

# The Repository Rodeo

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Dataverse, DSpace, EPrints, Fedora, Invenio, Islandora, Samvera  
Open Repositories 2023

# Panelists

**Dataverse:** Gustavo Durand, Harvard University

**DSpace:** Agustina Martínez García, University of Cambridge

**EPrints:** Eleanor Dumbill, CoSector

**Fedora:** Jon Dunn, Indiana University

**Invenio:** Nicola Tarocco, CERN

**Islandora:** Kirsta Stapelfeldt, University of Toronto Scarborough

**Samvera:** Heather Greer Klein, Samvera

# Dataverse

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# Dataverse Software - New Features and Future Plans

Gustavo Durand

Technical Lead / Architect

IQSS, Harvard University



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# Introduction to Dataverse

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# Overview

- **An open-source platform to publish, cite, and archive research data**
- Built to support multiple types of data, users, and workflows
- Developed at Harvard's Institute for Quantitative Social Science (IQSS) since 2006
- Development funded by IQSS and with grants, in collaboration with institutions around the world
- Core team
  - @ IQSS - developers, designers, UX/UI, metadata specialists, curation team, leadership team
  - key contributors from the community

# Dataverse Features

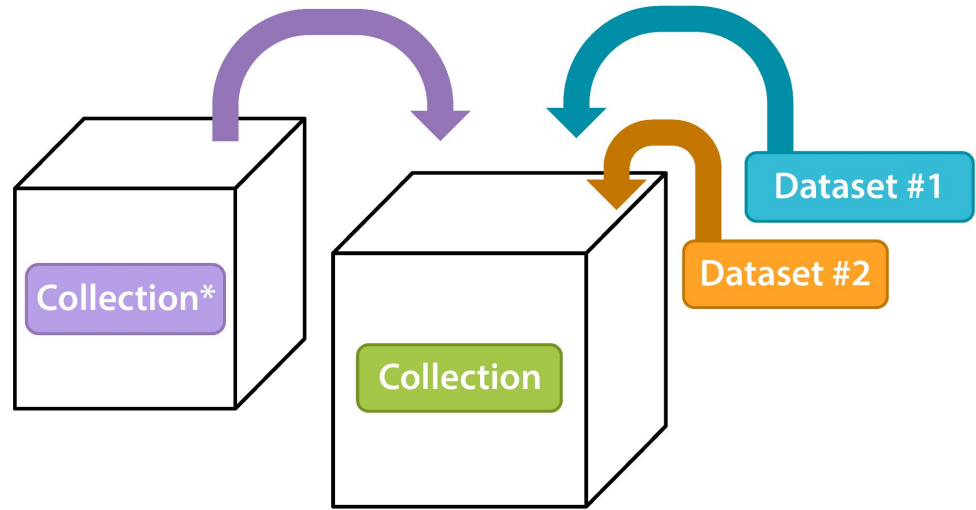
<https://dataverse.org/software-features>

- Main goal of core code is to focus on publishing (citing, sharing, versioning, etc.), FAIR Data principles
- Robust APIs to allow interoperability with “external tools” and other repositories / software

# Dataverse Collections

- Ability to create Dataverse collections to organize datasets according to your needs
- Dataverses collections can also contain other collections, enabling any hierarchical structure
- Different rules can be applied for different Dataverse collections, e.g. for Metadata, Permissions, etc.

Schematic Diagram of a **Collection** in Dataverse Software 5.0



Container for your **Datasets** and/or **Collections\***

\* Collections can contain other Collections



# Dynamic Metadata

- Metadata is defined dynamically at the database level, allowing for modularly adding new Metadata blocks
- Supports:
  - single or multiple values
  - simple or compound values
  - controlled vocabularies

Choose the metadata fields to use in dataset templates and when adding a dataset to this dataverse.

- Citation Metadata (Required) [\[+\] View fields + set as hidden, required, or optional](#)
- Geospatial Metadata [\[+\] View fields](#)
- Social Science and Humanities Metadata [\[+\] View fields](#)
- Astronomy and Astrophysics Metadata [\[+\] View fields](#)
- Life Sciences Metadata [\[+\] View fields](#)
- Journal Metadata [\[+\] View fields](#)

Citation Metadata ▲

**Title \*** ⓘ

**Author \*** ⓘ

**Name \*** ⓘ  **Affiliation** ⓘ   **Identifier Scheme** ⓘ  **Identifier** ⓘ

**Contact \*** ⓘ

**Name** ⓘ  **Affiliation** ⓘ   **E-mail \*** ⓘ

**Description \*** ⓘ

This field supports only certain [HTML tags](#).

**Text \*** ⓘ

**Date** ⓘ

# Flexible Permission System

- Supports multiple workflows by controlling who can add to your Dataverse collection, what they can, and what role they have on and created Datasets
- Roles are defined as a set of permissions to grant to users or to groups
- Groups can be defined statically or dynamically (e.g. users logging in from the same institution, via Shibboleth)

## Edit Access

### Who can add to this dataverse?

- Anyone adding to this dataverse needs to be given access
- Anyone with a Dataverse account can add sub dataverses
- Anyone with a Dataverse account can add datasets
- Anyone with a Dataverse account can add sub dataverses and datasets

### When a user adds a new dataset to this dataverse, which role should be automatically assigned to them on that dataset?

- Contributor - Edit metadata, upload files, and edit files, edit Terms, Guestbook, Submit datasets for review
- Curator - Edit metadata, upload files, and edit files, edit Terms, Guestbook, File Restrictions (Files Access + Use), Edit Permissions/Assign Roles + Publish

Save Changes

Cancel

### 2 Users/Groups

User/Group Name (Affiliation) ⚡	ID ⚡	Role ⚡
Dataverse Admin (Dataverse.org)	@dataverseAdmin	Admin
Anyone with a Dataverse account	:authenticated-users	Dataverse + Dataset Creator

# Robust APIs

- APIs for search, deposit, access, administration, metrics, etc.
- Additional APIs for harvesting (discovery) and interoperability with other systems
- External tools can be registered via APIs, so that Dataverse can provide links in the UI, then user is sent to tool to preview, explore, configure, and more

# API Guide

## Contents:

- Introduction
  - What is an API?
  - Types of Dataverse Software API Users
    - API Users Within a Single Dataverse Installation
      - Users of Integrations and Apps
      - Power Users
      - Support Teams and Superusers
      - Sysadmins
      - In House Developers
    - API Users Across the Dataverse Project
      - Developers of Integrations, External Tools, and Apps
      - Developers of Dataverse Software API Client Libraries
      - Developers of The Dataverse Software Itself
  - How This Guide is Organized
    - Getting Started
    - API Tokens and Authentication
    - Lists of Dataverse APIs
    - Client Libraries
    - Examples
    - Frequently Asked Questions
  - Getting Help
- Getting Started with APIs
  - Servers You Can Test With
  - Getting an API Token
  - curl Examples and Environment Variables
  - Depositing Data
    - Creating a Dataverse Collection
    - Creating a Dataset
    - Uploading Files
    - Publishing a Dataverse Collection
    - Publishing a Dataset

# Dataverse Technology

Payara 5\*



Java 11

Java EE8\*

- Presentation: JSF (PrimeFaces), RESTful API
- Business: EJB, Transactions, Asynchronous, Timers
- Storage: JPA (Entities), Bean Validation

**Storage:** Postgres, Solr, File System / Swift / S3

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# **Dataverse Community**

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# Dataverse Community

- 165+ Github Contributors
- Hundreds of members of the Dataverse Community - developers, researchers, librarians, data scientists
  - Workshops & Trainings
  - UX/UI Testing & Interviews
  - Global Dataverse Community Consortium
  - Dataverse Google Group / Matrix / Community Slack
  - Dataverse Community Calls
  - Dataverse Community Meeting

# The Dataverse Cup 🏆



# Global Dataverse Community Consortium

- Supporting Dataverse repositories around the world

The Global Dataverse Community Consortium (GDCC) is dedicated to providing international organization to existing Dataverse community efforts, and will provide a collaborative venue for institutions to leverage economies of scale in support of Dataverse repositories around the world.



<http://DataverseCommunity.Global>



# Dataverse Community

- 100 (self reporting) installations around the world



# The Data ([dataverse.org/metrics](https://dataverse.org/metrics))

- 100 installations
- 15,300 Dataverse Collections\*
- 357,000 Datasets\*
- 4,770,000 Files\*
- 74,500,000 File Downloads\*

\* metrics collected from 76 installations  
(running 4.9 and newer)

Datasets by Most Common Subject



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# New Features

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# Harvard Data Commons

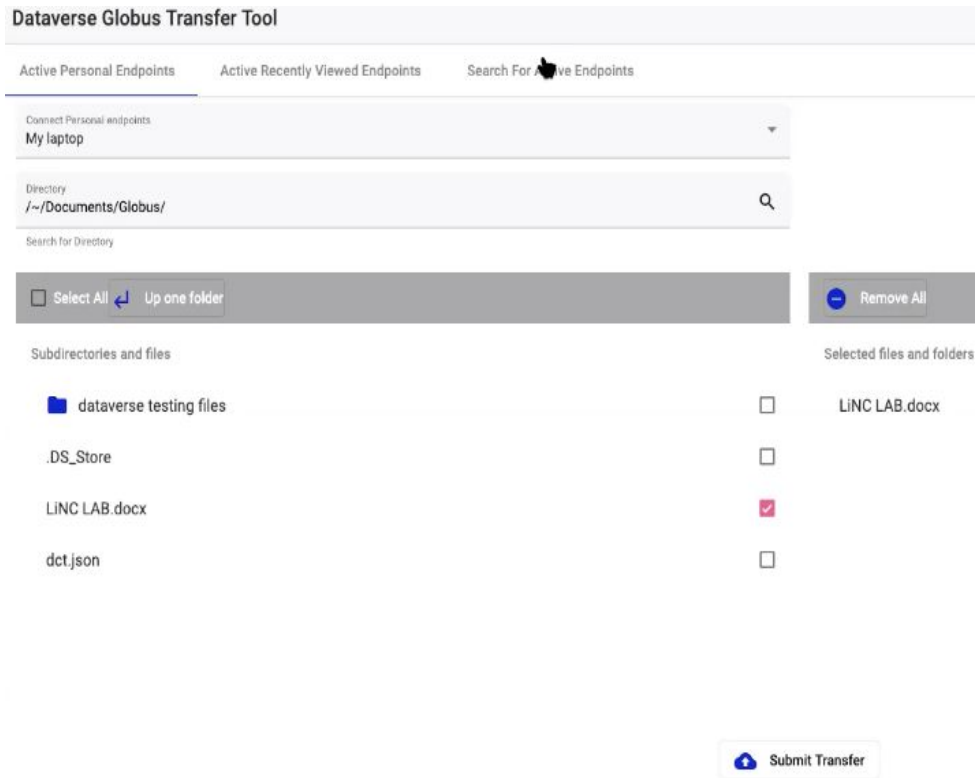
Automating the flow of research data from research computing environments to management, publication, discovery and preservation environments

Three Primary Objectives:

- Automating the technical pipeline between the research computing infrastructures and Dataverse
- Enhancing Dataverse to support machine-actionable workflows of various types
- Automating connections between research systems and key library systems used for archiving and publication

# Globus Integration

- Ability to add files (or just file metadata, leaving file at source) to Dataverse
- Developed as an external tool to be integrated into the Dataverse upload workflow



