



# Our journey for Artificial Intelligence and smart services for Libraries

July 2022,

Itai Veltzman, Director of Product Management

- ▶ **What did we do before AI?**
- ▶ **What do we have today?**
- ▶ **In the spotlight**
  - > CDI – Central Discovery Index as a knowledge graph
  - > Esploro - Smart Harvesting
- ▶ **What is next?**



## AI & Machine Learning



make sense



optimize



smart decision

### Library Solutions / Teaching & Learning

#### Discovery

- Article Recommender
- DEI recommendations
- Relationship Enrichment

#### Metadata Management

- Title match
- Subjects' enrichment
- Citation extraction from syllabi files

#### Operation

- DARA - Data Analysis Recommendation Assistant
- Ranking prioritization based on usage outcomes
- Automatic decision making

### Research

- Smart Harvesting
- Recommendations for related articles

- working
- future
- exist



Central Discovery Index (CDI)

### bX Article Recommender

Draw correlations between resources and display recommended articles related to the article of interest, using anonymized data from millions of scholars worldwide

(Learn more about the [bX Recommender](#)).

**Primo**   **Leganto**

### Citation Trail

Citation trail is an exploration tool that helps users (such as researchers and graduate students) to find related articles and to explore the topic of the seed article further (see [Using Citation Trail](#))

**Primo**



## What do we have today?

### Smart Harvesting

Smart Harvesting AI is at the heart of how Esploro keeps research repositories and researcher profiles comprehensive, accurate and always up to date ([see Smart Harvesting AI](#)).

Esploro

### DARA

Data Analysis

Recommendation Assistant.

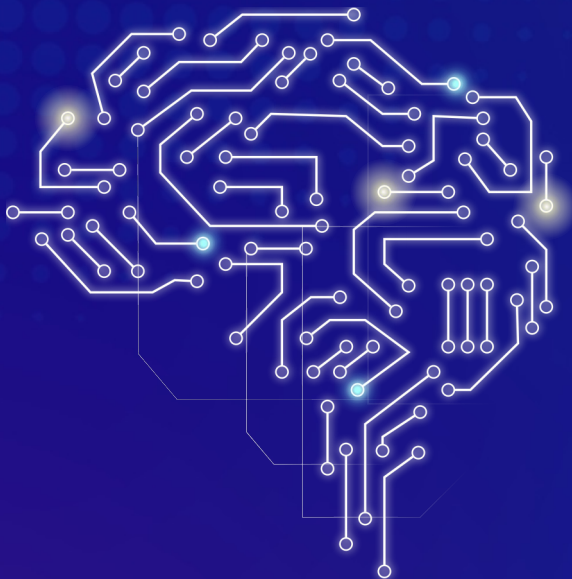
DARA is Alma's smart decision-support engine, driven by rules that brings the power of community best practices into the library ([DARA's First Birthday](#)).

Alma

### Ranking prioritization based on usage outcomes

Rialto's Selection Plan utilizes machine learning based on previous purchases and activity in the plan to optimize the selection of titles for automated purchase (See [Whitepaper on Rialto](#)).





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Central Discovery Index  
(CDI) - using smart  
services for a better  
discovery experience

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# CDI – Ex Libris' Central Discovery Index

## Different material types

Journal articles, conference proceedings, books, book chapters, newspaper articles, datasets, patents, reference entries, audiovisual material, archival material, reports and much more

## All disciplines

Agriculture & Forestry, Architecture, Arts & Humanities, Business & Economics, Engineering & Technology, Law, Library & Information Science, Mathematics, Medicine, Nursing, Psychology, Sciences, Social Sciences ...

CDI

4.7 billion records

3.300 providers

Article/chapter level records  
(and others)

