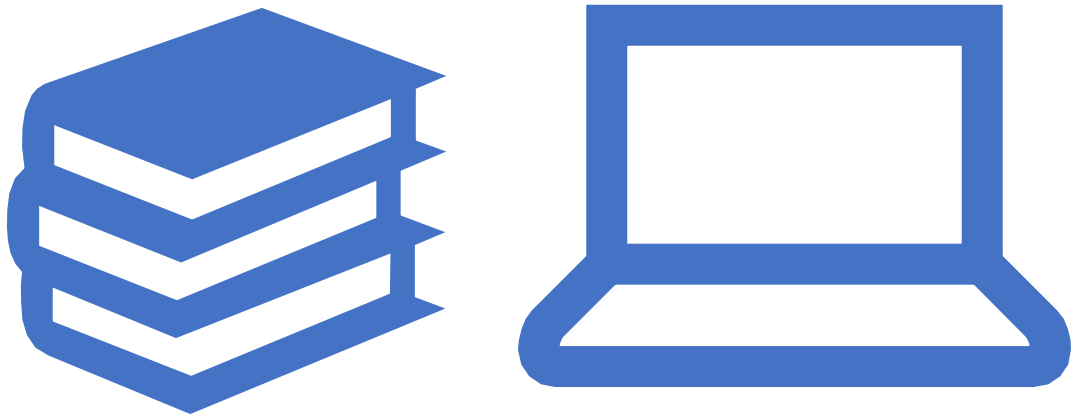




Component Networks may be Internal and/or External

Texas State University Libraries Digital Scholarly Research Ecosystem

Primary Components

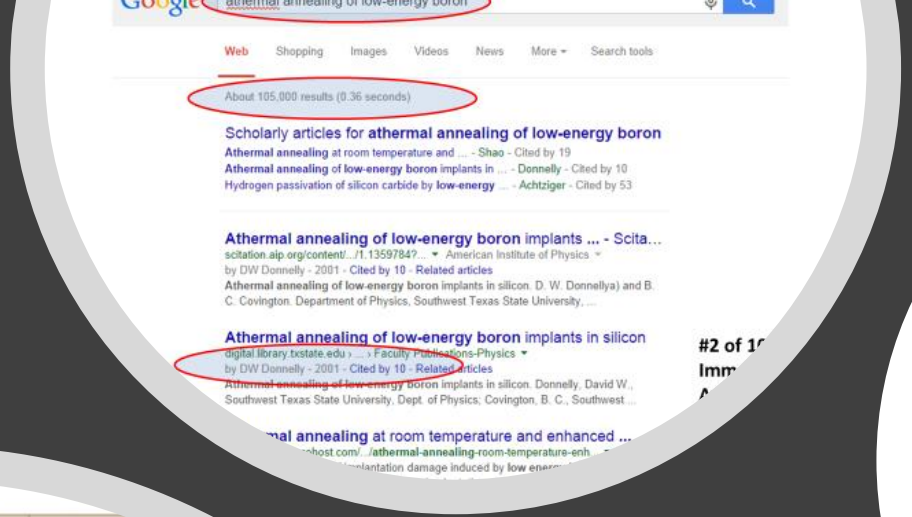


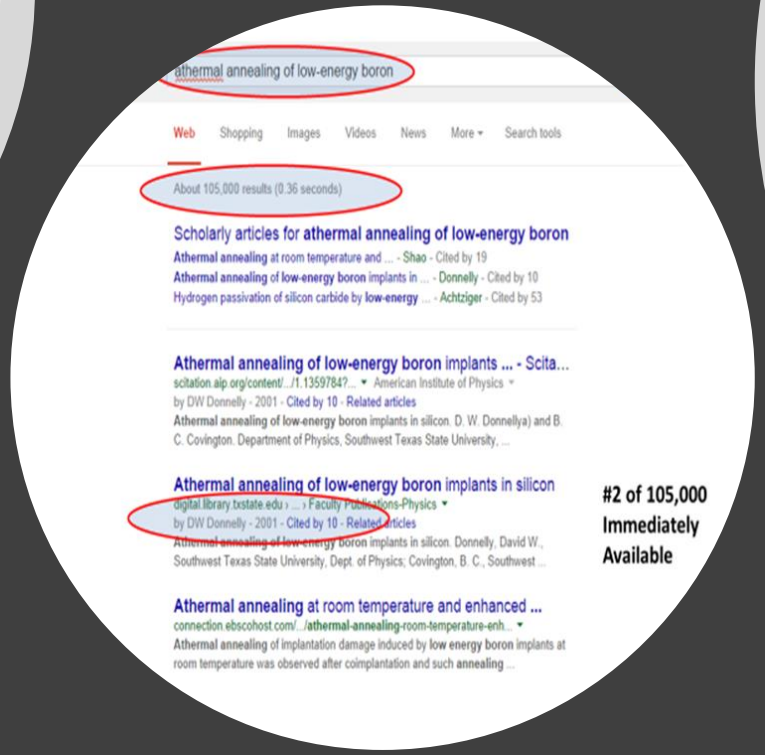
Institutional Digital Collections Repository (Dspace)

Organizes, centralizes and makes accessible research and knowledge generated by the institution's research community:

Pre-prints
Faculty Publications
White Papers
Conference Presentations
Graduate Student Theses and Dissertations

Historical Legacy Application

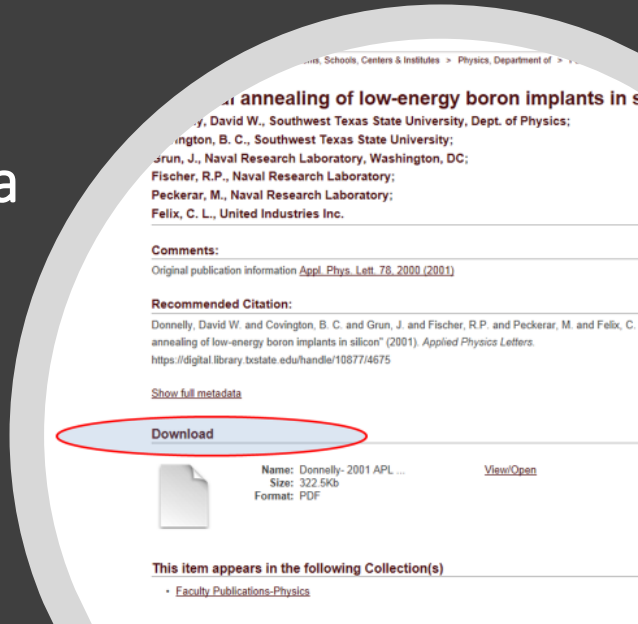




Primary Use Case Value

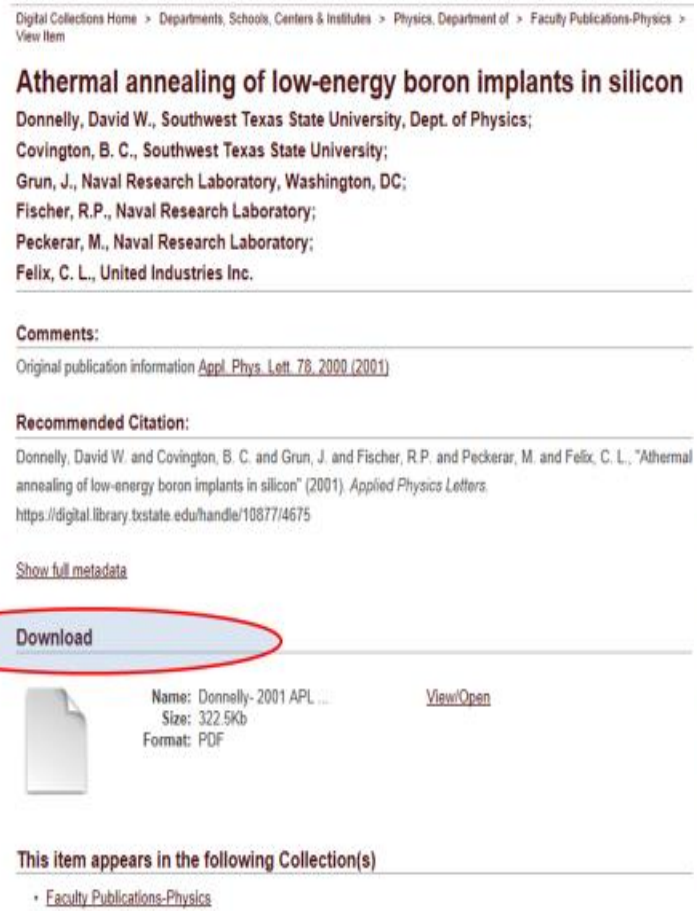
Application of Structured Metadata Schema for Search Engine Optimization

Enabling Accessibility and Multiple Points of Access



Efficacy of Structured Metadata Schema Application for Search Engine Optimization