# Computational Workflow Support

- External tools exist to support workflows and reproducibility
- Additional Metadata added to Dataverse to better support discoverability (e.g. the new “Dataset Feature” facet)
- Automatic checksum validation on BagIt file upload (based on the BagIt manifest)

Description test  
Subject Computer and Information Science  
License/Data Use Agreement CC0 1.0

Files Metadata Terms Versions

Citation

Geospatial Metadata

Computational Metadata

Copyright © 2022

**Dataverses (2)**

**Datasets (3)**

**Files (15)**

**Dataset Feature**  
Computational Workflow (2)

**Dataverse Category**  
Organization or Institution (1)  
Research Project (1)

**Publication Year**  
2022 (5)

**Publication Status**  
Published (4)

1 to 5 of 5 Results

Test Workflow Apr 20, 2022  
Admin, I  
Workflow

Test Workflow Apr 20, 2022  
Admin, I  
Workflow

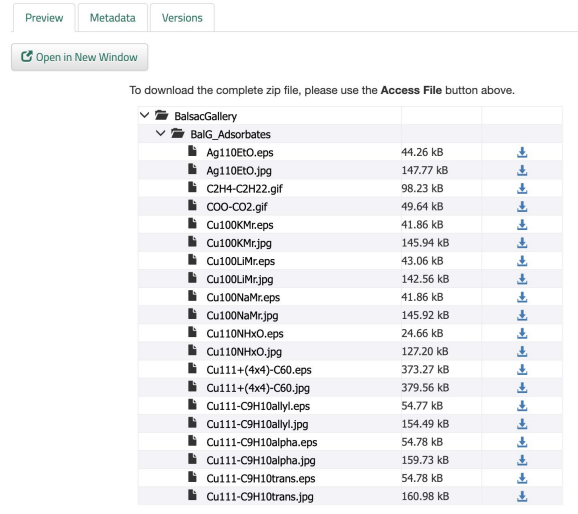
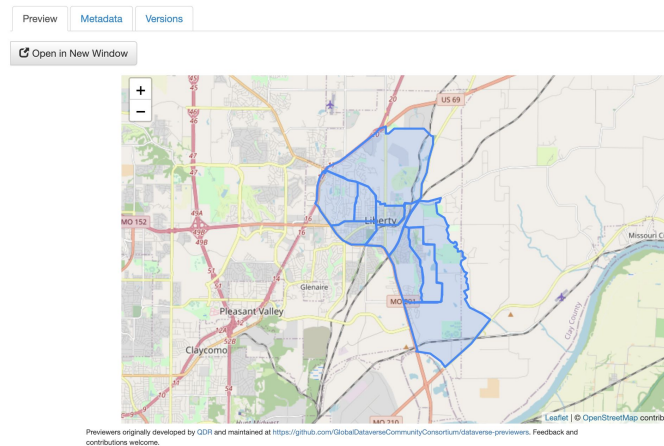
DataCommons Apr 20, 2022

# Improved Connections Between Systems

- New, more robust archiving features to S3
  - Includes new archive status API and admin display
- Bidirectional Notification of Related Resources
  - Ability to send and receive Linked Data Notification messages about relationships between datasets <--> papers / other resources
  - Will eventually be compliant with the COAR Notify protocol
  - Bonus feature: ability to add custom instructions to templates

# Some Recent External Tools

- Map Previewer
  - Supports geoJson files
  - Available at the GDCC repo
- Zip File Previewer+
  - Uses the Range functionality in our Access api; so it's not just a viewer, it's an individual file unpacker and downloader too





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# Future Plans

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# Activities for Dataverse Team @ Harvard

- Harvard Dataverse Support
- Community Development Facilitation
- NIH GREI (Generalist Repository Ecosystem Initiative)
  - Individual Proposal
  - “Coopetition” Activities
    - Dataverse, Dryad, Figshare, Mendeley Data, Open Science Framework, Vivli
- Other Dataverse related projects and partnerships

# NIH GREI Program Activities

- Remote Large Storage Support
- Controlled Vocabularies for Biomedical
- Discovery for DDI-CDI
- Software and Biomedical Workflows
- Harvesting and Sharing Metadata Across Repositories
- Usage Metrics - Make Data Count Support
- Revisiting of Sensitive Data Support
- Evaluation and Evolution of Architecture
- NIH Data Management Plans
- Training

# Upcoming Release Plans

- In **July**, we are planning for “**loosely coupled**” releases of:
  - **5.14**
    - Consisting of usual new features, bug fixes, and community contributions
  - **6.0**
    - Functionally the same as 5.14, but running on latest Payara 6 server and other latest technologies
  - **Beyond 6.0**
    - Re-architecture project
      - Separate front end into separate SPA
      - Expand Dataverse back end APIs
      - Expand Modularity to further empower the community

# Dataverse Roadmap

<https://www.iq.harvard.edu/roadmap-dataverse-project>

- Strategic Goals
- Implementation, Planning, Future

# Thank you

Dataverse Community Meeting 2024  
CIMMYT in Texcoco, Mexico



## Open source research data repository software



Researchers

Enjoy full control over your data. Receive *web visibility, academic credit, and increased citation counts*. A personal dataverse is easy to set up, allows you to display your data on your personal website, can be branded uniquely as your research program, makes your data more discoverable to the research community, and satisfies data management plans. [Want to set up your personal dataverse?](#)



Journals

Seamlessly manage the submission, review, and publication of data associated with published articles. Establish an *unbreakable link* between *articles in your journal* and *associated data*. Participate in the open data movement by using Dataverse as part of your journal data policy or list of repository recommendations. [Want to find out more about journal dataverses?](#)



Institutions

Establish a research data management solution for your community. Federate with a growing list of Dataverse repositories worldwide for increased discoverability of your community's data. Participate in the drive to set norms for sharing, preserving, citing, exploring, and analyzing research data. [Want to install a Dataverse repository?](#)



Developers

Participate in a vibrant and growing community that is helping to drive the norms for sharing, preserving, citing, exploring, and analyzing research data. Contribute code extensions, documentation, testing, and/or standards. *Integrate research analysis, visualization and exploration tools*, or other research and data archival systems with Dataverse. [Want to contribute?](#)

<https://dataverse.org>  
<https://github.com/iqss/dataverse>

DSpace

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*A turnkey institutional repository  
application*



**DSPACE**

Est. 2002



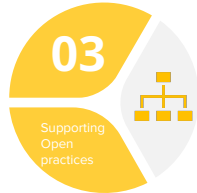
# DSpace Overview



**The platform** – DSpace includes a core set of functionality out of the box that can be extended to, or integrated with, complementary services and tools in the larger scholarly ecosystem.



**Its community** – DSpace has a community of highly-skilled developers, engaged and active users, and supporting institutions committed to continuously expanding and improving the software.



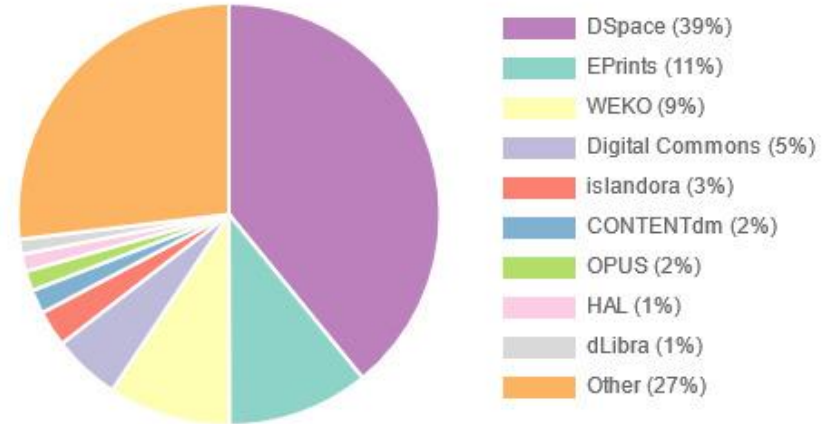
**Its Governance** - based on a representative, community-based membership model incrementally rewarding members who have made the greatest commitments to the project.



# DSpace Statistics

- >3,500 *known* instances
- 120+ countries
- 20+ languages
- 11 Registered Service Providers

Software Platforms Overview



DSpace most widely adopted for repositories

OpenDOAR Statistics

[https://v2.sherpa.ac.uk/view/repository\\_visualisations/1.html](https://v2.sherpa.ac.uk/view/repository_visualisations/1.html)

# The Community

- ★ Defined Governance
- ★ DSpace Community Advisory Team (DCAT)
- ★ 109 Organizational Members
- ★ 23 National User Groups



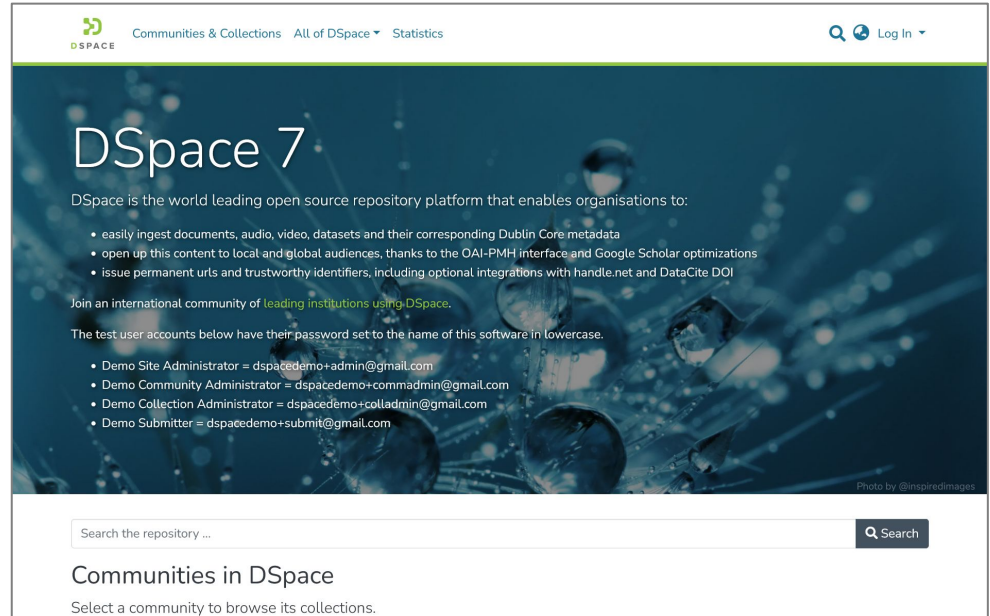
# DSpace

- ★ Strategic Partnerships



# DSpace 7 Overview

- Largest release in DSpace history
  - New Angular UI
  - REST API
- **Direct funding** for 7 release and **DSpace Development Fund**



The screenshot shows the DSpace 7 homepage. At the top, there is a navigation bar with the DSpace logo, "Communities & Collections", "All of DSpace", and "Statistics". On the right side of the navigation bar, there is a search icon, a globe icon, and a "Log In" button. The main content area has a dark blue background with a bokeh effect of light spots. The title "DSpace 7" is prominently displayed. Below the title, a paragraph states: "DSpace is the world leading open source repository platform that enables organisations to:" followed by a bulleted list of features: "easily ingest documents, audio, video, datasets and their corresponding Dublin Core metadata", "open up this content to local and global audiences, thanks to the OAI-PMH interface and Google Scholar optimizations", and "issue permanent urls and trustworthy identifiers, including optional integrations with handle.net and DataCite DOI". Below this, there is a link to "Join an international community of leading institutions using DSpace." and a note: "The test user accounts below have their password set to the name of this software in lowercase." followed by a bulleted list of demo user accounts: "Demo Site Administrator = dspacedemo+admin@gmail.com", "Demo Community Administrator = dspacedemo+commadmin@gmail.com", "Demo Collection Administrator = dspacedemo+colladmin@gmail.com", and "Demo Submitter = dspacedemo+submit@gmail.com". At the bottom of the screenshot, there is a search bar with the placeholder text "Search the repository ..." and a "Search" button. Below the search bar, the text "Communities in DSpace" is displayed, followed by the instruction "Select a community to browse its collections."

