Improving Transparency in Open Discovery: A Postprint Review of the US NISO ODI

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Abstract

[Purpose/Significance] This study examines the "Open Discovery Initiative: Promoting Transparency in Discovery" (ODI) released by the National Information Standards Organization (NISO), aiming to promote in-depth understanding and widespread adoption of the ODI project within China's library community, and to foster the development of discovery services based on central index repositories and the standardization of digital resource construction. [Method/Process] The paper introduces the background, development status, core content, and characteristics of ODI, while summarizing the best practice guidelines for this standard and activities of relevant organizations. Based on this foundation, it investigates the current state of ODI application and practice in the discovery service field both domestically and internationally, and analyzes the development trends of ODI. [Result/Conclusion] ODI has proposed a series of recommended implementation specifications in areas such as metadata sharing, equitable linking, standardizing data formats, promoting consistency in content handover, and usage statistics. Currently, numerous resource providers and discovery service providers have recognized these specifications and put them into practice, which will benefit the standardization development of digital resources.

Full Text

Preamble

Improving Transparency in Open Discovery: A Review of the U.S. NISO ODI

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Abstract

[**Purpose/Significance**] This study examines the "Open Discovery Initiative: Promoting Transparency in Discovery" (ODI) released by the National Information Standards Organization (NISO) to promote in-depth understanding and widespread application of the ODI project among Chinese libraries, and to advance the development of central index-based discovery services and the standardization of digital resource construction. [**Method/Process**] The paper introduces the background, development, core content, and characteristics of ODI, summarizes its best practice guidelines and related organizational activities, investigates the current application and implementation status of ODI in discovery services both domestically and internationally, and analyzes future development trends. [**Result/Conclusion**] ODI proposes a series of recommended implementation specifications covering metadata sharing, fair linking, standardized data formats, promoting consistency in content exchange, and usage statistics. Numerous resource providers and discovery service providers have recognized and implemented these specifications, which will benefit the standardization of digital resource construction.

Keywords: ODI; discovery service; central index; metadata

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1. Background of NISO ODI

As digital and online resources have gradually become the mainstay of library collections and user access, how to integrate various resources to meet users' needs for one-stop, convenient, and efficient resource discovery has become a critical issue in library literature discovery and delivery services. In recent years, advances in information technology have introduced central index-based discovery systems into library services.

Central index-based discovery services enable comprehensive searching across all library resources (including both subscribed and free resources from different providers) through a unified central index. This index comprises metadata, full-text data, or other descriptive content, covering journal articles, e-books, research reports, reference materials, images, maps, datasets, audio-visual materials, and various other resource types. Major discovery systems such as ProQuest's Summon (launched in 2009), OCLC's WorldCat Local (WCL), Ex Libris's Primo Central (Primo), and EBSCOhost Discovery Service (EDS) have attracted global library attention and rapidly become the dominant service model for literature discovery and delivery.

However, this complex ecosystem, while bringing significant benefits to libraries and end-users in resource retrieval and discovery, has also created new challenges. The implementation of discovery services involves multiple stakeholders—content providers, discovery service providers, and libraries—and raises intertwined issues concerning metadata standards, data exchange

formats, transmission protocols, fair linking, and usage statistics.

Content providers (including commercial and non-profit organizations) supply the content and are primary contributors to the central index. Discovery service providers build the discovery systems. Libraries acquire resources from content providers and subscribe to discovery platforms to deliver convenient literature discovery and delivery services to their users. Effective indexing requires collaboration between content and discovery service providers to supply metadata or full-text content. Libraries need clear information about how their collections are represented in discovery services—for example, which materials are indexed, whether by full text or citation only, and whether metadata originates from aggregated databases or abstracting and indexing services. However, current discovery indexes are often built through private agreements and special exchange models between content and discovery service providers, with inadequate disclosure of metadata quality, exchange methods, search mechanisms, or relevance ranking algorithms. This lack of transparency creates concerns for all stakeholders and hinders service adoption.

For libraries, this situation prevents clear understanding of collection coverage and representation in discovery services, obscuring actual user needs and resource usage patterns. For content providers, while central indexing improves resource discoverability and usage, it also reduces brand visibility by bypassing their proprietary interfaces and limits control over content presentation. For discovery service providers, inconsistent metadata quality and frequent challenges to linking fairness create operational difficulties. When a discovery service provider shares a parent company with a content provider or has exclusive agreements, questions about algorithmic fairness in retrieval and linking can undermine platform credibility. These issues have persisted since discovery services emerged, and without intervention, could stall service development. The demand for greater transparency and standardization led to the creation of the NISO ODI project.

2. Overview of NISO ODI Development

The ODI project originated through the efforts of Oren Bet-Arie from Ex Libris, independent consultant Jenny Walker, and library technology expert Marshall Breeding. In June 2011, at the American Library Association (ALA) Annual Conference in New Orleans, they convened a meeting with industry managers to discuss shared concerns about library discovery services, subsequently submitting a formal proposal to NISO. By year-end, NISO's Discovery to Delivery Topic Committee accepted the proposal, and the ODI Working Group was established in early 2012, with Breeding and Walker serving as co-chairs. The working group comprised representatives from libraries, content providers, and discovery service providers.