Accessibility and Multiple Points of Access



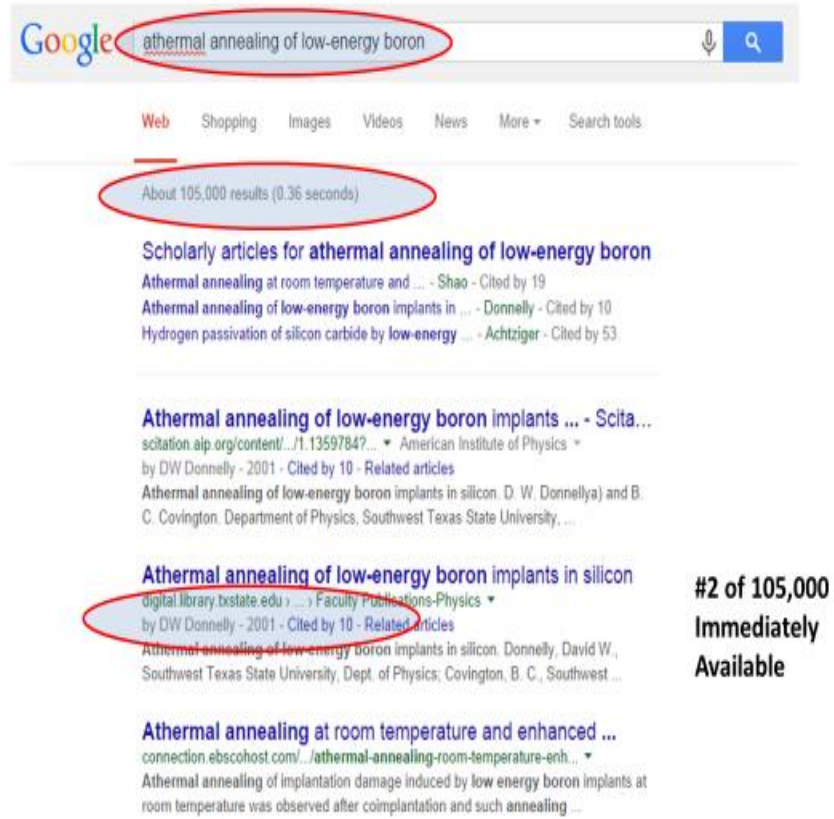
Contributor	dc.contributor.author	Donnelly, David W.	
Contributor	dc.contributor.author	Covington, B. C.	
Contributor	dc.contributor.author	Grun, J.	
Contributor	dc.contributor.author	Fischer, R.P.	
Contributor	dc.contributor.author	Peckerar, M.	
Contributor	dc.contributor.author	Felix, C. L.	
Contributor	txstate.contributor.author	Donnelly, David W., Southwest Texas State University, Dept. of Physics	
Contributor	txstate.contributor.author	Covington, B. C., Southwest Texas State University	
Contributor	txstate.contributor.author	Grun, J., Naval Research Laboratory, Washington, DC	
Contributor	txstate.contributor.author	Fischer, R.P., Naval Research Laboratory	
Contributor	txstate.contributor.author	Peckerar, M., Naval Research Laboratory	
Contributor	txstate.contributor.author	Felix, C. L., United Industries Inc.	
Date	dc.date.available	2013-07-19T16:20:49Z	
Date	dc.date.issued	2001-04-02	
Uri	dc.identifier.uri	https://digital.library.txstate.edu/handle/10877/4675	
Subject	dc.subject	"Athermal annealing", "baron implants", silicon	en_US
Title	dc.title	Athermal annealing of low-energy boron implants in silicon	en_US
Language	dc.language.iso	en_US	en_US

Dublin Core Metadata

Access Points

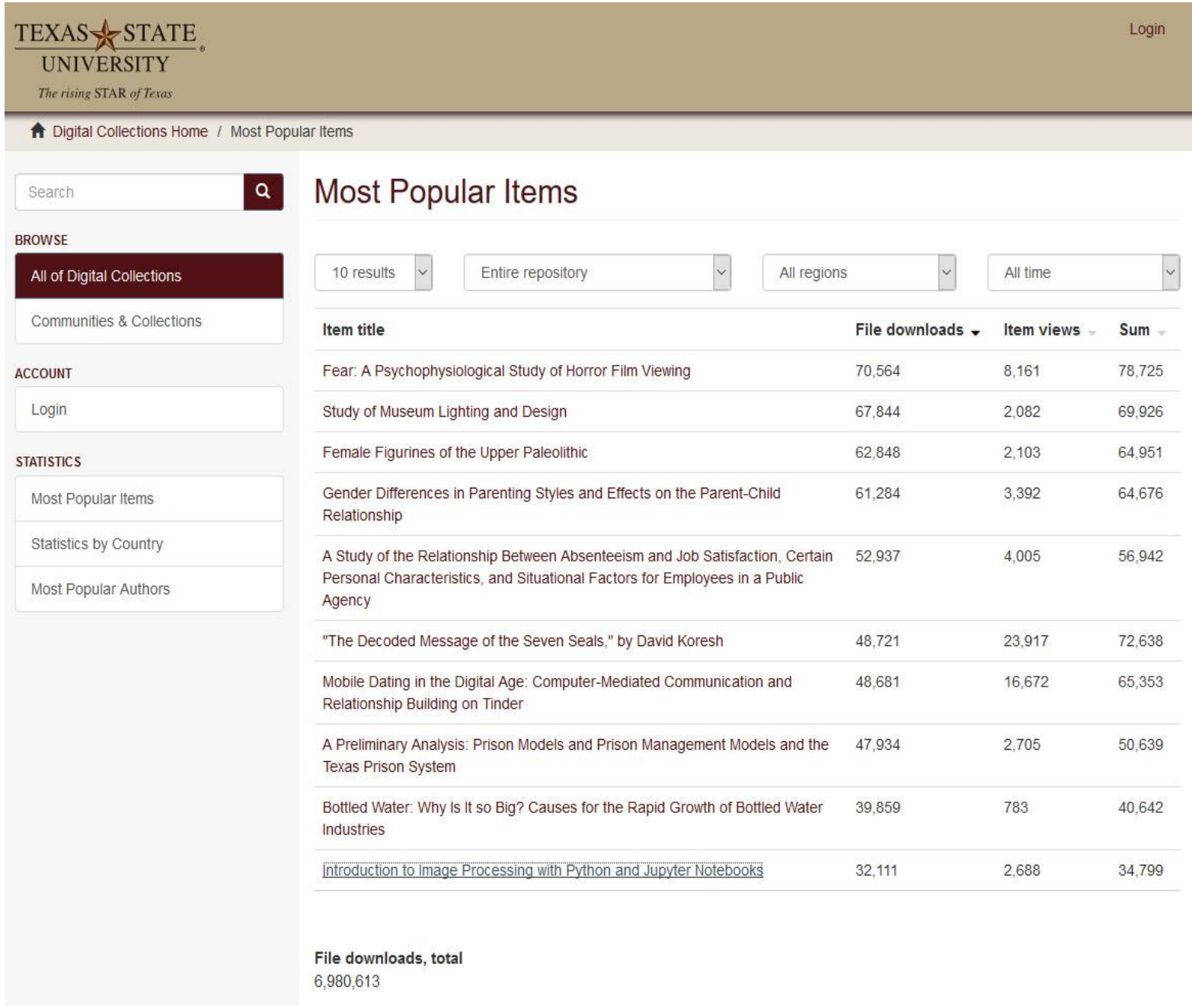
Findability

Search Engine Optimization (SEO)