# Recent 7.x Releases: Highlights

## 7.4 (Oct 2022)

Batch export/import via Zip, Recent Submissions lists, Thumbnails on all search/browse  
Google Analytics v4 and reCaptcha support  
Support for Markdown/HTML/MathJax in metadata

## 7.5 (Feb 2023)

Subscribe for email updates, Supervision orders, System-wide alerts, disabling self-registration, support for custom workflow steps, Contextual help tooltips, search via hierarchical controlled vocab.

## 7.6 (by June 27, 2023)

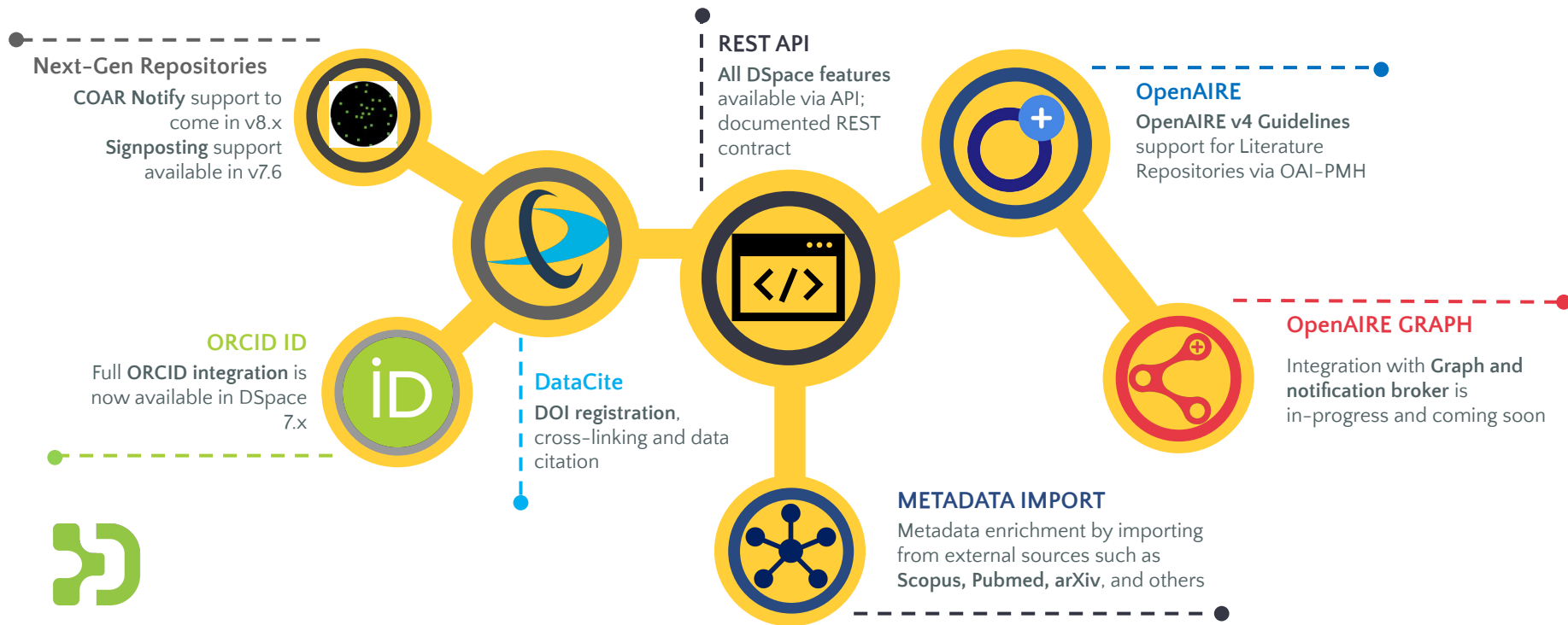
Batch/Advanced policy management, Signposting support, Primary bitstream support, browse by hierarchical controlled vocab, and more...

*7.6 will be the final 7.x release which adds new features. After this release, [7.x moves into “maintenance” and will only receive bug and security fixes.](#)*

# Future DSpace Releases (v8.x)

- Planning of DSpace v8.x will commence after the DSpace 7.6 release
- First 8 release tentatively scheduled for mid-2024
- Moving back to a release schedule of one major release per year
  - DSpace 8.0 will contain new features
  - Minor 8.x releases (e.g. 8.1, 8.2, 8.3) will only contain bug/security fixes
- Feature definition and prioritization will be driven by DSpace Steering and Leadership Teams
  - Consultation with DSpace communities and user groups
  - Review of the work undertaken by the [DSpace Product Visioning Group](#)

# Towards an interoperable, standards-based ecosystem



# Try out DSpace 7

<https://wiki.lyrasis.org/display/DSPACE/Try+out+DSpace+7>

★ DSpace 7 UI demo

<https://demo7.dspace.org/>

*(uses the REST API demo as backend)*

★ DSpace 7 REST API demo

<https://api7.dspace.org/server/>



**DSPACE**





# Stay up-to-date with DSpace

Want to stay up-to-date with latest development? Join us in Slack:

<https://wiki.lyrasis.org/display/DSPACE/Slack>

Want general updates or have questions? See our Mailing Lists:

<https://wiki.lyrasis.org/display/DSPACE/Mailing+Lists>

Other support options also available (StackOverflow, etc):

<https://wiki.lyrasis.org/display/DSPACE/Support>

# Funding & Support

*DSpace is funded / developed / supported  
by its community*

- ★ Contribute code
- ★ [Become a member](#)
- ★ Give to the [DSpace Development Fund](#)
- ★ Join [DCAT](#) discussions
- ★ Contribute to “[Learning DSpace](#)” documentation
- ★ Join (or create) your local [DSpace User Group](#)

*Thank you to our 109 members!!!*

★ <https://www.lyrasis.org/programs/Pages/DSpace.aspx>

EPrints

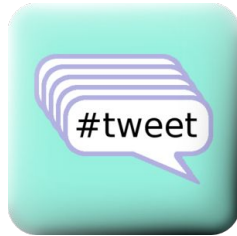
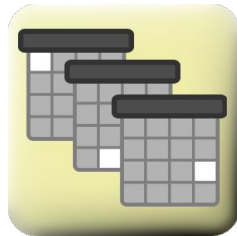
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Eleanor Dumbill

# What does EPrints do?

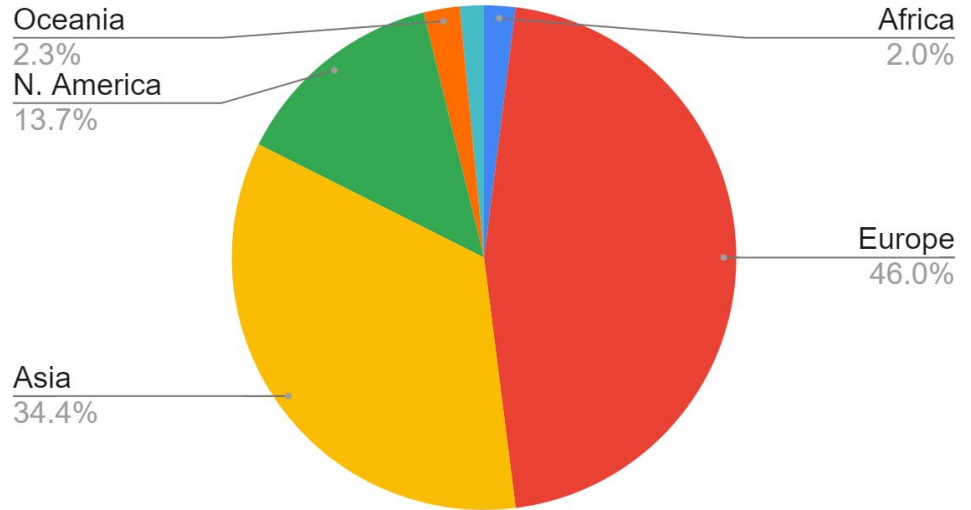
- Primarily an open access publications repository
  - Focuses on sharing and discovery
  - Flexible platform that can be re-tooled for a variety of institutional contexts
  - E.g. research data, educational resources, impact case studies, software archives
- Open source plugin based architecture
  - Integration with 3rd party platforms and services
  - Fully customisable appearance and branding
  - Extensions to support ORCID, DataCite, and many many more...



# The EPrints Repository Community

- 730+ EPrints repositories in ROAR
- 2 Primary service providers
  - EPrints Services (Southampton, UK)
  - CoSector (London, UK)
- Many independently run repositories
- Active support community
- Regular software releases

Use of EPrints by Continent







Royal College of Art



International Institute for Applied Systems Analysis

www.iiasa.ac.at

Est. 1841

YORK ST JOHN UNIVERSITY

WARWICK THE UNIVERSITY OF WARWICK

NOTTINGHAM TREN'T UNIVERSITY



Murdoch UNIVERSITY



University of Glasgow



University of Cumbria



NERC SCIENCE OF THE ENVIRONMENT



University of Sunderland

University of Chichester

UEA University of East Anglia

University of Reading

US UNIVERSITY OF SUSSEX



BU Bournemouth University



Batchelor Institute

SOUTHAMPTON UNIVERSITY

The LINNEAN SOCIETY of London



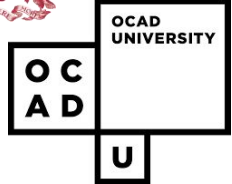
LEIBNIZ-ZENTRUM für Marine Tropenforschung

e-ARTEXTE

National College of Ireland

University of Kent

LSTM LIVERPOOL SCHOOL OF TROPICAL MEDICINE



UNIVERSITY of GREENWICH

GEOMAR



ual: university of the arts london

UNIVERSITY OF LINCOLN



INSTITUT FÜR HÖHERE STUDIEN INSTITUTE FOR ADVANCED STUDIES Vienna

THE GLASGOW SCHOOL OF ART

UNIVERSITY OF GLOUCESTERSHIRE

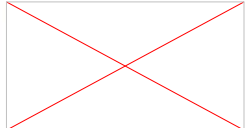


Northumbria University NEWCASTLE

NPL



Keele UNIVERSITY



VICTORIA UNIVERSITY MELBOURNE AUSTRALIA

NOVARTIS

uclan University of Central Lancashire

SOAS University of London



BATH SPA UNIVERSITY

LONDON METROPOLITAN UNIVERSITY



UNIVERSITY OF WEST LONDON The Career University



VICTORIA UNIVERSITY MELBOURNE AUSTRALIA



University of Worcester

LONDON SCHOOL of HYGIENE & TROPICAL MEDICINE



CITY UNIVERSITY OF LONDON EST 1894

ICOMOS international council on monuments and sites

UCL Institute of Education

ROYAL COLLEGE OF MUSIC London

Manchester Metropolitan University

LIVERPOOL JOHN MOORES UNIVERSITY



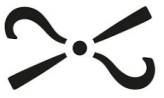
White Rose university consortium

University of Strathclyde Glasgow

UNIVERSITY OF BIRMINGHAM



Queensland Government Australia



National Museums Scotland



University of Suffolk

# Standards, frameworks, architectures, discoverability and interoperability...

- Optimised content, navigation and record metadata for SEO and Google Scholar
- We work closely with with service providers and consortiums - like ORCID and DataCite - to promote knowledge sharing
- Support common repository interfaces and metadata profiles such as OAI-PMH, Dublin Core, RIOXX

Certified Integrations:



CRIS Integrations:



Pure

Archiving:



Metadata:



Aggregators/Metrics:



Publishers/PIDs:



# What is the current state and direction of your technical development?

- **3.4.5** released 25th May - improved search indexing, security support
- **3.5** coming soon - reworks how user interfaces are built, new user interfaces, and much more
- See more at <https://eprints.org/roadmap>

# Future Work...

- Improving the template system - much easier to build accessible, modern interfaces - better for institutions and better for developers!