To assess industry satisfaction with next-generation discovery services and identify pressing needs, the working group conducted a cross-industry survey from

September 11 to October 4, 2012, targeting librarians, content providers, and discovery service providers. The survey covered metadata delivery/indexing levels, data exchange technologies, and usage data improvement. Out of 2,000 contacted individuals, 871 valid responses were collected (782 from librarians, 74 from publishers, and 15 from discovery service providers).

Based on survey results, the working group identified five priority areas for initial recommendations: (1) data formats, exchange standards, transmission methods, and continuous updates; (2) disclosure methods for restricted content; (3) descriptors for indexing levels and content availability; (4) definition of fair linking from discovery to content; and (5) usage statistics collection, distribution, and reporting pathways.

In October 2013, the working group completed a draft of recommended practices, officially publishing "Open Discovery Initiative: Promoting Transparency in Discovery" (NISO RP-19-2014) on June 25, 2014. The document defines discovery service terminology, reviews the evolution of discovery and delivery models, and provides recommended best practices for content providers and discovery service providers, while also outlining future priorities.

Following publication, ODI established a Standing Committee on October 27, 2014, to replace the initial working group. The committee, co-chaired by Laura Morse from Harvard Library and Lettie Conrad from SAGE, continues to promote ODI adoption, provide implementation guidance, and maintain a forum for stakeholders. Recent activities include: (1) encouraging providers to complete and publicly release ODI conformance checklists; (2) strengthening communication with abstracting and indexing database providers through comprehensive surveys initiated in January 2017; (3) providing libraries with templates to request conformance checklists from providers and publishing completed checklists; (4) organizing workshops and publishing promotional materials; and (5) collaborating with the COUNTER project on usage data collection and statistics.

Future ODI priorities include cross-industry collaboration mechanisms, APIs, handling restricted content in discovery services, demand-driven resource discovery, unbiased link monitoring, and enhanced interoperability with COUNTER standards.

3. Core Content and Characteristics of ODI

ODI aims to enhance transparency in next-generation discovery services and recommend consistent content exchange mechanisms. The initiative comprises four parts: introduction, evolution of discovery and delivery services, recommended practices, and development proposals. The recommended practices form the core content.

3.1 Advocating Metadata Sharing to Enhance Central Index Construction

For central index-based discovery systems, metadata construction is crucial. Metadata can be categorized as "thin" or "thick." Thin metadata (e.g., from CrossRef) contains minimal fields—just title, author, source, and identifiers—sufficient only for OpenURL generation. Thick metadata includes additional elements such as subjects and abstracts. While metadata scale affects resource coverage breadth, metadata "thickness" influences discovery depth, relevance ranking, deduplication, faceted navigation, and data mining.

Given metadata's importance and current ecosystem challenges, ODI calls for collaboration among content providers, discovery service providers, and libraries to ensure comprehensive resource discovery. Content providers should supply core metadata and underlying full-text or original content to enable effective indexing for authorized users.

To address transparency gaps, ODI defines data points and clarifies what metadata elements are accessible to which users under what conditions. Tables 1 and 2 list metadata elements based on the KBART (Knowledge Base and Related Tools) schema, originally designed for serials and monographs to improve A-Z lists, link resolution, and OpenURL linking. ODI extends KBART to include subjects, abstracts, content types, and formats for broader resource description.

Table 1 lists core metadata elements that content providers should supply to discovery service providers, including title, authors, publisher, volume/issue/pages, dates, identifiers, collection title, and links.

Table 2 lists enhanced metadata elements, including abstracts/descriptions, keywords from controlled vocabularies, content and carrier types, and full-text access permissions. Incorporating these elements significantly improves user experience and supports librarians and researchers who rely on controlled vocabularies.

Beyond providing metadata to discovery services, ODI recommends that content providers disclose their participation level to libraries and subscribers. For each product (journal packages, abstracting/indexing databases), providers should specify coverage scope and depth, as detailed in **Table 3** .

To further enhance transparency, ODI also requires discovery service providers to disclose their metadata information to libraries, as shown in **Table 4** .

These specifications on metadata content and transparency measures help ensure metadata scale and quality, thereby improving discovery service effectiveness.

3.2 Advocating Fair and Unbiased Linking

Link fairness is critical in discovery service evaluation and implementation, determining whether retrieval results are based on business relationships or gen-

uine user needs and library preferences. This directly impacts service value and affects all stakeholders' interests. ODI promotes fair linking and has gained industry consensus.