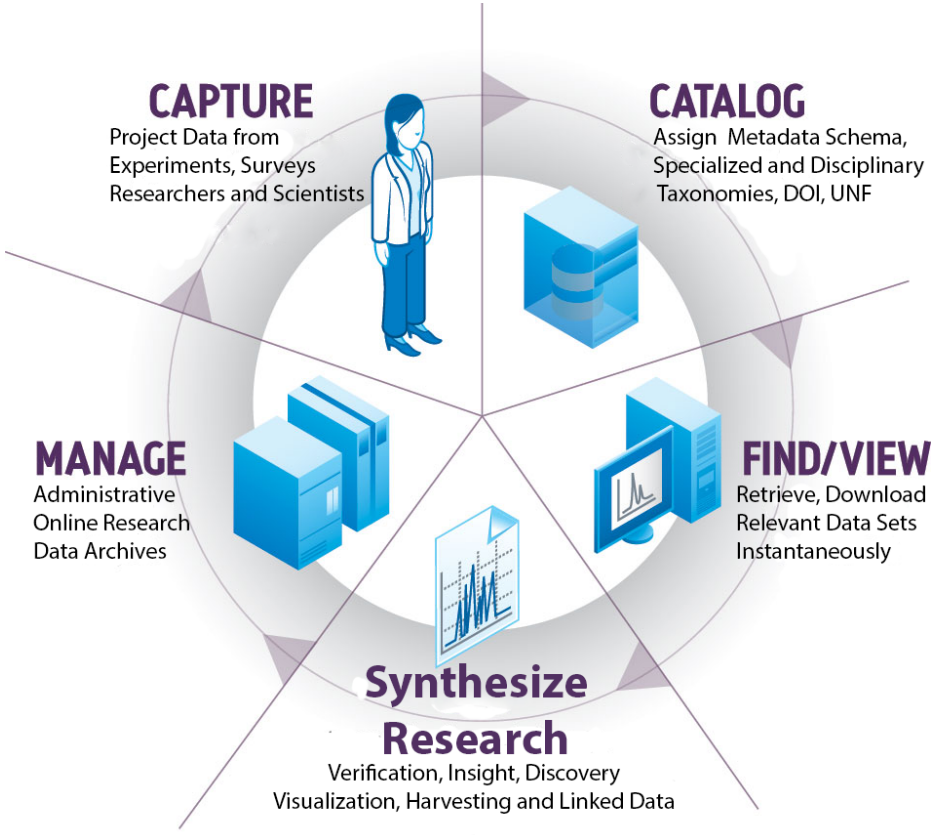


#2 of 105,000 Immediately Available

Digital Collection Repositories Gives Insight and another window into Faculty/Student Research (Statistics)

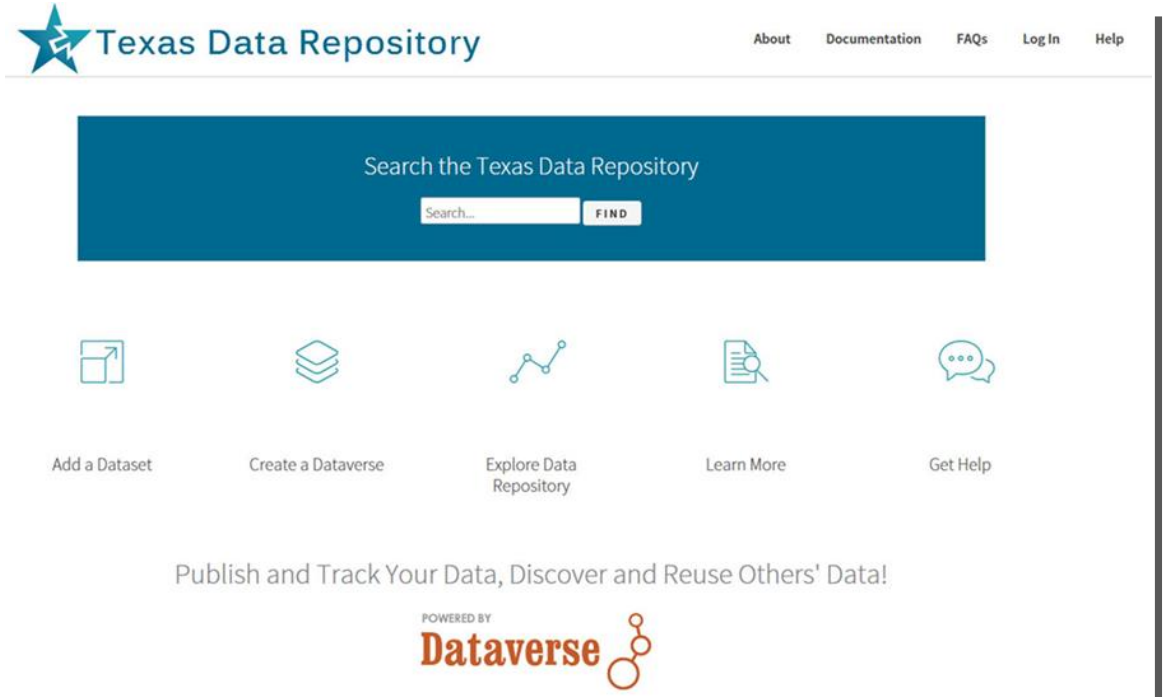


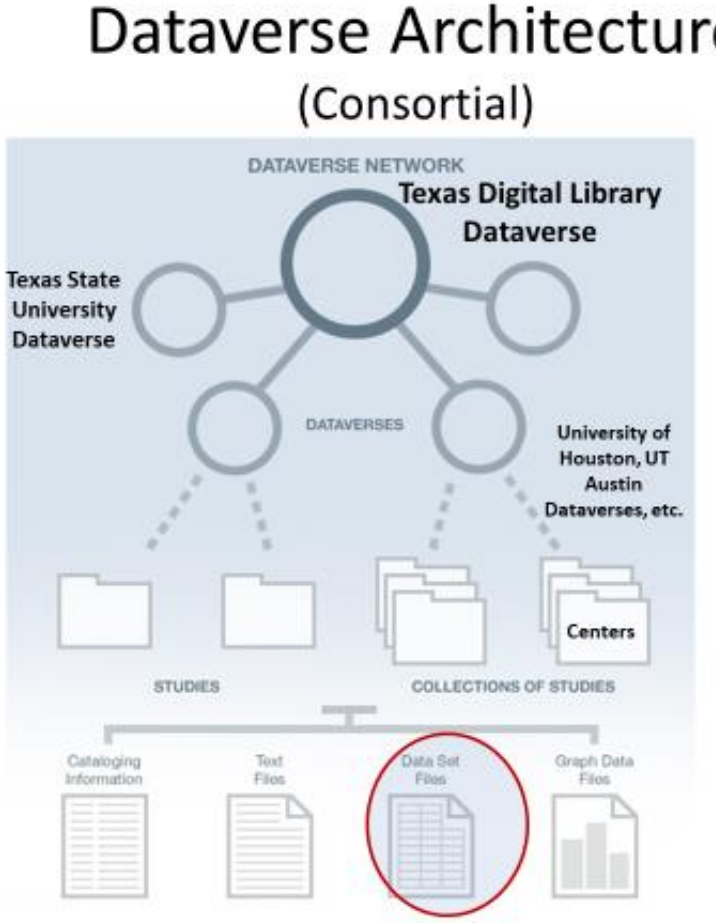
Research Data Repository



Texas State University Dataverse/TDL Dataverse

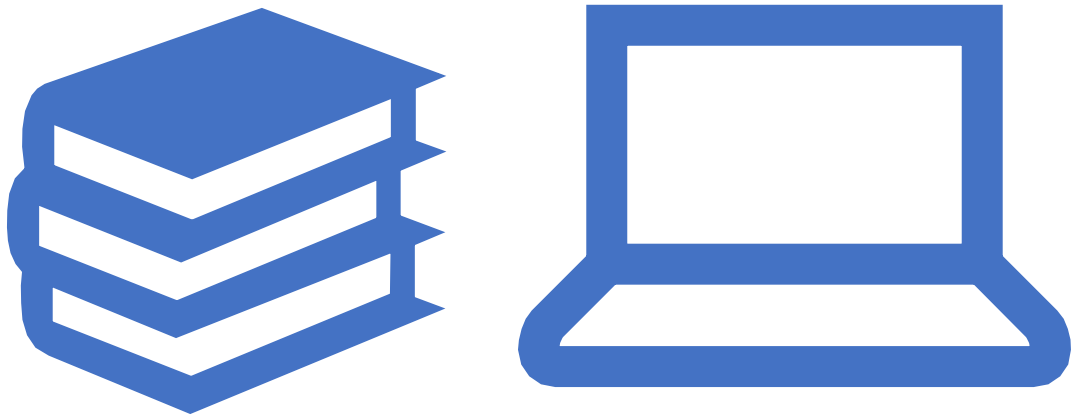
Larger Consortial Online Research Data Repository





Digital Scholarly Research System

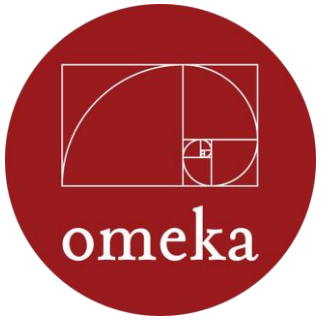
Secondary Components



Vireo, Omeka and OJS

(Dependent on Primary Content Repositories)

Electronic Thesis and Dissertation Management System
Addresses Intermediary steps in the ETD Process
Bridges Student Thesis/Dissertation Submission with
Graduate School Review, Online Publication and ETD Preservation



Open Source User Interface Software
allows an elegant portal or gateway entrance to digital collections data repositories, large research projects - linking text,image media and datasets

Open Access Academic Journal Software for the academic refereed journal workflow and online publishing

ORCID is a hub connecting the research landscape

Researcher Identity Management System

ORCID

- Allows publications from a researcher to be found, linked and aggregated across multiple information Systems
- Gives Researchers Unique Number (ORCID ID) Connecting and Disambiguate Scholars names
  Maria Hernandez, Biochemist
  Maria Hernandez, M.D. or Astrophysicist
- Can also act as a Network Hub