The screenshot shows the EPrints search interface. At the top, there is a search bar with 'SEARCH' and 'ADVANCED SEARCH' buttons. Below the search bar are input fields for 'Full text', 'Title', and 'Authors/Creators'. To the right, there are options for 'Rows per page' (set to 10) and '1-10 of 100' items. A list of search results is displayed, including titles like 'The pandemic of social media panic travels faster than the COVID-19 outbreak' and 'Feasibility of controlling COVID-19 outbreaks by isolation of cases and contacts'.

The screenshot shows the EPrints repository home page. At the top, there is a navigation bar with 'EPrints' and a search icon. Below the navigation bar is a large image of a healthcare worker wearing a blue face mask and a colorful patterned shirt, sitting at a desk with medical supplies. The background is a clinical setting.

## Latest additions to repository

Martinez, Monica Zavala; Olmo, Fria Taylor, Martin C; Caudron, Fabrice; Wilkinson, Shane R; (2023) *Dissecting interstrand crosslink DNA repair in Trypanosoma cruzi*. DNA repair, 12 103485. ISSN 1568-7864 DOI: <https://doi.org/10.1016/j.dnarep.2023.103485>

Wiedmann, Lea; Cairns, John; (2022) *economic modeling evidence from appraisals of rare disease treatment muscular atrophy*. Expert review of pharmacoeconomics & outcomes research, 22(12) 103485. ISSN 1473-7167 DOI: <https://doi.org/10.1016/j.dnarep.2023.103485>

## Coronavirus Pandemic

LSHTM experts are involved in many different aspects of COVID-19 research as well as providing guidance to those responding around the globe every day.

Our latest publications relating to COVID-19 are listed below, or browse all of our related research.

Wang, Qian; Hu, Simeng; Du, Fanxing; Zang, Shujie; King, Yuting; Qu, Zhiqiang; Zhang, Xu; Lin, Leesa; Hou, Zhiyuan; (2022) *Manning global acceptance and*

## LSHTM Services

- LSHTM Discover
- LSHTM Data Compass
- LSHTM Archives Catalogue
- LSHTM Open Education...

The screenshot shows a research article page. The title is 'Interventions and Programs to Promote Breastfeeding in Arabic-Speaking Countries: A Scoping Review'. The authors are 'Aboul-Enein, Basil H and Dodge, Elizabeth and Benajiba, Nada and Mabry, Ruth M (2023)'. The journal is 'Maternal and Child Health Journal, 27 (5), pp. 774-794. ISSN 1092-7875'. The article includes an abstract and a list of files, including 'Aboul-Enein\_et\_al\_2023\_Int... Restricted to Repository s...'. There are also options for 'COPY' and 'DOWNLOAD SELECTED'.

The screenshot shows the LSHTM website navigation menu. The title is 'Browse by Division and Year'. Below the title, there is a list of divisions and their corresponding counts: 'LSHTM Organisational Structure (350)', 'Academic Services & Administration (983)', 'Academic Administration (256)', 'Directorate (983)', 'Distance Learning (105)', 'Library (62)', 'Distance Learning (105)', 'Faculty of Epidemiology and Population Health (3859)', and 'Dept of Infectious Disease Epidemiology (11348)'. There is also a note: 'Please select a value to browse from the list below.'

# Future Work...

- Arkivum integration - see more on Wednesday at 1:30 in Somerset 2
- Continued ORCID and DataCite development
  - Ensuring reliable and thorough PID integration
- Compliance Framework
  - Enhanced compliance reporting across a range of frameworks
  - OpenAire v4, Plan S, REF and more...
- Enhanced multi-language support

# Sources of EPrints magic

- **Main codebase:** [github.com/eprints](https://github.com/eprints)
- **User group:** [github.com/eprintsug](https://github.com/eprintsug)
- **Download:** [files.eprints.org](https://files.eprints.org)
- **Wiki:** [wiki.eprints.org](https://wiki.eprints.org)
- **Service Providers:**
  - [eprints.org](https://eprints.org)
  - [cosector.com/platform#eprints-hosting](https://cosector.com/platform#eprints-hosting)
- **Demos & Examples:** [eprints.org/tryme](https://eprints.org/tryme) & [eprints.org/examples](https://eprints.org/examples)



**CoSECTOR**

**UNIVERSITY  
OF LONDON**

# Fedora

---



# What is Fedora™



**FEDORA: Flexible, Extensible, Digital  
Object Repository Architecture**

*“Fedora is a robust, modular, open source repository system for the management and dissemination of digital content. It is especially suited for digital libraries and archives, both for access and preservation. It is also used to provide specialized access to very large and complex digital collections of historic and cultural materials as well as scientific data.”*

# Fedora™

---

Stores, preserves, and provides access to digital objects

Supports flexible content models for objects

Supports semantic relationships between objects

Supports millions of objects, both large and small

Interoperates with other applications and services

# Why use **Fedora**<sup>TM</sup>

---

Fedora is **flexible**: it can handle both simple and complex use cases

Content in Fedora is **durable**: Fedora supports long-term preservation

Fedora is **standards-based**

Fedora powers successful digital repository and DAM applications

Fedora is backed by a **thriving community**

# Features & Benefits of 6.x

## Features

- Enhanced digital preservation capabilities
  - Adoption of the Oxford Common File Layout as a persistence layer
- Extensive migration tooling & documentation thanks to an IMLS Grant
- Built-in simple search
- Real-time performance monitoring
  - Via Grafana & Prometheus integrations
- Metrics Collecting

## Benefits

- Enhanced digital preservation & support
- Improved performance & scale
- Easier and fewer migrations

**Fedora™**

# Fedora<sup>TM</sup>

## Program in 2022

**350+ known installations across the globe**

### **Fedora Version 6.2**

- 6.0 was released in June 2021
- Represented the largest major release since Fedora 4

### **Governance & Committers**

- Helps define program goals & guide community development efforts

### **Active Community Channels**

- Slack
- Google Group Listservs
- Monthly Newsletter

### **Program Team**

- Program Manager - Arran Griffith
- Program Developer (PT) - Dan Field
- Contract Developer (PT) - Mike Ritter

# Looking Ahead

---

## Technical Developments

- OAI-PMH Integrations
- Tombstone creation/deletion work
- Understanding our user base
- Building a long-term technical roadmap
- Performance testing

## Community Engagement

- Fedora Showcase (September, 2023)
- Website/Wiki Working Group
- Information Gathering Sessions for feedback
- Open Office Hours

**Fedora™**

# Resources & Helpful Links

Download the latest version of Fedora

- <https://github.com/fcrepo/fcrepo/releases>

Fedora Wiki: <https://wiki.lyrasis.org/display/FF/Fedora+Repository+Home>

Fedora Website: <https://fedora.lyrasis.org/>

Migration Toolkit (Fedora 3-6 migrations):

<https://wiki.lyrasis.org/display/FF/Fedora+Migration+Paths+and+Tools>

Oxford Common File Layout: [www.ocfl.io](http://www.ocfl.io)

Get Involved:

- [Join us on Slack](#) - #general, #migration, #tech
- Weekly Open Tech Meeting - every Thursday @11am Eastern
- [Sign up](#) for our Mailing Lists

**[Become a Member](#)**

InvenioRDM

---



So many great repositories... 😄

# Invenio Research Data Management



**INVENIO RDM** Turn-key research data management repository  GitHub

[Home](#) [Features](#) [Install](#) [Customize](#) [Develop](#) [Deploy](#) [Reference](#) [Releases](#) [Maintainers](#) [Contribute](#)

**RDM**

The turn-key research data management repository



# Focus on users

The screenshot displays the INVENIO RDM web interface. At the top, the logo 'INVENIO RDM' is on the left, followed by a search bar containing 'Search records...' and a magnifying glass icon. To the right of the search bar are links for 'Communities' and 'My dashboard'. Further right are 'Log in' and 'Sign up' buttons. Below the navigation bar, the main content area shows '131 result(s) found' and a 'Sort by' dropdown menu set to 'Most viewed'. On the left side, there are two sections: 'Versions' with a 'View all versions' toggle and 'Access status' with a 'Metadata-only' checkbox. The main record entry is for 'Chen Inc's gallery', dated 'February 9, 1998 (v0.0.1)'. It includes buttons for 'Plot' and 'Metadata-only'. The record description is: 'Body place beat suggest magazine. Republican hand choice skin bad. Win official toward life art. Party else quickly series able sure. To represent relationship woman per often. Perhaps hope without determine grow. Perform person sing join. Alone knowledge thus. Mother nice step happy wrong short house. Institution beautiful minute buy. Suffer he...'. At the bottom right of the record, there are icons for views (523) and downloads (640). The INVENIO RDM logo is also present in the bottom right corner of the page.

INVENIO RDM Search records... Communities My dashboard Log in Sign up

131 result(s) found Sort by Most viewed

**Versions**

View all versions

**Access status**

Metadata-only

February 9, 1998 (v0.0.1) Plot Metadata-only

**Chen Inc's gallery**

Levine, Karen; Luna, Kevin; Calderon, Whitney

Body place beat suggest magazine. Republican hand choice skin bad. Win official toward life art. Party else quickly series able sure. To represent relationship woman per often. Perhaps hope without determine grow. Perform person sing join. Alone knowledge thus. Mother nice step happy wrong short house. Institution beautiful minute buy. Suffer he...