10% annual growth

Links/Quicklinks 

Publisher and aggregator content

Digital repositories

Open Access repositories

Institutional Repositories

Library catalogs

Audiovisual databases

Special Collections

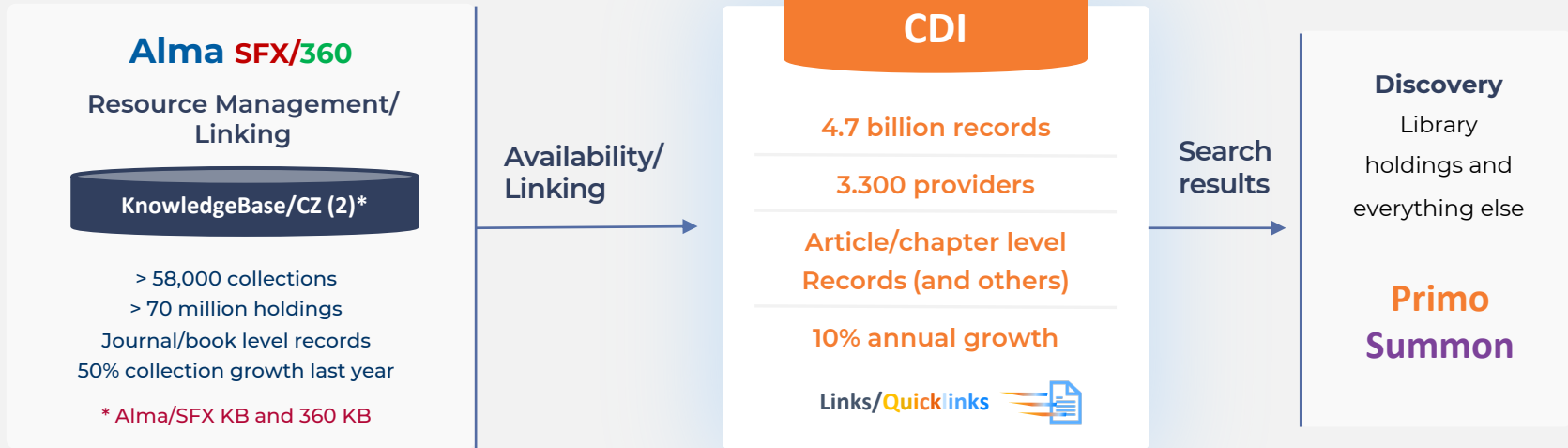


Data services



53M average  
weekly searches

# CDI and Ex Libris products



## Rapido

### Resource Sharing

CDI indexes the global title index containing all sharable resources

8

## Esploro

### Research workflows

CDI source for research outputs (Author – works)

## Leganto

### Course resource lists

Expand search beyond the reading list  
Flag items on discovery as coming from a readinglist