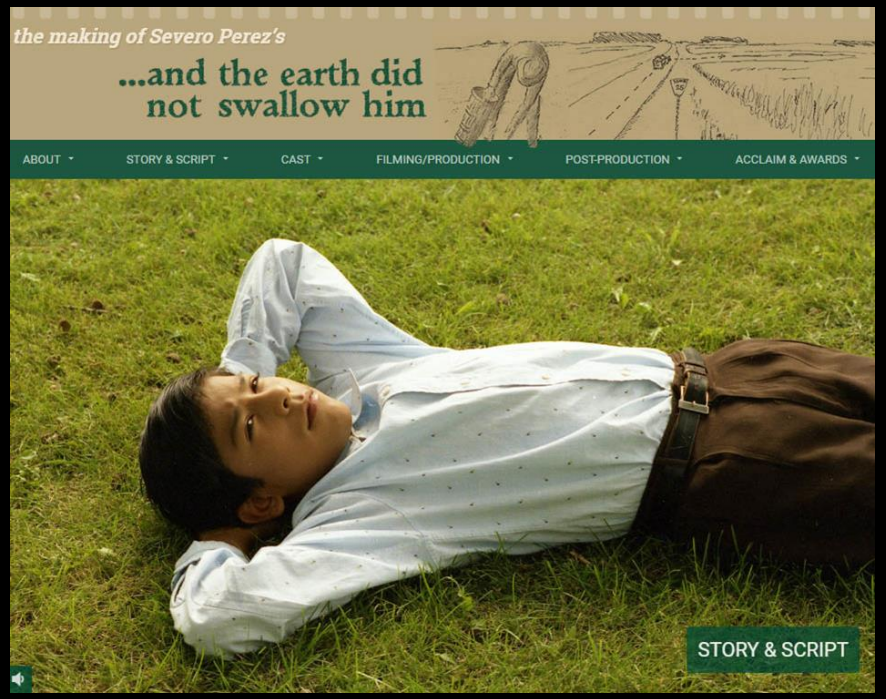
Digital Scholarly Research System

Tertiary Components

The Digitization Lab Hardware & Specialized Software

The Digitization Lab

Expands Possibilities for Faculty Research Projects



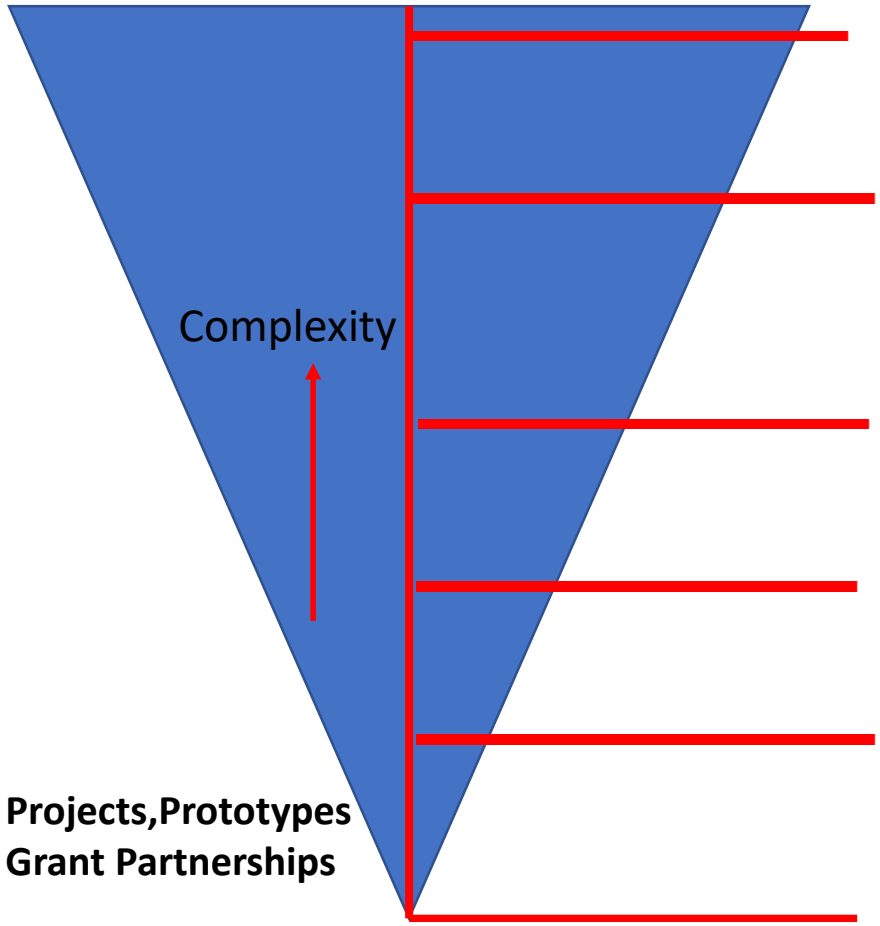
Digitization possibilities on media levels range from OCR to image, book, manuscript & journal digitization, 3D objects, posters, audiovisual material maps, GIS and visualization technologies (IIIF etc)

Combining Components System Synergies

Digital Scholarly Research Ecosystem

Combining These Research Ecosystem Components

Opens Possibilities For Digital Scholarship & Partnership Opportunities



Cognitive Cartography/Multimedia Archives
(Video, Text, GIS, Images, Field Notes)
Dick Reavis: National Tour of Texas

Multimedia, Digital Archives/Retrospective ETD Projects
(Digital video, online exhibit images, text, digital archives)
Severo Perez: And the Earth Did not Swallow Them

Online Exhibits/Digital Archives/ Online Academic Journals
(images and text, Omeka front end/Database back end, IIIF)
Cabeza de Vaca La Relacion Digitization
Santiago Tafolla: Mexican Amer. Confederate Soldier

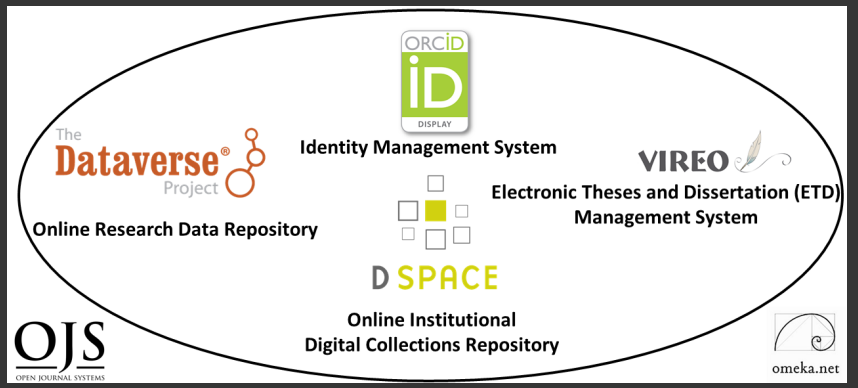
Interactive Image Archives/Data & Research Projects
(Image libraries, Interactive Commenting/Metadata)
Texas State Flickr Commons

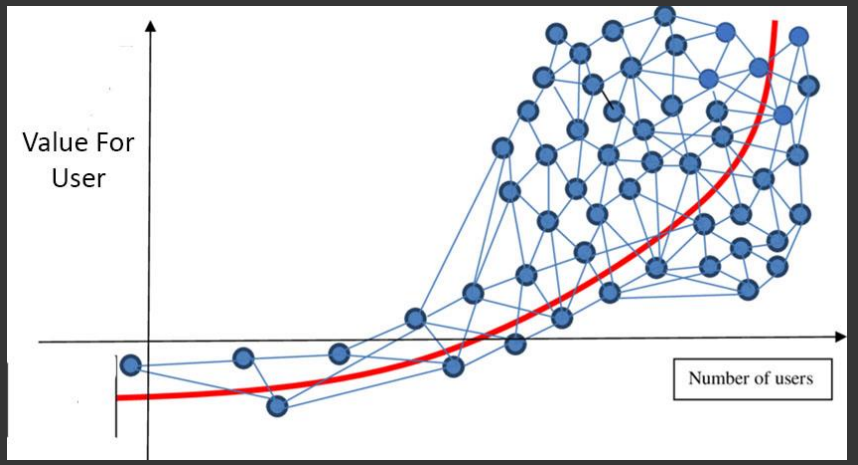
Digital Libraries Archiving & Documentation Projects
(Text, Metadata, OCR, Search, Zoom ability, Page Turning)
Pedagogs University Yearbooks