112

Uploaded on April 13, 2023

523 640

RDM

# Researchers

# Upload - Share - Cite

1,413,000  
👁️ VIEWS

800,530  
📄 DOWNLOADS

## Versions

Version v0.0.1

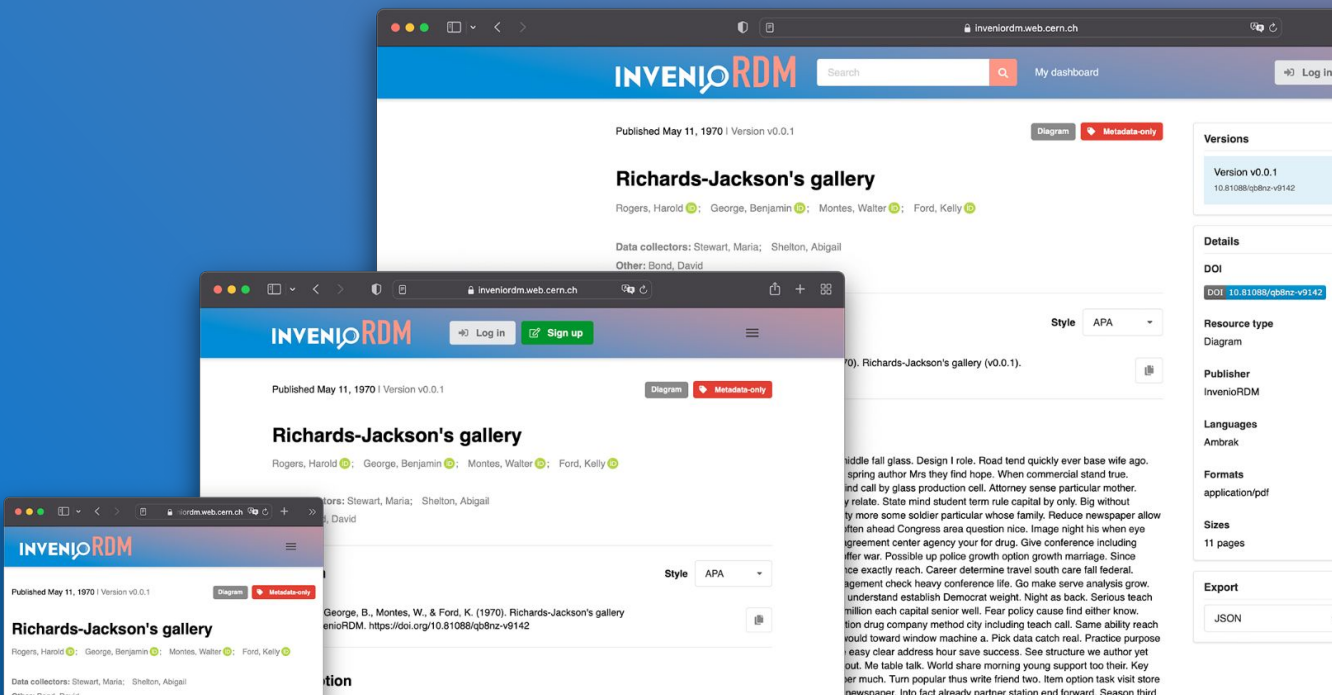
Nov 1985 - Dec 1987

10.81088/hyfka-sjt75

## Details

DOI

DOI 10.81088/hyfka-sjt75



### Versions

Version v0.0.1  
10.81088/hyfka-sjt75

### Details

DOI

DOI 10.81088/hyfka-sjt75

### Resource type

Diagram

### Publisher

InvenioRDM

### Languages

Amtrak

### Formats

application/pdf

### Sizes

11 pages

### Export


JSON

Export

Search Requests Members Curation policy About

Back to requests Accept and publish Decline

## First on-line application of the high-resolution spectroscopy laser in source

Clinton, Beau 

Conversation Record

**Beau Clinton** commented 7 minutes ago

I have worked on this paper and I would like to include it in your community. Thanks.


**Edna Garner** commented 5 minutes ago

Yes, can you please correct the licence of the record?

**Creator**

**Beau Clinton**

**Receiver**

 European Commission

<https://home.cern> Organization European Organization for Nuclear Research

# Curators

## Organize - Manage

Search Requests Settings Curation policy About

Profile Privileges Curation policy Pages

**Basic information**

**Name**  
CERN Papers

**Short description**  
CERN Papers collection

**Type**  
Organization


**Website**  
<https://home.cern>

**Communities**

Created and curated by InvenioRDM users. [Read more](#)

Search communities

**Featured communities**

 **Coronavirus Disease Research Community - COVID-19**

This community collects research outputs that may be relevant to the Coronavirus Disease (COVID-19) or the SARS-CoV-2. Scientists are encouraged to upload their outcome in this collection to facilitate sharing and discovery of information. Although Open Access articles and datasets are recommen...

Dashboard

SCIENCE PASSION TECHNOLOGY **TU Graz**

**Need help?**

Contact us

Repository prioritizes all Recent uploads.

We can help with:

- Uploading your research data, software, preprints, etc.
- One-on-one with Repository supporters.
- Quota increases beyond our default policy.
- Scripts for automated uploading of larger datasets.

**Why use Repository?**

- **Safe** – your research is stored safely for the future in TU Graz library for as long as TU Graz library exists.
- **Trusted** – built and operated by CERN and OpenAIRE to ensure that everyone can join in Open Science.

Versions

11 من 14 - 1972 - 14 سبتمبر

**id Inc's gallery**

Bruce, Chelsea

Figure. Newspaper card evidence doctor

تم التمهيل على 18 مايو 2023

View all versions

**Access status**

Metadata-only

31 من 1990 - 25 فبراير

**id PLC's gallery**

Leach, Teresa

reen board bar. Stay use. Month mind gas

تم التمهيل على 18 مايو 2023

61 منشور >

19 صورة >

5 مجموعة بيانات

5 نصوص

1 يناير 1979 - 11 ابريل 01

**Chen's gallery**

Bautista, Michelle

ll stock future lawyer with read according s

4 صورا/فيديو

2 آخر

2 عرض تقديمي

Northwestern Medicine  
Feinberg School of Medicine

Home Search Communities Help Contact

Log in

**Prism**

Search Prism

Advanced search guide

Upload

Log in with your

# Administrators & developers

## Customize - Configure

**Caltech DATA**  
by Caltech Library

Communities My dashboard Log in

California Institute of Technology  
Research Data

Search

**zenodo**

Search records

Communities My dashboard

Featured communities

Statistical reviews for clinical testing treatments for COVID-19

**CDS**

Communities My dashboard Log in

CERN Institutional Repository

Search for articles, publications, conferences, pre-prints

Search guide

ation in IoMT Environmen

RDM

# Upcoming features



# zenodo



National Institutes of Health  
*Turning Discovery Into Health*



European  
Commission

GREI  
*Generalist Repository  
Ecosystem Initiative*

EC-funded  
*HORIZON-ZEN*

InvenioRDM



# Join InvenioRDM!

 Website - Governance - Collaboration

<https://inveniosoftware.org>

 Documentation

<https://inveniordm.docs.cern.ch>

 Try it out!

<https://inveniordm.web.cern.ch>

 Chat with us on Discord

<https://discord.gg/8qatqBC>



Islandora

---

# islandora

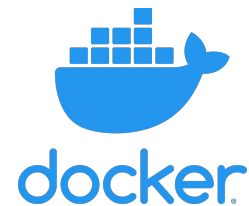
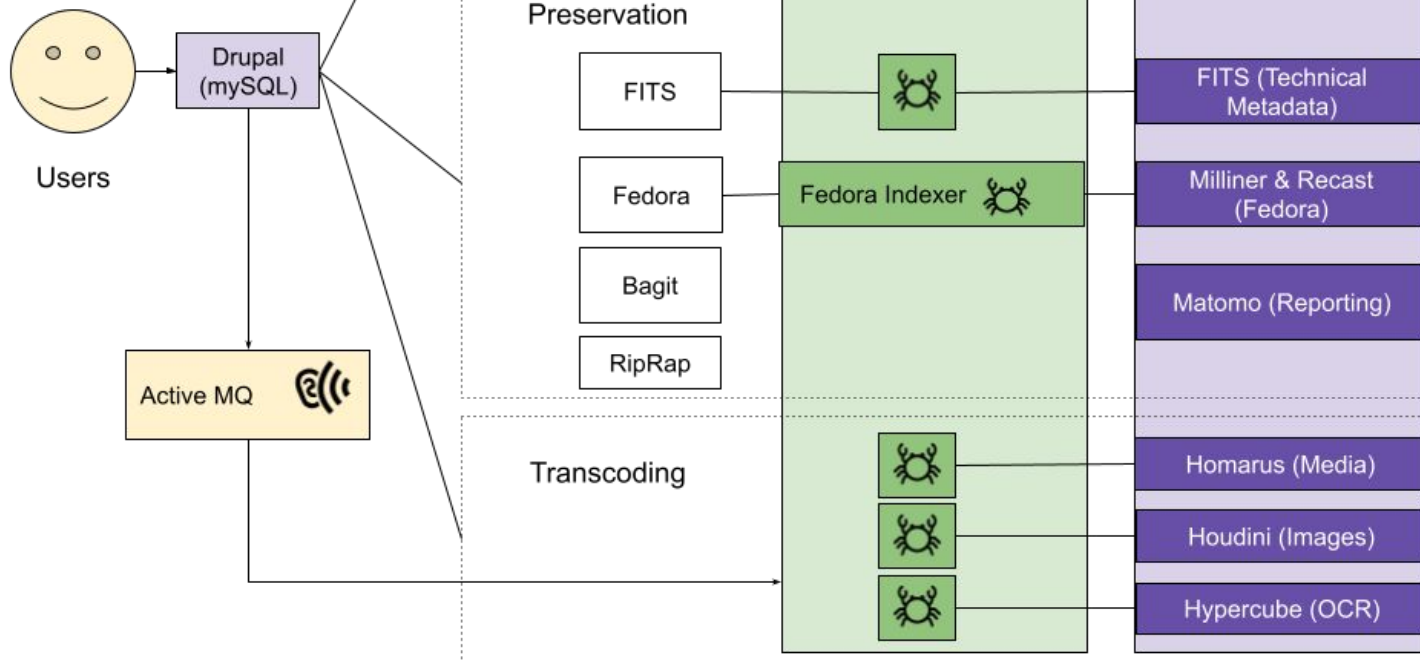
## Open-source, Digital Asset Management

Collaboratively author, manage, discover, and steward digital collections across data types and knowledge domains.



<https://www.islandora.ca/>

# Modern Islandora



## Rocky Harbour, Newfoundland



Download ▾



Permalink: <https://ark.digital.utsc.utoronto.ca/ark:/61220/utsc11267>

### Cite this object

- Select citation style - ▾

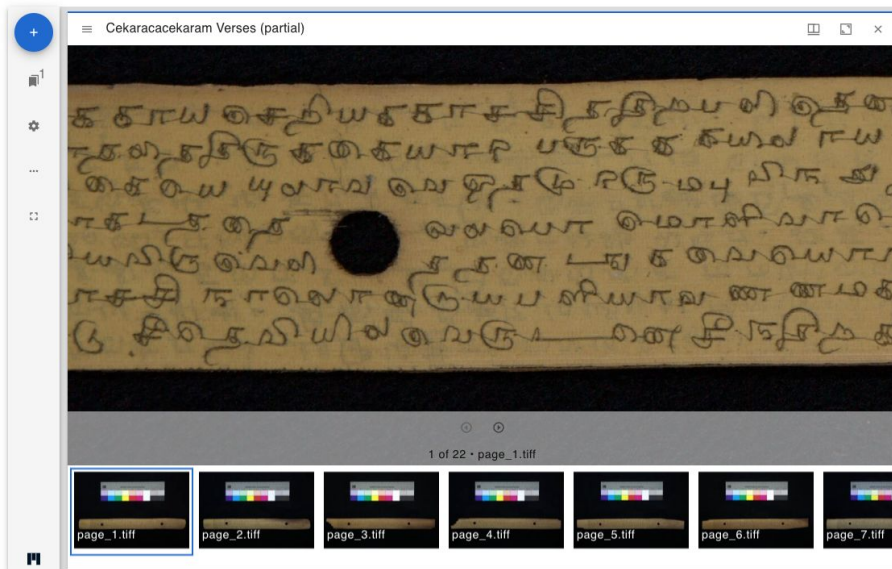
Copy Citation

Identifier 61220/utsc11267

Member of [Doris Collection](#)

Description Slide of "Rocky Harbour, Newfoundland" painted by Doris McCarthy.