**Better Together**  
ProQuest Content

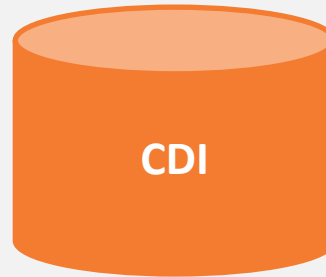
# CDI and the knowledge graph



Creating new  
discovery paths



Adding  
Context



Publisher and  
aggregator content

Digital repositories

Open Access repositories

Institutional Repositories

Library catalogs

Audiovisual databases

Special Collections

# CDI and the knowledge graph



Creating new  
discovery paths



Adding  
Context



**Focus of CDI is on data  
intelligence and smart services  
based on contextual relations**

Context and  
glanceability

Exploration with  
formal and informal  
relationships

Publisher and  
aggregator content

Digital repositories

Open Access repositories

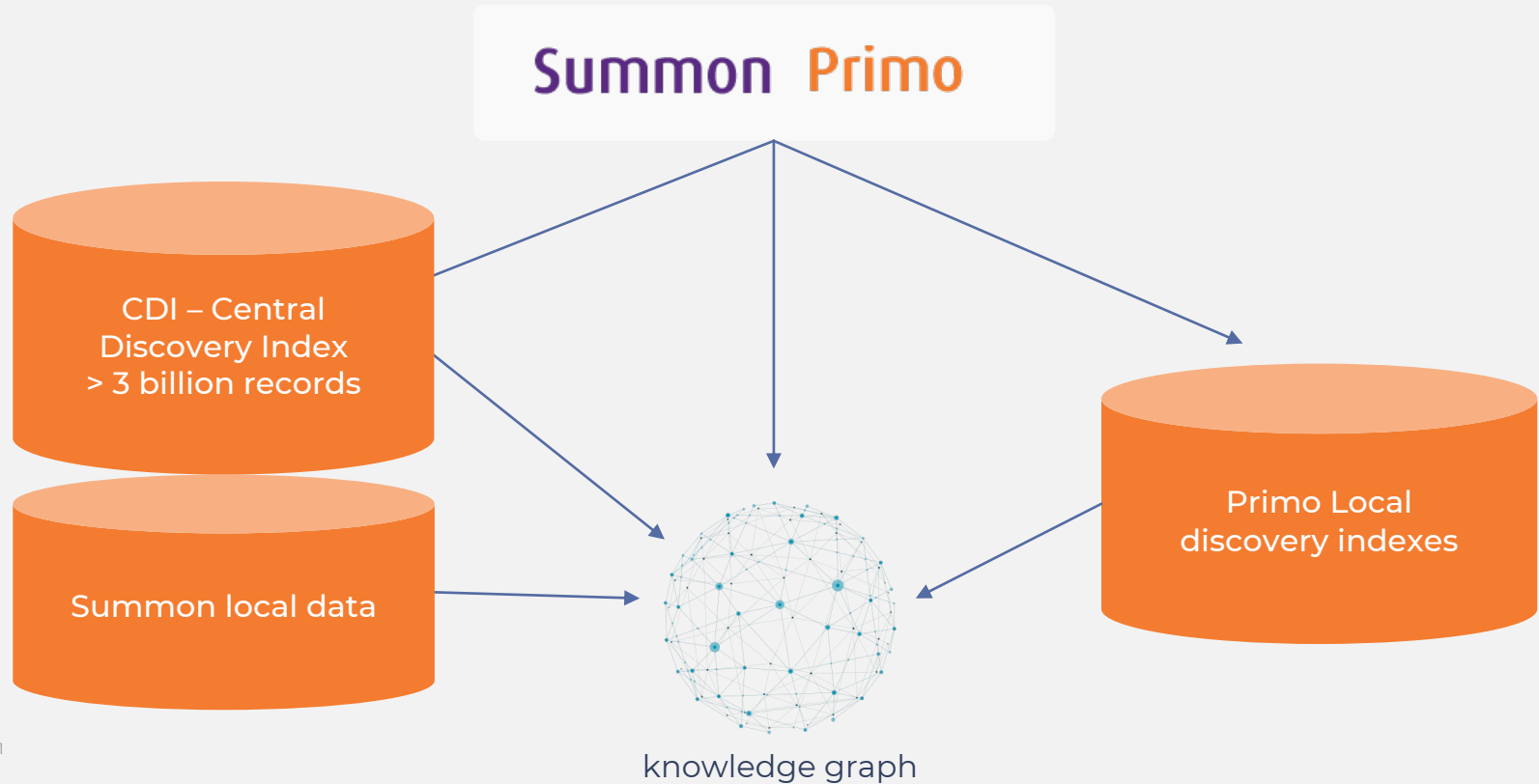
Institutional Repositories

Library catalogs

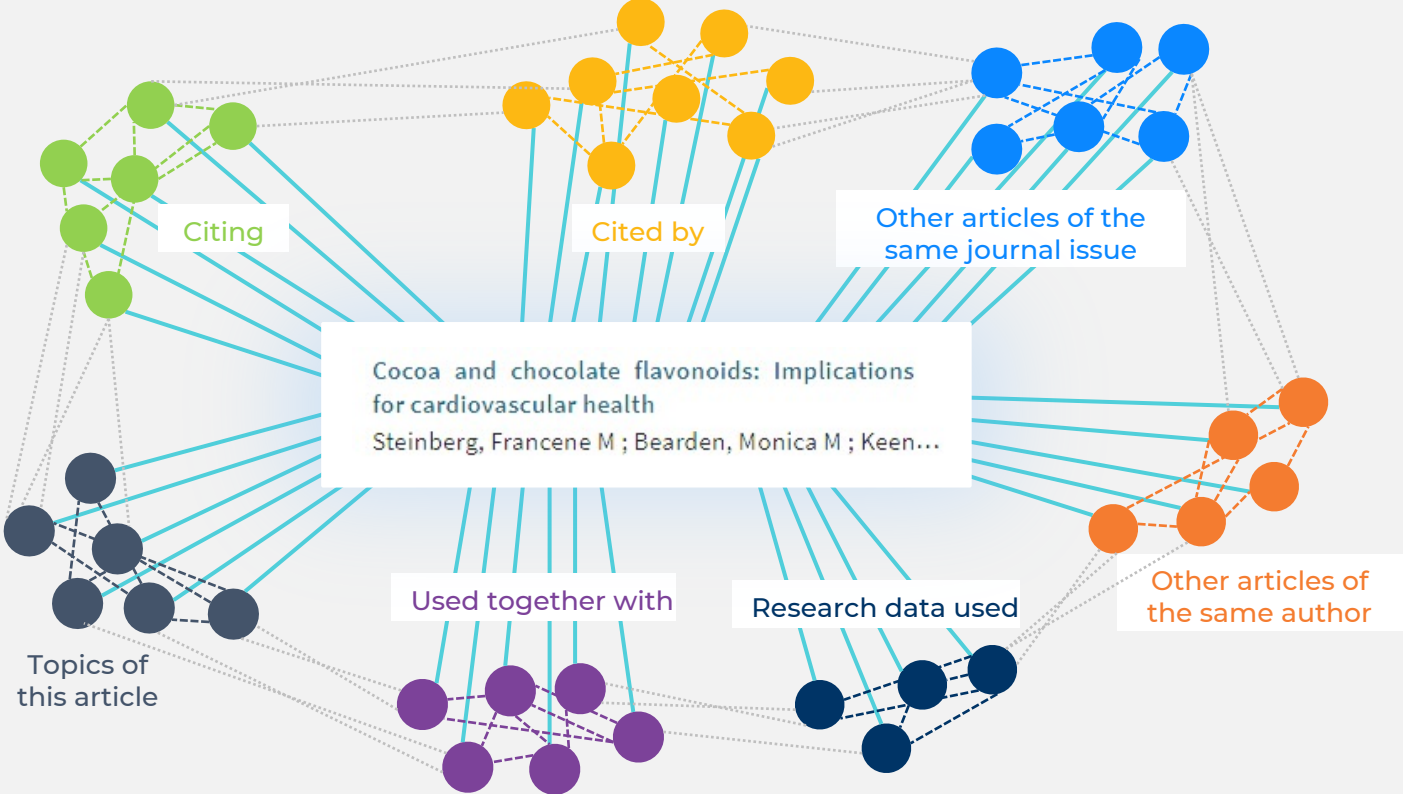
Audiovisual databases

Special Collections

## CDI and the relationship graph

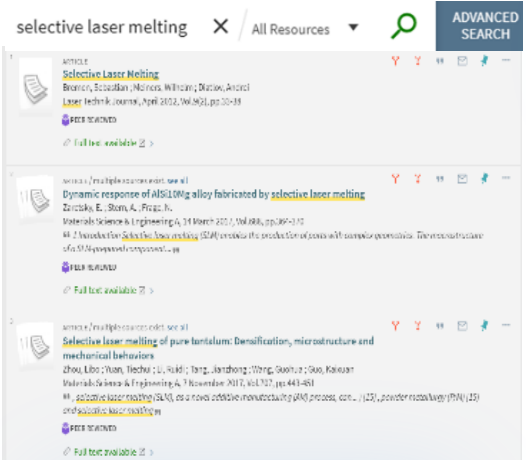


# knowledge graph - examples





# Discovery beyond the single search box with data relations



The screenshot shows a search interface with the query 'selective laser melting' and a search button labeled 'ADVANCED SEARCH'. Below the search bar, there is a list of search results. The first result is titled 'Selective Laser Melting' and includes the authors 'Bronckers, Sebastian ; Mironov, Vladimir ; Dierker, Andre' and the journal 'Laser Technol, Journal, April 2012, Vol.30(2), pp.10-18'. The second result is titled 'Dynamic response of AlSi10Mg alloy fabricated by selective laser melting' and includes the author 'Zurlo, E. ; Storti, A. ; Prati, R.' and the journal 'Materials Science & Engineering, A, 14 March 2017, Vol.688, pp.269-310'. The third result is titled 'Selective laser melting of pure tantalum: Densification, microstructure and mechanical behaviors' and includes the authors 'Zhou, Libo ; Yuan, Tiesha ; Li, Ruidi ; Tang, Jiarong ; Wang, Guohua ; Guo, Kaiwan' and the journal 'Materials Science & Engineering, A, 7 November 2017, Vol.707, pp.443-451'. Each result includes a 'Full text available' link.