Faculty Digitization Proposals/Partnerships

Ecosystem Open Source Software Enables Core Research

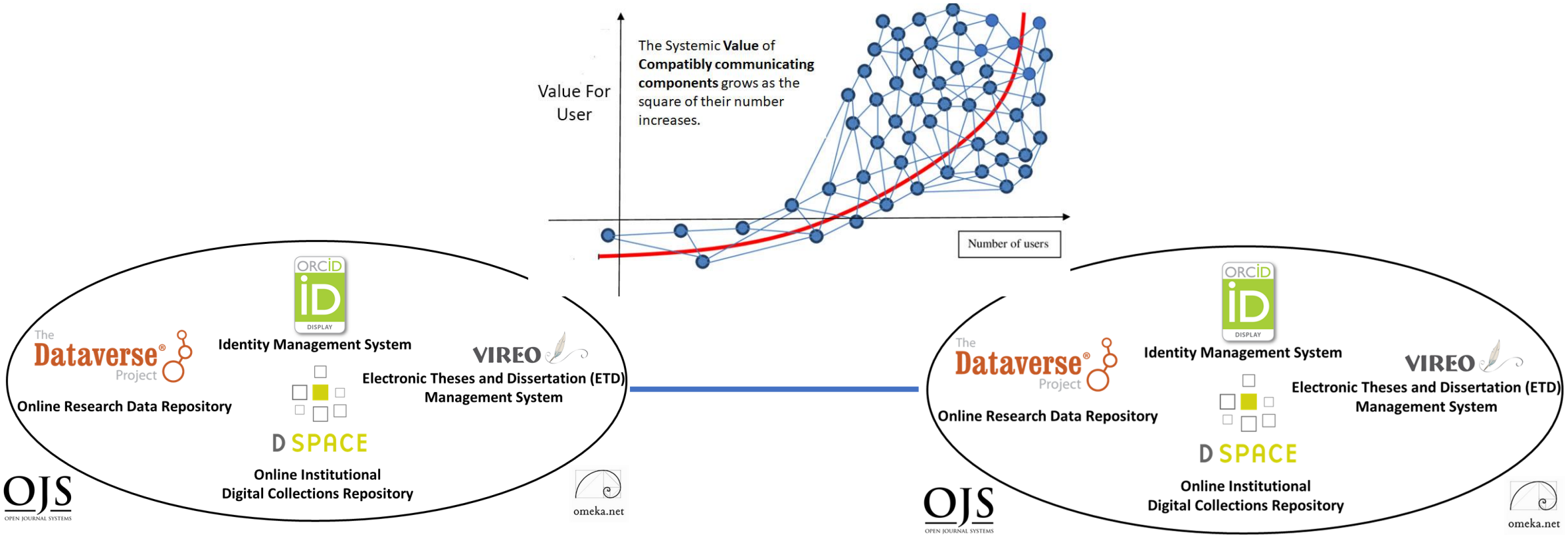
- Articles, Theses, Dissertations in the collections repository can be associated with datasets in the data repository for reference, verification or reproducibility.
- Journal article citation lists can be associated with articles and datasets in the Collections and Data Repositories
- Papers in the collections repository and datasets in data repository can be associated with ORCID ID's for aggregation of research profiles. Also, the University's Faculty Profile Systems (Digital Measures)
- Further Desired Connections can also guide developmental paths for both component software and the ecosystem





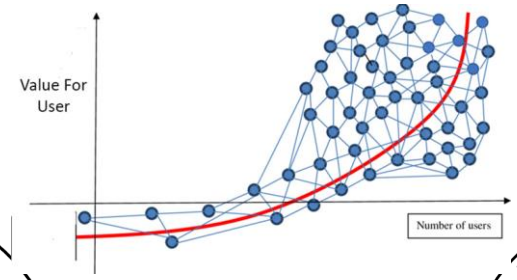
Network Effects

Both In and Between Individual Components and In and Among Component Networks



1) ORCID Aggregates from Several Sources and Networks and Connects to Other Networks, Internal and External
2) OMEKA can act as a middleware front end connecting several components and component networks internally.
   3) Digitization Lab's IIIF Framework can create internal or globally distributed Image Libraries.
4) Dataverse can be configured as a single Instance or as a Consortial Model (Texas 22 Individual Instances, TDL)

Network Effects and Opportunities Among Research Institutions



Research Institution A

Research Institution B

Research Institution C

The Dataverse® Project
Online Research Data Repository

ORCID iD DISPLAY
Identity Management System

VIREO
Electronic Theses and Dissertation (ETD) Management System

D SPACE
Online Institutional Digital Collections Repository

OJS OPEN JOURNAL SYSTEMS

omeka.net

Assessment and Results

Quantitative and Qualitative Measures

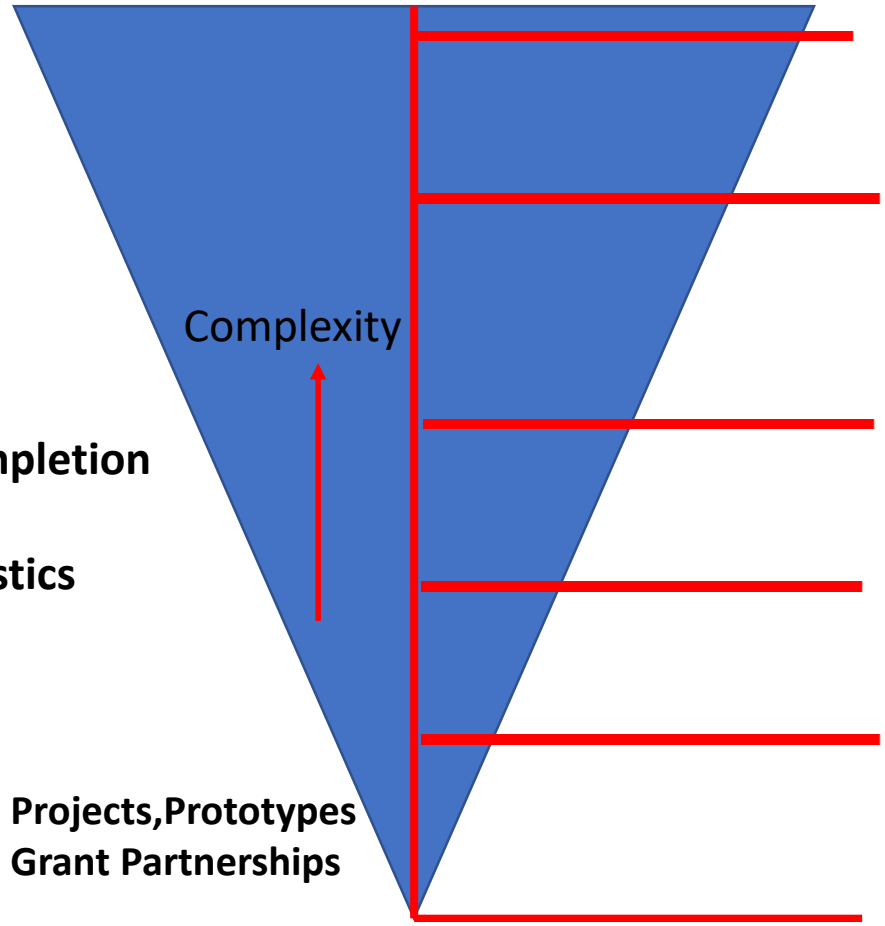
Ecosystem Implemented in Stages, 2014-2019

System	2014	2015	2016	2017	2018	2019
Downloads						
DSpace	326,762	318,742	385,163	341,224	972,359	1,010,349
ETDs	136,985	158,240	200,373	328,420	470,437	505,658
Dataverse	n/a	n/a	n/a	455	3,451	2,043
Number of Items						
DSpace	1,340	1,437	1,546	1,660	2,135	2,720
ETDs	967	1,174	1,326	1,581	1,789	2,218
Dataverse	n/a	n/a	n/a	28	33	53
ORCID IDs						
ORCID	101	190	316	438	545	669
Hosted Journals						
OJS	1	1	2	2	3	4

Annual Usage Growth (Downloads, Number of Items, ORCID ID's and Hosted Journals)

LibQual Biannual Survey 2013-2019, Faculty and Student System Perceptions, Comments

Larger Digital Scholarly Research Projects Can Act as Qualitative/Quantitative Benchmarks



1) Project Completion (Milestones)
2) Usage Statistics

Cognitive Cartography/Multimedia Archives
(Video, Text, GIS, Images, Field Notes)
Dick Reavis: National Tour of Texas

Multimedia, Digital Archives/Retrospective ETD Projects
(Digital video, online exhibit images, text, digital archives)
Severo Perez: And the Earth Did not Swallow Them

Online Exhibits/Digital Archives/ Online Academic Journals
(images and text, Omeka front end/Database back end, IIIF)
Cabeza de Vaca La Relacion Digitization
Santiago Tafolla: Mexican Amer. Confederate Soldier

Interactive Image Archives/Data & Research Projects
(Image libraries, Interactive Commenting/Metadata)
Texas State Flickr Commons

Digital Libraries Archiving & Documentation Projects
(Text, Metadata, OCR, Search, Zoom ability, Page Turning)
Pedagogs University Yearbooks