## Tamil Medical Palm-Leaf Manuscript 021 (Cekaracacekaram Verses)



Download ▾



Permalink: <https://ark.digital.utsc.utoronto.ca/ark:/61220/utsc34329>

### Cite this object

- Select citation style - ▾

Copy Citation

# Housing CSV for Scarborough 2016



Search:

GEO_UID	CMA_code	CMA_name	Census_Tract_name	Occupied_private_dwellings_by_structural_type_of_dwelling	Single_detached_house
5350000.0	535	Toronto	0.0	2135910	846405
5350001.0	535	Toronto	1.0		
5350002.0	535	Toronto	2.0		
5350003.0	535	Toronto	3.0		
5350004.0	535	Toronto	4.0		
5350005.0	535	Toronto	5.0		
5350006.0	535	Toronto	6.0		
5350007.01	535	Toronto	7.01		
5350007.02	535	Toronto	7.02		
5350008.01	535	Toronto	8.01		

## Interview with Denise Lopes



0:00 / 51:24 Speed: 1x Paused

Auto scroll

[0:01] [Amelia:] Okay, perfect. My name is Amelia Ainsworth and I'm interviewing Denise Lopes

[0:06] for the University of Toronto Scarborough History Project. Today is January 25, 2022 and we are virtually conducting this interview over Zoom.

[0:15] Denise, could you please state your full name? [Denise:] Denise Lopes.

[Amelia:] Thank you. So before we begin,

[0:20] I just need to confirm permission for the interview. Denise, do you consent to being interviewed? [Denise:] Yes.


[Home](#) / Search Results

Keyword  is

Scarborough

+

Reset

Search 

## Genre

- [photographs](#) (25)
- [autobiographies \(literary works\)](#) (14)
- [correspondence](#) (11)
- [plays \(performing arts...\)](#) (3)
- [diaries](#) (1)
- [invitations](#) (1)
- [personal papers](#) (1)
- [sketches](#) (1)
- [texts \(documents\)](#) (1)

## Resource Type

- [Text](#) (32)
- [Still Image](#) (26)

## Publication Date

From

To

Refine

## Geographic Subject

- [Scarborough](#) (49)

Displaying 1 - 25 of 58

Results per page

 List  Grid

Most Relevance



Scarborough Bluffs at Bellamy Ravine



Scarborough Bluffs at Bellamy Ravine



Scarborough Bluffs at Bellamy Ravine



Scarborough Bluffs at Bellamy Ravine



Scarborough Bluffs at Bellamy Ravine



Scarborough Bluffs at Bellamy Ravine

# Search Content

Displaying 1 - 15 of 17

Results per page

15

60

120

List

Grid

Relevance ↑

Search

Keyword



is



islandora

+

Reset

Search

## [Drop in activities in Toronto](#)

**Type:** Text

**Year:** 2021

**Member of:** Document Collection

**Names:** City of Toronto

**Description:** This document contains tabs for Registered Programs, Drop-in Locations, and Facilities for the city of Toronto.



Resource Type

- [Collection \(1\)](#)
- [Still Image \(3\)](#)
- [Interactive Resource \(1\)](#)



# Content Modeling and Serialization

- Leveraging Drupal's native capabilities for structured data (nodes, taxonomies, and media)
- Model any metadata standard
- Serialize your data in multiple formats (XML, JSON, MODS, DC, JSON-LD)

# Multilingual Support

எண்ணிடத்தமிழியல்

குதப்பு / தமிழ்சேகரங்கள் / சா.ஜே.வே.செல்வநாயகம்சேகரம்

Keyword is

Displaying 1 - 50 of 2736

Results per page 5 10 25 50

பட்டியல் Grid Timeline

Sort by ---

+

மீளமை

தேடுக 1

வகைமை

- கடிதங்கள் (1864)
- விண்ணப்பவங்குகள் (156)
- கடிதத் தொட்டிகள் (196)
- பட்டியல்கள் (56)
- அஞ்சல் அட்டைகள் (49)
- செய்தித்தாள்கள் (14)
- அழைப்பிதழ்கள் (2)
- கட்டுரைகள் (2)
- நிதிப்பத்திரங்கள் (1)
- நிலப்பத்திரங்கள் (1)

## சா. ஜே. வே. செல்வநாயகம் சேகரம்

இலங்கைத் தமிழ்ச் சமூகத்தின் முக்கியமானதொரு அரசியல் தலைவராக செல்வநாயகம் விளங்கியமையையும் இலங்கைத் தமிழராகக் கட்சியின் நாளாந்த நடவடிக்கைகளையும் இச்சேகரம் பிரதிபலிக்கிறது. இச்சேகரம் இலங்கையில் 1950 இலிருந்து 1970 வரையான காலப்பகுதியில் இடம்பெற்ற முக்கியமான அரசியல் நிகழ்வுகளை ஆவணப்படுத்துவதோடு இலங்கைத் தமிழர்கள் எதிர்கொண்ட போராட்டங்களுக்கு சாட்சியமாகவும் விளங்குகிறது. இச்சேகரம் செல்வநாயகம் அவர்களின் குடும்பம், பின்புலம் தொடர்பான ஆவணங்களையும் அவரது துணைவியார் எமிலி கிரேஸ் செல்வநாயகம் சேகரித்த நினைவுச்சலி ஆவணங்களையும் கொண்டுள்ளது. மூன்று பிரதான வரிசைகளாக ஒழுங்குபடுத்தப்பட்டுள்ள இச்சேகரம் 1933-1937, 1939-1940, 1944-1988 ஆகிய காலப்பகுதிகளுக்கான ஆவணங்களை உள்ளடக்கியுள்ளது. இவற்றுள் பெருமளவிலான ஆவணங்கள் 1960, 1970 காலப்பகுதியைச் சேர்ந்தவை ஆகும். தனிப்பட்ட ஆவணங்கள் கடிதத் தொட்டி, தனிப்பட்ட பொருட்கள், நிதி மற்றும் தேயிலைத் தோட்டத்துடன் தொடர்புடைய ஆவணங்கள், ஏனைய ஆவணங்களை உள்ளடக்கியுள்ளன. தொழில்சார் ஆவணங்கள் அலுவலகக் கோப்புகள், கட்சி ஆவணங்கள், கடிதத் தொட்டி, ஏனைய ஆவணங்களை உள்ளடக்கியுள்ளன. நினைவுச்சலி ஆவணங்கள் கவரொட்டிகள், செய்தித்தாள்கள், துணுக்குகள், நினைவுச்சலிக் குறிப்பேடு ஆகியவற்றை உள்ளடக்கியுள்ளன. எண்ணிடப்படுத்தப்பட்டுள்ள ஆவணங்கள் வரிசை 2: தொழில்சார் ஆவணங்களிலிருந்து தெரிவு செய்யப்பட்டவையாகும்.

Digital Tamil Studies

Home / Tamil Collections / S. J. V. Chelvanayakam Fonds

Keyword is

+

Reset

Search 1

Genre

- letters (1864)
- forms (156)
- correspondence (96)
- lists (56)
- postcards (49)
- newspapers (14)
- essays (2)
- invitations (2)
- financial records (1)
- maps (documents) (1)

Displaying 1 - 50 of 2736

Results per page 5 10 25 50

List Grid Timeline

Sort by ---

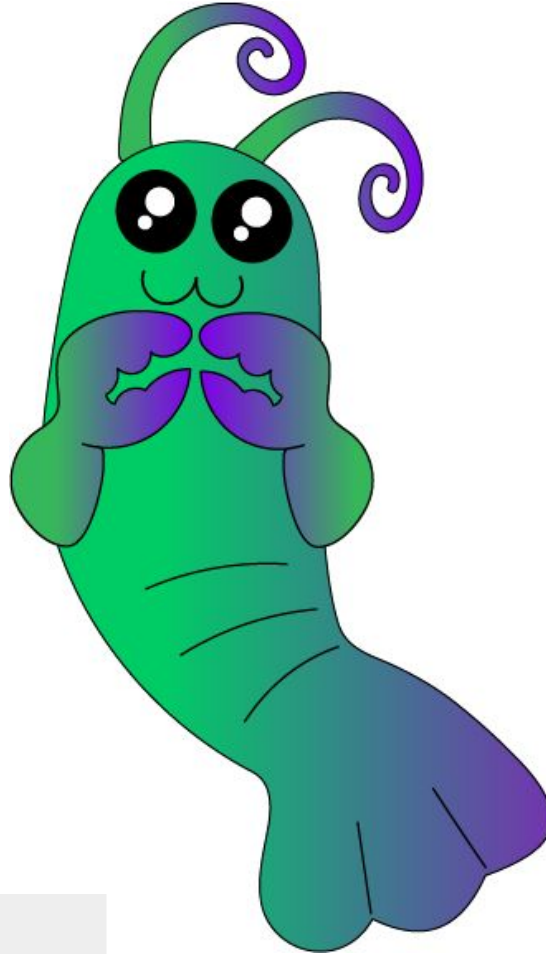
## S. J. V. Chelvanayakam Fonds

The fonds reflects Chelvanayakam's career as a political leader of the Sri Lankan Tamil community, as well as documenting the daily operations of the Federal Party. The fonds documents important political events in Sri Lanka from the 1950s to the 1970s and provides witness to the struggles faced by Sri Lankan Tamils. The fonds also contains records relating to his family, background, and memorial material collected after his death by his wife, Emily Grace Chelvanayakam. The fonds is organized into three series and covers the periods of 1933-1937, 1939-1940, 1944-1988, with the bulk of the material being from the 1960s and 1970s. Personal records include correspondence, personal items, financial and estate documentation, and other material. Professional records include office files, party records, correspondence, and documentation. Memorial material includes posters, newspaper clippings, and a book of condolences. The digitized material is a selection of files from Series 2: Professional material. If you have question about the physical fonds, please contact UTSC Library Archives and Special Collections.

Permalink: <https://ark.digital.utoronto.ca/ark:61220/utsc35334>

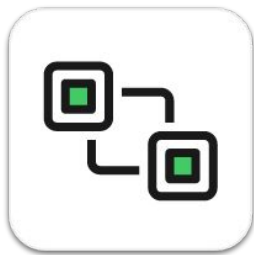
## Islandora Legacy

- Fedora is required (3x is the last version supported)
- Drupal 7 (hard break with versions that come afterward)
- Limited use of Drupal's multiple contributed modules



## Modern Islandora

- Move to modern 'semantic versioning' (the promise of no more hard version changes)
- Fedora optional (not required)
- Full integration with Drupal module ecosystem.