Search result list

## Data relations

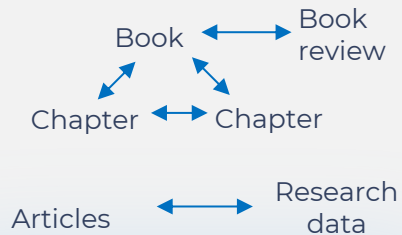
- Understand context by exploring relations
- Find more material by following suggestions and relations

- Positive impact on learning and research output
- Learning about the topic
- Enhanced information literacy
- Supports the use of more diverse material

Enhanced user experience

# Discovery Beyond Searching: Contextual Relations in Discovery

## Formal relationships, e.g.



## Informal relations, e.g.

co-usage „Other users also looked at“ – bX article recommendations

## Curated relationships

Citation Trail

Other items from the same reading list or collection (collection discovery)

**BOOK**  
**Abraham Lincoln in the post-heroic era: history and memory in late twentieth-century America**  
 Barry Schwartz 1998. Chicago: University of Chicago Press 2008  
 PRIMO-ALMA-MARC ISBN 9780226741888 (cloth : alk. paper); ISBN 0226741895 (cloth : alk. paper)

Available at ONL: Open Stacks located in the main building (E457.2 .S383 2008) >

Chapters of this book >  
 Book reviews >

Send to >

Chapters of this book >  
 Book reviews >

**Related reading**  
 Recommended books that are related to this record

**Related reading**  
 Recommended books that are related to this record

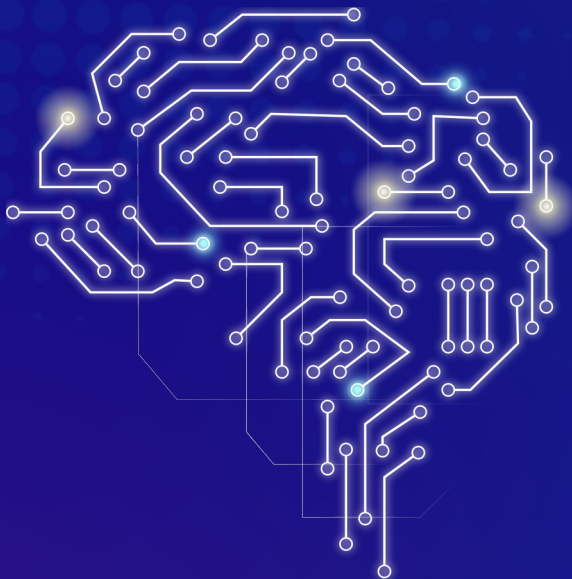
**Citations**  
 Find sources citing this or sources cited in this

**Related Articles**  
 suggested by bX Recommender

1. **Plastics at sea: Trade design for a global solution to marine plastic pollution**  
 International Journal of Marine Pollution, 2018, Vol. 58, pp. 220-228

2. **Solutions to global marine litter pollution**  
 The Journal of Great Lakes Research, 2017, Volume 43

3. **Plastic pollution: challenges in marine and coastal environments: from local to global**  
 Environmental Science and Technology, 2017, Volume 51, Issue 1



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# Esploro

## Smart Harvesting – Overview

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# Esploro - Research Information Management Solution



Expert  
Finder



University  
Prestige &  
Ranking



Data for  
Activity Reporting



National  
Assessment



Industry  
Partnerships



Open Access  
Repository



Research Portal  
SEO-Friendly



Researcher  
Profiles



Funding  
Opportunities



Research  
Analytics



APIs &  
Data Exports

## Research Information Hub

(Publications, Datasets, Activities, Awarded Grants, Projects, etc.)

### Smart Harvesting

(Ex Libris Central Index, National Repositories,  
Disciplinary Repositories)

### Direct & Mediated Deposits

(Libraries, Researchers, Assistants)

# Discovery Beyond Searching: Contextual Relations in Discovery

## The Goal

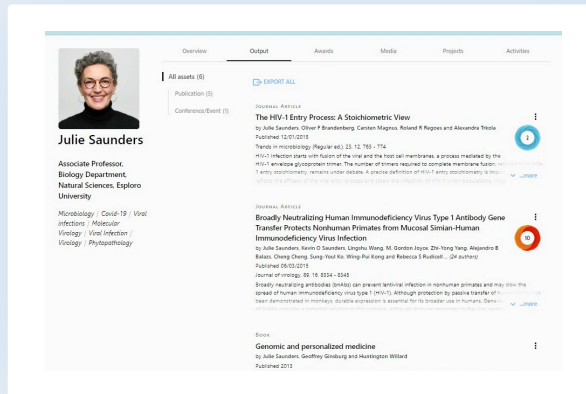
Creating a comprehensive list of researcher publications, automatically and with minimal work on the part of the institution.