Faculty Digitization Proposals/Partnerships

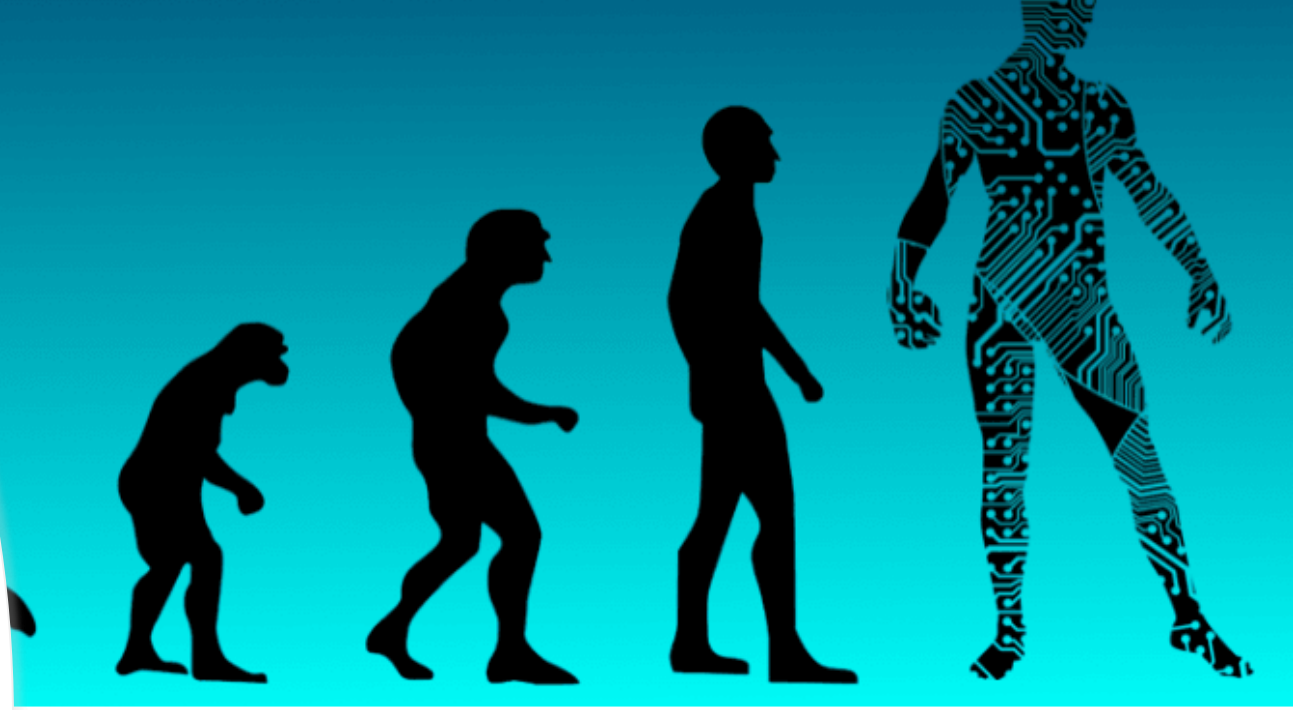
Summary Reflections

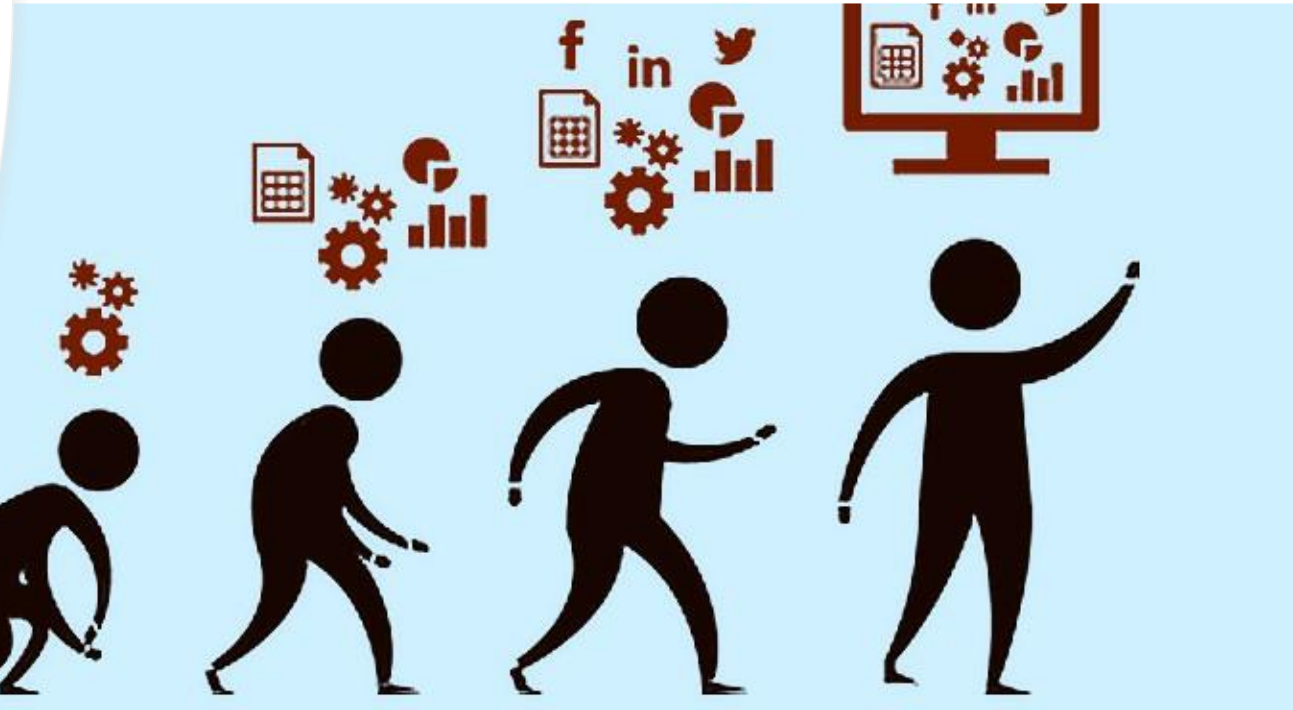
Placing Digital Scholarship Components within an Ecosystem Paradigm Usefully Enables:

1) Better Guidelines and Roadmaps for Developing Digital Scholarly Components

2) Pathways Forward and Evolutionary Possibilities for System Development

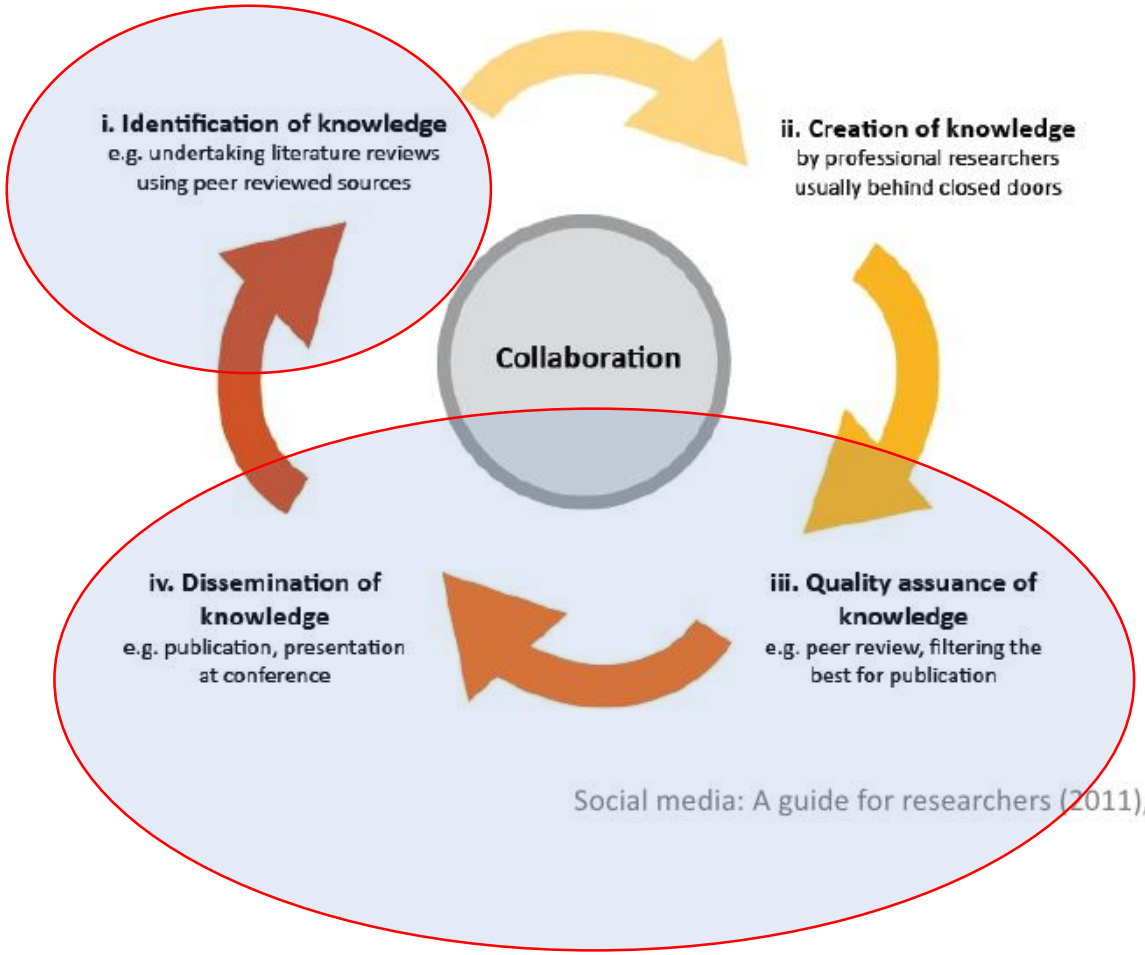
3) New Possibilities For Researchers working within the academic research cycle