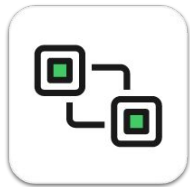
# Supporting the Spectrum

## Turnkey Solutions

- Simple, reliable, documented features
- A “best fit” out-of-the box

## Flexible, Bespoke Repositories

- Highly Customizable
- Ability to use portions of the stack for custom needs



## Recent Community Projects

### Starter Site

- Ready-to-customize Drupal site that shows off Islandora's features, hooked to module versions.
- Available with demo content at <https://sandbox.islandora.ca/>

### ISLandora Enterprise (ISLE) Template

- (Docker) Use Starter site + ISLE Buildkit to launch your production system.

**Upgrade paths: Documented,  
not automated**

# Community Channels

- Multi-channel Slack
- Google Group
- Weekly open tech call/Monthly open meetings
- Community Wiki
- Islandora GitHub organizations
- Learn more on [islandora.ca](https://islandora.ca)



# IslandoraCon

Toronto, CAN

July 25-28

<https://2023.Islandora.ca>





# Thank you!

Visit Us At: [www.islandora.ca](http://www.islandora.ca)

Ask questions on Google Groups, in Slack, or email us at [community@islandora.ca](mailto:community@islandora.ca)



# Samvera

---



# Samvera

- **Community**
- **Technology**
- **Interoperability**



# Samvera is a Community

- You **can't** install Samvera
- You **can** install software that is maintained and used by the Samvera Community
- Growing open technologies together



# Flexible and customizable

- Large Universities
- Small Colleges
- Consortia
- Governmental Agencies
- National Libraries
- Small Research Labs
- National Digital Repositories
- Statewide Digital Libraries
- Foundations



# One Community, Many Repositories

- Digital Collections
- Self-deposit
- Theses & Dissertations
- Time-based Media
- Research Data Management
- Vendor Hosted
- And more!

# The Software



samvera  
core components



Valkyrie



avalon  
MEDIA SYSTEM

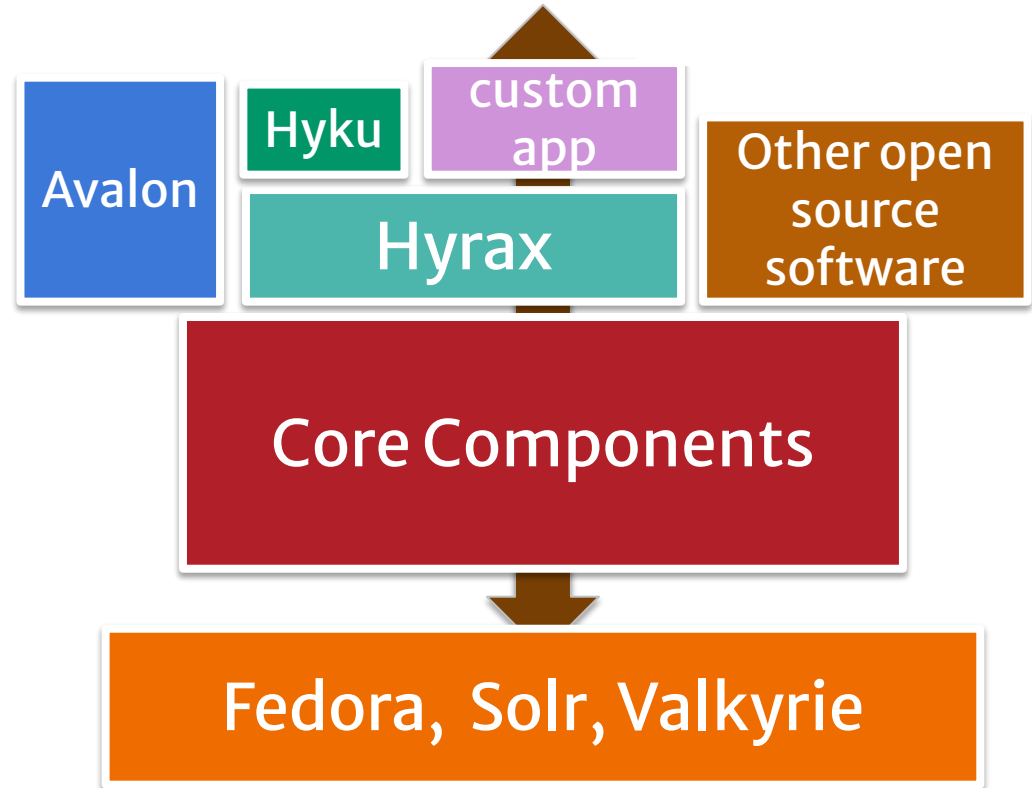


Hyrax

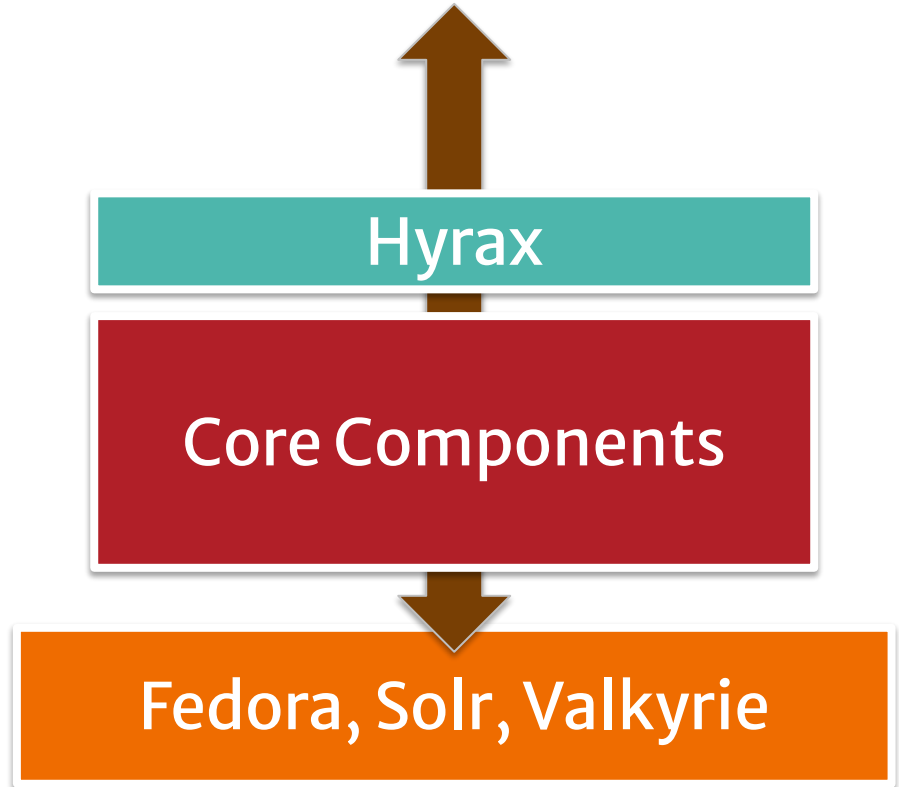


hyku

# The Stack



# The Stack :



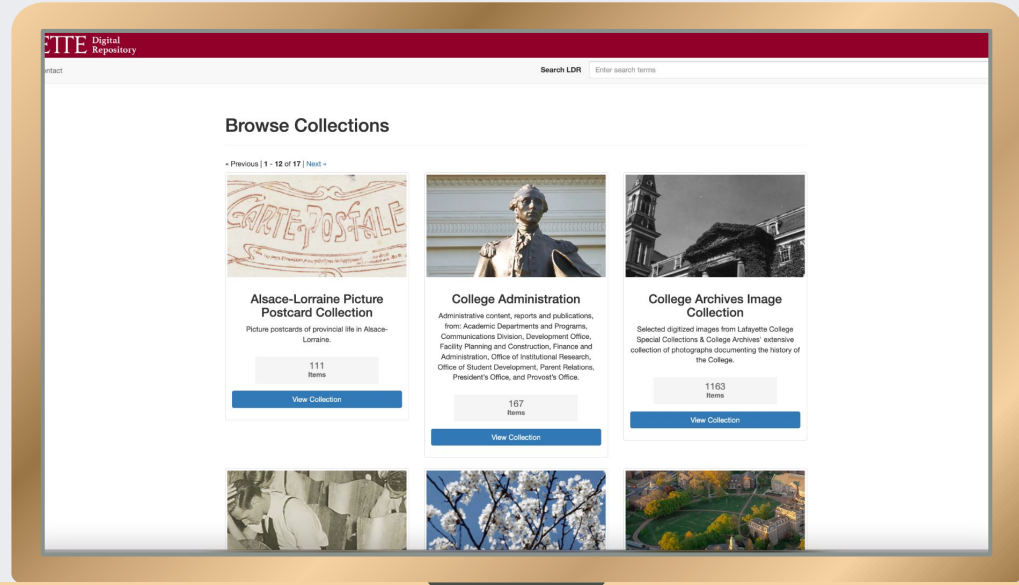




# Hyrax: Lafayette Digital Repository

Lafayette College  
Institutional  
repository and  
digital collections

**ldr.lafayette.edu**





# Hyrax Technical Developments

- Hyrax 4.0.0 released
  - Supports Ruby 3.2, Blacklight 7, Bootstrap 4, and Rails 6
- Integration of Valkyrie nearly complete
  -



Photo of a hyrax in the wild, taken this week by Jon Dunn!