## The Challenge

Finding high quality data and matching the publications to the correct researcher.

## The Solution

Machine learning algorithm classify assets based on researcher name, general info, and semantic by leveraging the Ex Libris Central Discovery Index (4B records)



Overview Output Awards Media Projects Actions

All assets (6)

Publication (5)

Conference/Event (1)

**Julie Saunders**  
Associate Professor  
Biology Department  
Natural Sciences, Esploro University

Microbiology / Covid-19 / Viral infections / Molecular Virology / Viral Infection / Virology / Phytozoology

**JOURNAL ARTICLE**  
**The HIV-1 Entry Process: A Stoichiometric View**  
by Julie Saunders, Oliver P Brandenburg, Cristian Nguyen, Roland R Regens and Alexandra Theiss  
Published 12/01/2018

**JOURNAL ARTICLE**  
**Broadly Neutralizing Human Immunodeficiency Virus Type 1 Antibody Gene Transfer Protects Nonhuman Primates from Mucosal Simian-Human Immunodeficiency Virus Infection**  
by Julie Saunders, Karim O Saunders, Linghua Wang, M Gordon Joyce, Zhi-Tong Tang, Alejandro B Bales, Cheng-Chang Jiang, Hui-Jia Wang, Shu-Kang and Rebecca S Padgett... (24 authors)  
Published 05/01/2019

**Book**  
**Genomic and personalized medicine**  
by Julie Saunders, Geoffrey Ginsburg and Harrington Willard  
Published 2013



OXFORD ACADEMIC

**BRAIN**

Issues Subject More Content Submit Purchase About All Brain

**BRAIN**

Volume 144, Issue 10  
October 2021

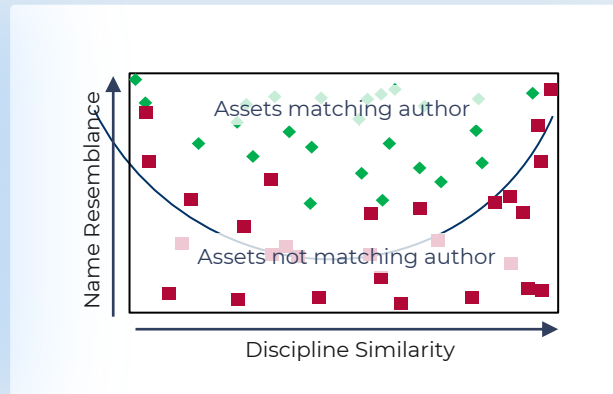
**Article Contents**

Global targets are not enough  
Cooperation hinges on wealthy nations doing more

**Call for emergency action to limit global temperature increases, restore biodiversity and protect health: Wealthy nations must do much more, much faster**

Lukoye Atwoli, Abdullah H Baqui, Thomas Benfield, Raffaella Bosurgi, Fiona Godlee, Stephen Hancock, Richard Horton, Laurie Laybourne Langton, Carlos Augusto Monteiro, Ian Norman, Kirsten Patrick, Nigel Prattis, Marcel G M Oldé-Rikkert, Eric J Rubin, Pooah Sahni, Richard Smith, Nick Talley, Sue Tarule, Damián Vázquez  
Author Notes

Brain, Volume 144, Issue 10, October 2021, Pages 2897–2899,  
<https://doi.org/10.1093/brain/awab296>  
Published: 06 September 2021



## 1 *Smart* Migration

- Migrating outputs from existing repositories:
- Automated author matching and deduplication
- Creating relationships to other entities (Authors - Researchers - Academic Units)