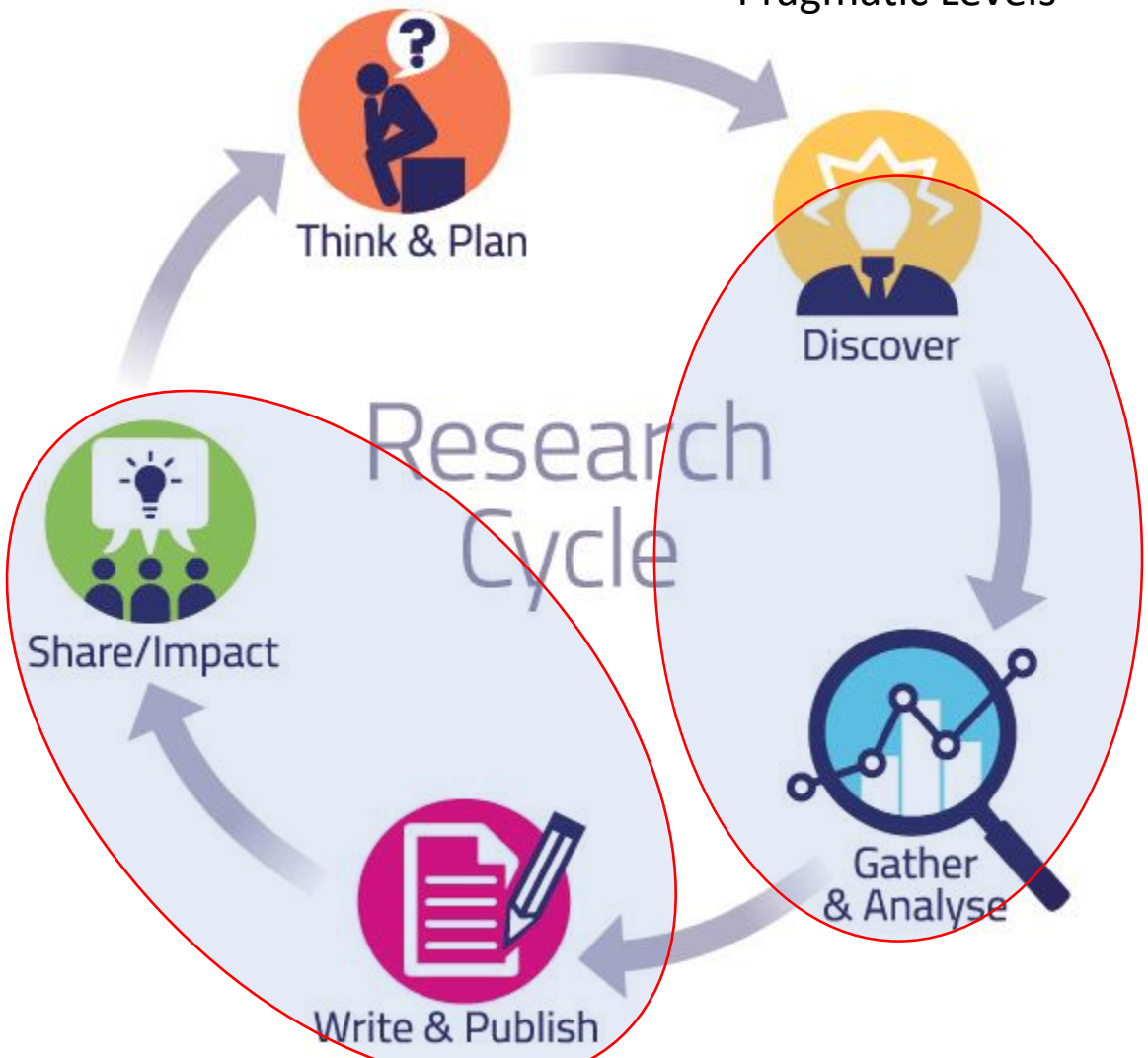


Ecosystem Components Enable Various Parts of the Academic Research Cycle

Abstract Levels



Pragmatic Levels



Digital Scholarly Ecosystem Timelines and Implementation Paths

Many Roads To Rome

Year 1 Digital Collection Repository and Digitization Lab

Year 2 User Interface Software (OMEKA), Identity Management System, ORCID

Year 3 Data Repository

Year 4 ETD Middleware (VIREO) and OJS Software

Year 5 Complex Digitization Projects, IIIF Server, Faculty Grant Projects etc.

Human Resources

- **System Administrator/Programmer** (server infrastructure set-up/maintenance/basic customization
- **Digital Collections Librarian**: Administration, Marketing, User Support, Collections and Data Repository, OJS/ORCID

- **Metadata Librarian**: Dublin Core, Specialized Schema
- **Web Developer/Programmer**: OMEKA, System Integration
- **Project Manager/Department Head** (PMP Certification)
- **Digitization Specialist**
- **GIS Specialist/Data Visualization Specialist**
- **AI Specialist/Post-Doc/CLIR Fellow**

Further References

Uzwyshyn, R. 2020 **Developing an Open Source Digital Scholarship Ecosystem (Preprint)**. ICEIT2020. Oxford, UK. https://www.researchgate.net/publication/336923249_Developing_an_Open_Source_Digital_Scholarship_Ecosystem

Texas State University Libraries Website. https://www.library.txstate.edu/

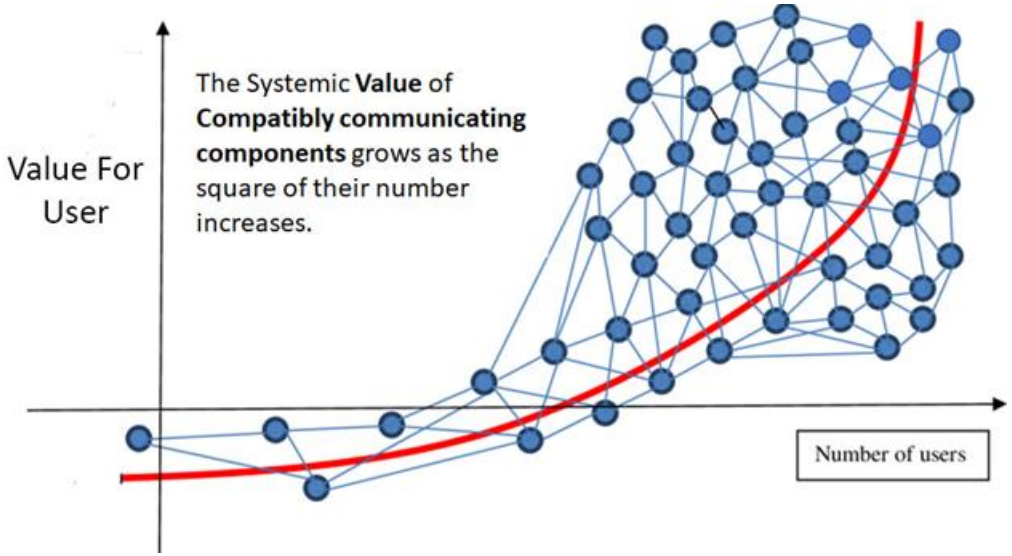
Texas State Digital Collections Repository https://digital.library.txstate.edu/

Texas State Data Research Repository https://dataverse.tdl.org/dataverse/txstate

Texas State Online Research Identity Management System: https://guides.library.txstate.edu/researcherprofile/orcidTexas

State Electronic Thesis and Dissertation Management (VIREO): https://www.tdl.org/etds/