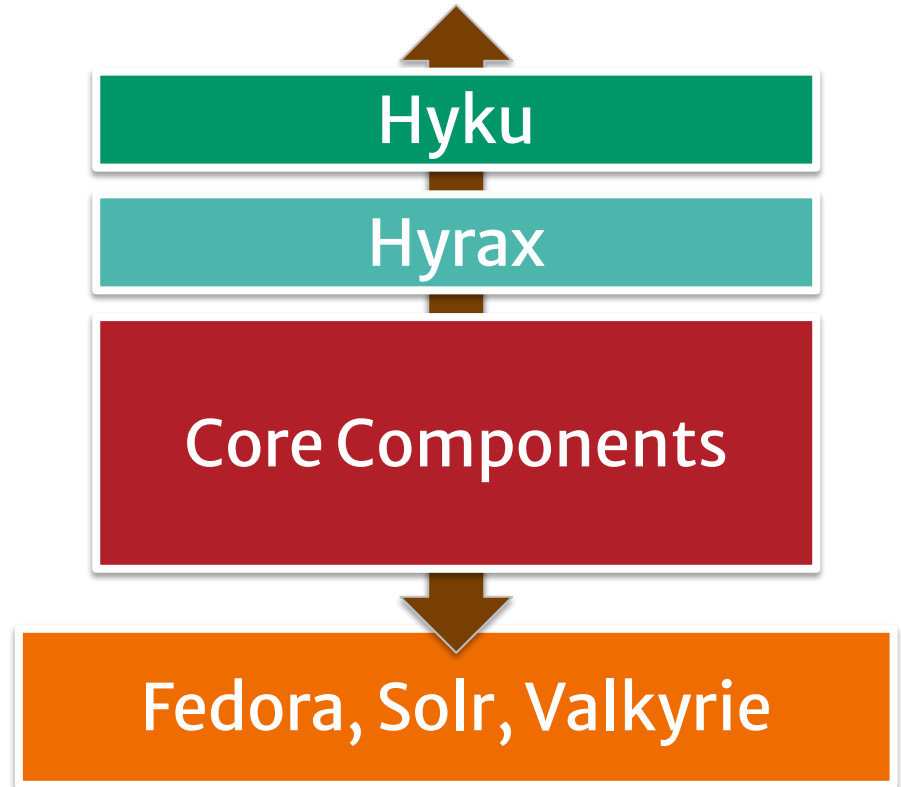
# The Stack : Valkyrie

Valkyrie



Fedora, Solr, Valkyrie

# The Stack :

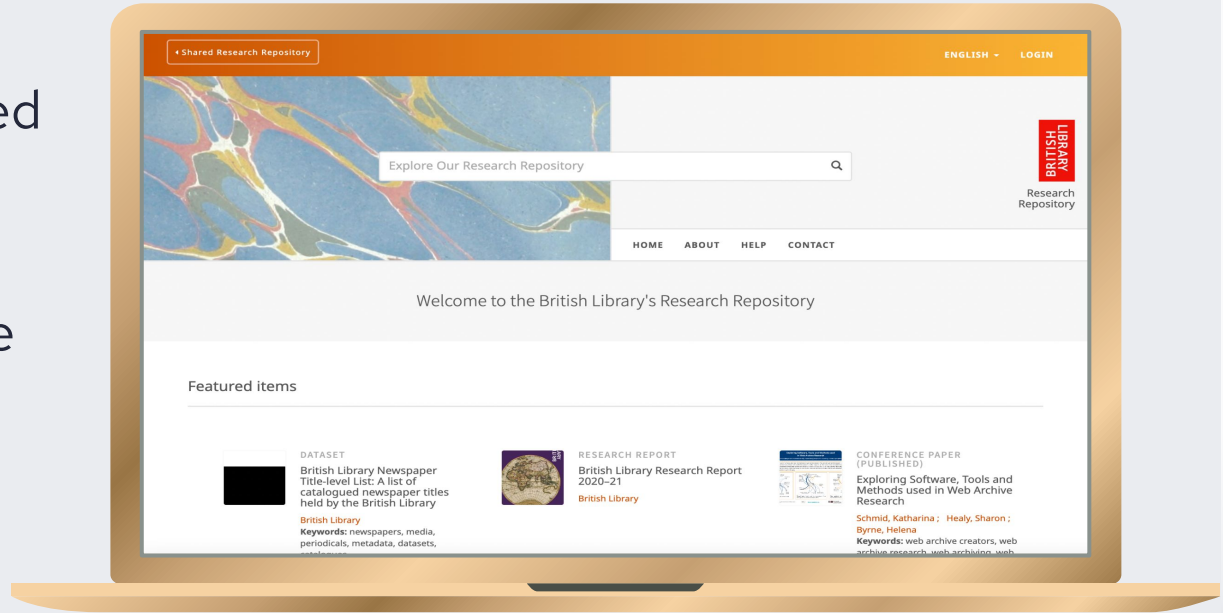




# Hyku: Shared Research Repository

British  
Library-managed  
multi-tenant  
repository for  
cultural heritage  
organizations.

**iro.bl.uk**





# Hyku Technical Developments

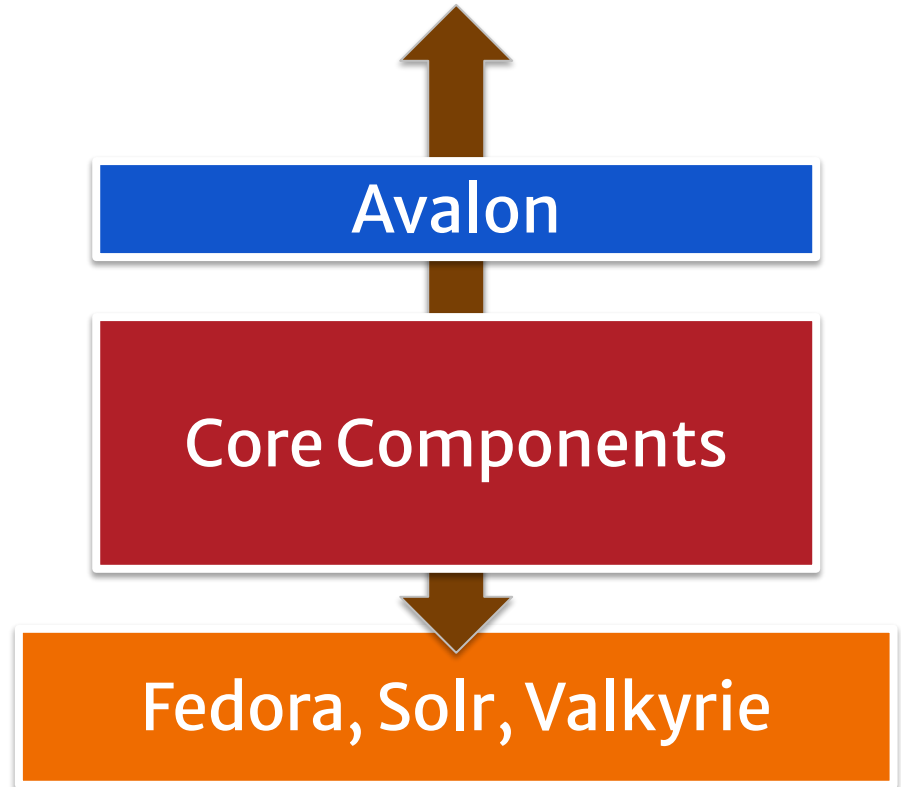
Version 5.0

- Groups with roles
- Google Analytics
- Graph nested indexer

Up next: PDF splitting out of the box,  
Serverless IIIF support



# The Stack :





# Avalon: Media Collections Online

Indiana University audio  
and video collections

[media.dlib.indiana.edu](http://media.dlib.indiana.edu)

The screenshot shows the Media Collections Online website interface. At the top left is the Indiana University logo (Psi symbol) and the text "Media Collections Online Indiana University". To the right are navigation links: "Browse Items", "View Collections", a search icon, and "Sign in".

Below the navigation is a "Browse By" sidebar with the following categories and counts:

Format	Count
Moving Image	10,030
Sound Recording	2,621

Other sidebar categories include "Main contributor", "Date", "Genres", "Collection", "Unit", and "Language", each with a right-pointing arrow.

The main content area features three "Featured" sections:

- Featured Film:** A thumbnail image of a film scene.
- Featured Film Collection:** A thumbnail image of a large crowd at a fair.
- Featured Audio Collection:** A thumbnail image of a man in a suit reading a document.

Below these thumbnails are the following titles:

- NY World's Fair Home Movies 1964-1965
- Indiana University Libraries Moving Image Archive
- The Indiana School of the Sky

A central text block states: "Media Collections Online houses audio and video collections." followed by a bulleted list:

- Use the search box, browse, or view the collections listing to discover content.
- Some content is only available when you sign in with your username and passphrase.
- Sign in to Canvas to access course materials.
- Media Collections Online now includes items digitized as part of the IU Media Digitization and Preservation Initiative (MDPI).

On the right side, there is a callout box: "Visit the Media Collections Online wiki to learn about services for IU units."



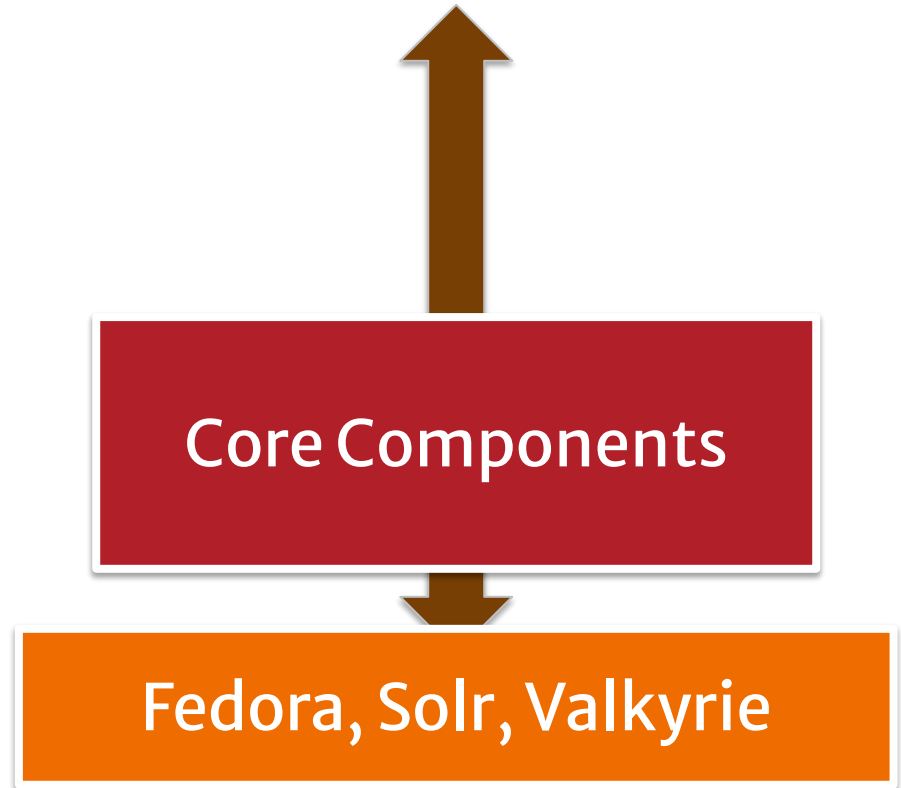


## Avalon Media System Technical Developments

- Controlled digital lending
- Performance improvements
- Unicode support for file names
- In progress: multiple captions per file

avalon  
MEDIA SYSTEM

# The Stack : core components





# Integration flexibility

- ORCID integration
- Minting DOIs through services like DataCite
- Dissemination to Google Scholar to enhance discoverability



## Integration spotlight: IIIF

- Avalon's Ramp, a IIIF manifest-based media player library
- Hyku uses IIIF Image & Presentation API support, IIIF Universal Viewer
- bloom-iiif: IIIF Presentation API Collection items React.js component that renders a horizontal slider
- clover-iiif: IIIF Presentation API Manifest viewer handling Image, Sound, and Video canvases for React.js.



# Samvera Connect 2023 in Philadelphia

- First in-person Connect since 2019
- 23rd -26th October
- Call for proposals open through June 21st
- Samvera Europe Meeting 11th September in London
- Join us to learn more about Samvera



# Samvera Virtual Connect

Free virtual conference every May; see past sessions on YouTube

The screenshot shows the YouTube channel page for 'Samvera Community'. The channel name is 'Samvera Community' with the handle '@samveracommunity6617', 104 subscribers, and 220 videos. The page features a navigation menu with options for Home, Shorts, Subscriptions, and Library. Below the navigation, there are tabs for HOME, VIDEOS, LIVE, PLAYLISTS, COMMUNITY, CHANNELS, and ABOUT. The 'Created playlists' section displays five playlists: 'Samvera Virtual Connect 2023' (22 videos), 'Samvera 101' (1 video), 'Samvera Connect 2022' (27 videos), 'Samvera Virtual Connect 2022' (19 videos), and 'Samvera Connect Online 2021' (36 videos). Each playlist has a 'View full playlist' link. At the bottom, there are buttons for 'Videos' and 'Play all'.



# Growing Open Technologies Together

**Get in touch!** [Heather@samvera.org](mailto:Heather@samvera.org)

- [Getting Started in the Samvera Community](#)
- [Tour our Repositories](#)
- [Samvera 101 and demo videos on YouTube](#)

# Questions

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