## 2 *Smart* Expansion

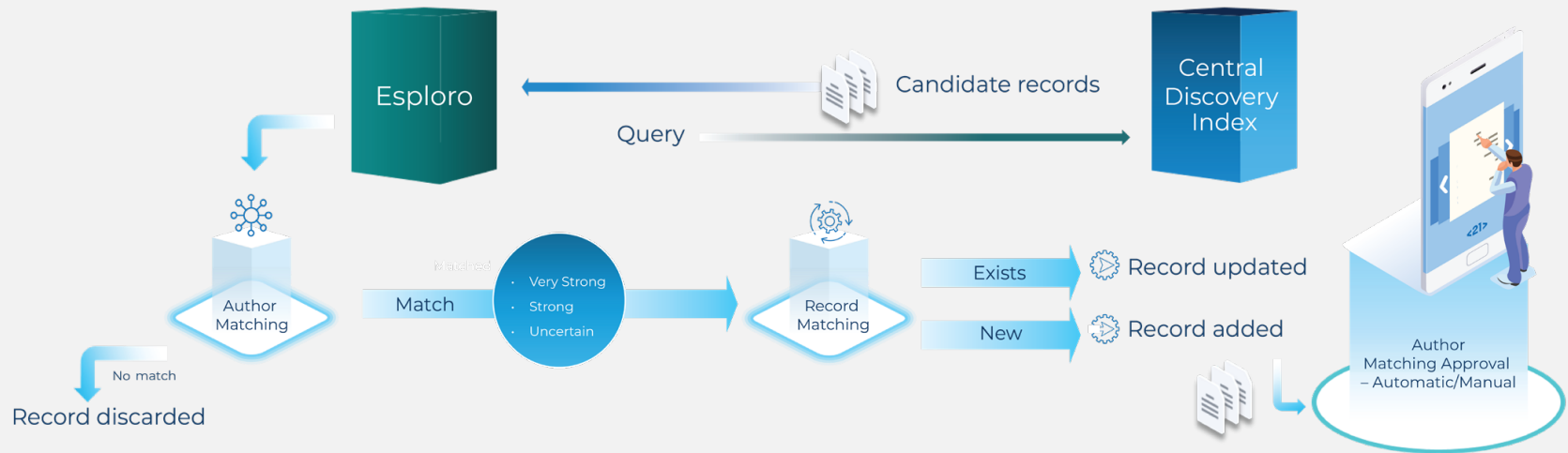
- Adding & enhancing known researcher outputs using:
- Ex Libris Central Discovery Index (CDI)
- Researcher Publication Lists
- ORCID profiles

## 3 *Smart* Harvesting

- Populating the repository using machine learning algorithms:
- Searching in Ex Libris CDI and open repositories
- Matching outputs to researchers (affiliated and non-affiliated)
- Creating and enhancing records including links to OpenAccess full-text

## Enrichment

# Esploro Smart Harvesting Flow



## Asset Info

- Title
- Authors (to find co-authors)
- Subjects
- Abstract
- Year
- Publication title

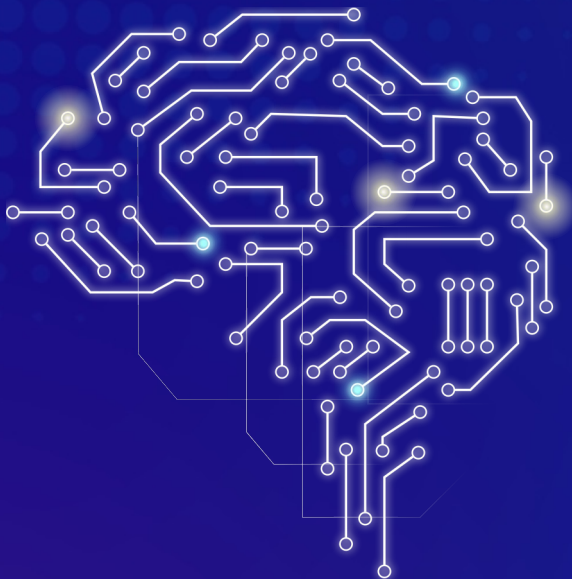
Algorithm  
features  
compare and get  
grade



## Researcher Info

- Name and name variants
- Affiliations
- Research topics
- Area of expertise
- Biographical info – e.g education, honors
- Metadata from the most recent associated assets
  - Title
  - Authors (to find co-authors)
  - Subjects
  - Abstract
  - Year
  - Publication title





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What is next?

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## What are we researching?

Ex Libris is working with Clarivate Data scientists' group on new initiatives

**Alma**

Metadata Management

- Title match POC
- Subjects' enrichment POC

Teaching and Learning  
Citation extraction from syllabi files POC

**Leganto**

## Thoughts of the future

Recommendation for a staff user on available functionality in order to improve work efficiency

Automatic decision making for simple workflows in area such as

- Collection development
- Reading list fulfillment

Recommendation based on reading materials for promoting diversity and inclusion

Recommendations for related articles (assets) based on field of interest and past usage (in the context of Exploro portal as an institutional repository).

More relationships in CDI



**ExLibris**  
Part of **Clarivate**

**IFLA  
WLIC  
2022**  
GALWAY



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# Thank you

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