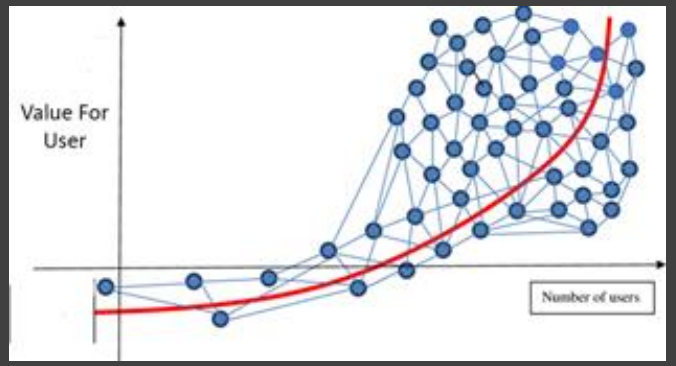
Texas State Digital & Web Services: https://www.library.txstate.edu/services/faculty-staff/digital-web-services.html



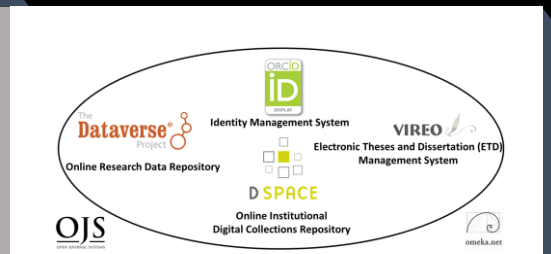
Questions, Comments

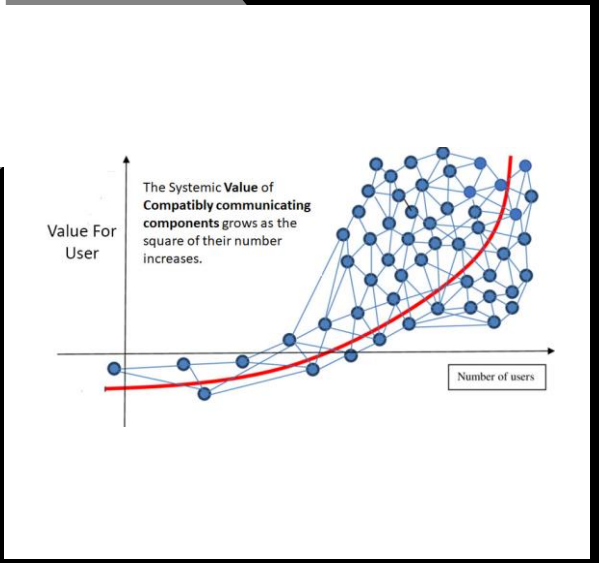
Ray Uzwyshyn, Ph.D. MLIS
Director, Collections and Digital Services
Texas State University Libraries
ruzwyshyn@txstate.edu, 512-245-5687
http://rayuzwyshyn.net

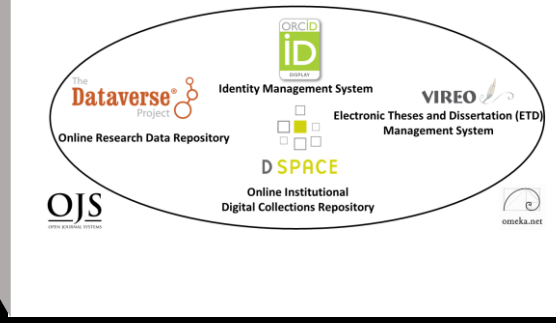
Envisioning
Future Possibilities
Networked Global Scholarly Research Environment



Can we Enable Scholarly Research Network Ecosystem Possibilities on Global Levels?







Is it Desirable or Time to Begin Thinking About Empowering a Global Research University Community ?

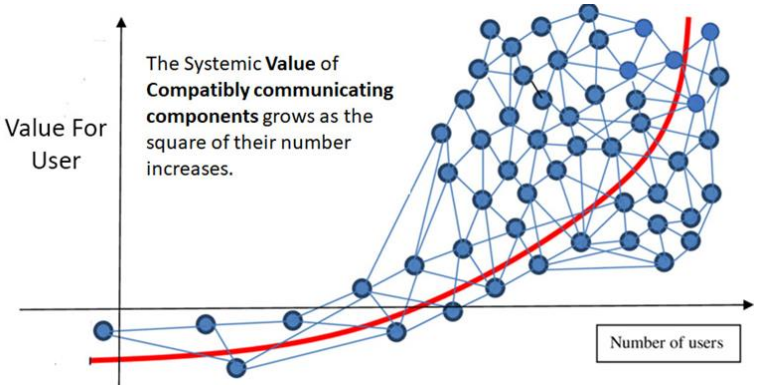
Research Universities and Digital Research Ecosystems

- **~266-300** Research Institutions US & Canada,
  Carnegie R1 & R2, Very High or High Research Activity, 124 ARL Libraries

- **~1000-1250** Research Universities Worldwide
  QS Rankings and Times Higher Education Supplement. (40% Europe, 26.5% Asia Pacific, US/Canada 18%, Latin America 9% and Middle East/Africa.

- **26,000-40,000** Universities Globally**.** Research Universities 2.7% - 4.2% of all universities worldwide. Highest by Country: **US 156**, UK 76, Germany 45, Japan 44.

- Other Top 2-3% Research Institution Academic Libraries Globally, 1000 Institutions beyond the US and Canada. This represents the other 90% of Research Libraries Globally



one laptop per child

Brainstorming & Antecedent Models

One Laptop Per Child

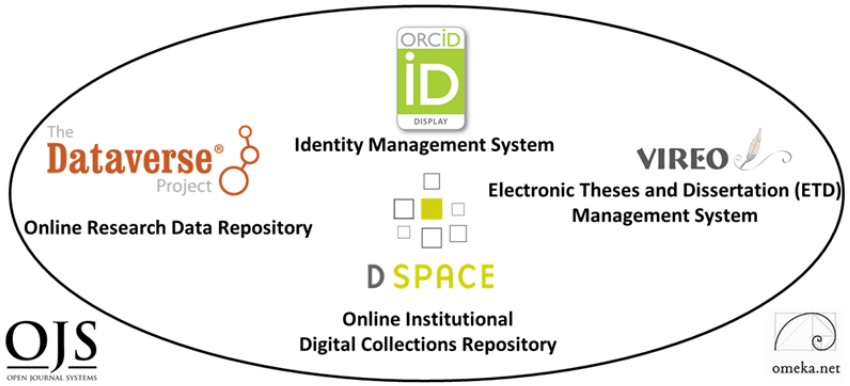
Dreamed up mid-late 90's, Launched 2005

- Nicholas Negroponte, MIT Media Lab Founding Director
- Noble Initiative/Grand Ambitions
- Vision: Give each child in world access to a laptop with open source software for less than 100.00 $US/laptop
- Gage Effects For Education Globally
- Can We do the same thing for academic research globally?

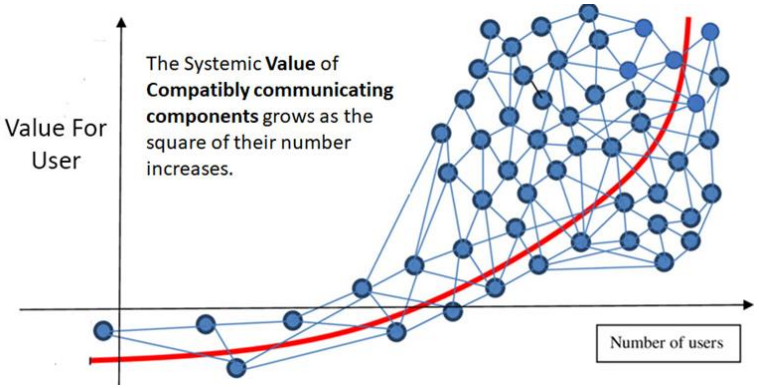
One Server Per Research Institution 2020-2025

Simple Idea

- Empower 1000 Research University Institutions/Research Libraries Globally
- Give them One Configured Server Ecosystem with 6 Open Source Scholarly Research Software Components, < $1000.00 US/Server or set up Fractional Server Space Globally (SAAS)
- Set Up Brief Training
- **Measure the Effects**



Research Universities and Digital Research Ecosystems



- **124** ARL Research Libraries (US and Canada)
- **131** US Research Universities (Carnegie R1, Very High Research Activity)
- **135** Doctoral Universities (Carnegie R2, High Research Activity, US), ~266-300 Research Institutions US & Canada
- **1011** Research Universities Worldwide (40% Europe, 26.5% Asia Pacific, US/Canada 18%, Latin America 9% and Middle East/Africa. **QS Rankings**
- **1250** Research Universities Worldwide, **Times Higher Education Supplement** (2.7% - 4.2% of all universities worldwide)
- By Country: **US 156**, UK 76, Germany 45, Japan 44
- Global Estimates of General University #'s **26,000-40,000**

Empower Other Top 2-3% Research Institution Libraries Globally, 1000 Institutions, the other 90% of Research Libraries Globally