ODI recommends that discovery services adopt the following protocols to ensure fairness:

1. Discovery services should not discriminate among content providers or products (especially their own) in retrieval result generation, relevance ranking, or link ordering based on business relationships.
2. When identical content exists across multiple platforms (e.g., a primary publisher and one or more secondary databases), discovery service providers should offer mechanisms enabling libraries to intervene in which platforms are presented to users and in what order.
3. Discovery service providers should publish annual reports or website statements disclosing business relationships with content providers, including direct or indirect affiliations and paid agreements for metadata, direct linking, or special arrangements.
4. Providers should issue statements confirming the neutrality of their algorithms for result generation, relevance ranking, and link ordering regarding sources and relevant factors.
5. Settings related to link presentation for search results should be configurable library parameters (including number of links displayed, result ordering, and how libraries identify "full-text access" links).
6. When abstracting and indexing providers can supply links, discovery service providers should offer seamless connections from the discovery interface to these services (not necessarily full-text links).
7. Discovery service providers should inform content providers and libraries when content changes may affect result sets, relevance ranking, or link ordering.

3.3 Standardizing Data Formats and Transmission Standards

Data formats and transmission methods are fundamental operational elements in discovery services. ODI advocates for consistency in data exchange to reduce ecosystem complexity and technical barriers that might hinder broad content provider participation.

ODI proposes that when content providers transmit data to discovery service providers, they should:

1. Clearly describe performance, limitations, and preferences regarding how content should be transmitted for optimal indexing.

2. Communicate with content providers when formats, schemas, or transmission mechanisms affect service features or performance.

3. Use robust encoding schemas. Widely used schemas in libraries and publishing include MARC, MODS, METS, VRA, DC, KBART, EAD, and ONIX. Recommended text formats include CSV, TXT, and XML. Recommended transmission methods include OAI-PMH, ResourceSync, API, and FTP.

These recommendations help address standardization issues, particularly for Chinese databases and self-built collections lacking standardized construction, thereby improving resource integration and discoverability.

3.4 Emphasizing Usage Statistics and Recommended Minimum Metrics

Usage statistics are crucial for both content providers and libraries. ODI recommends that discovery service providers supply structured metrics to demonstrate resource usage, encouraging provider participation and helping libraries monitor service performance.

For content providers, ODI suggests the following metrics:

1. **Total Searches**: A search is a query initiated from a search box. According to COUNTER standards, filtering, sorting, or pagination of original queries should be recorded as actions, not searches. Automated searches should not be counted.

2. **Result Clicks**: Providers should receive counts of user clicks on their resources in search results. When multiple providers supply metadata for the same article, each should receive a click count. Each result should be counted only once per user, regardless of multiple clicks.

3. **Total Click-throughs**: This reports how frequently users access a provider's full-text content. Discovery services can track requests but not successful deliveries. This metric also indicates access sources (OpenURL vs. direct links).

For libraries, ODI recommends discovery service providers supply:

1. **Monthly Total Searches**: Tracks usage trends. Ideally, providers should also report searches per content collection, especially for abstracting/indexing databases requiring authenticated access.

2. **Monthly Total Accesses**: Reports monthly user visits to show usage trends.

3. **Monthly Total Click-throughs**: Shows frequency of valuable results.

4. **Top 500 Recent Search Terms**: Helps libraries analyze user search patterns and topics.

5. **Top 100 Referring Links**: Identifies the most common sources linking to the discovery service.

While ODI's statistical recommendations require further refinement, they standardize reporting functions and feedback mechanisms, enhancing provider participation and enabling libraries to analyze user behavior for improved intelligent retrieval and recommendation services.

4. Implementation of ODI Recommended Practices

To promote practical application, ODI developed conformance checklist templates for content providers and discovery service providers, encouraging public release to enhance transparency.

4.1 Content Providers and ODI Recommendations

The content provider checklist covers four areas with six items: metadata sharing, participation disclosure, non-confidentiality clauses, and standardized data formats. Each item has three compliance levels: conformant, partially conformant, and non-conformant (**Table 5**).

As of September 2017, six content providers published complete conformance checklists: CREDO, EBSCO, Emerald, IEEE, Gale, and SAGE.

Metadata Sharing: All six provide core metadata for each indexed item and additional descriptive content where possible. However, regarding complete submission of core metadata and full-text data, CREDO, Emerald, and IEEE fully support this, while EBSCO, Gale, and SAGE partially support it. EBSCO, as both content and discovery provider, supplies 262 full-text databases but excludes abstracting/indexing databases from this policy. SAGE currently does not support discovery service indexing, and Gale varies its indexed content and linking methods by provider.

Participation Disclosure: All six provide detailed resource lists. For example, IEEE Xplore discloses discoverable resources, coverage dates, index types, provider types, and participating discovery services to libraries (**Figure 1** [**Figure 1: see original paper**]).

Data Formats: All providers follow ODI recommendations, delivering title lists in KBART and other standard formats (XLS, XLSX, HTML, CSV, XML).

4.2 Discovery Service Providers and ODI Recommendations

The discovery service provider checklist includes four areas with 16 items: content lists, linking disclosure, and usage reports for content providers and libraries (**Table 6**).

Following ODI's official release, EBSCO (as both major content provider and discovery service provider) announced support on June 26, 2014, advocating

collaboration and transparency. Ex Libris (Primo) and ProQuest (Summon) followed with support declarations and published conformance checklists in June 2015.

Content Lists: EBSCO fully supports providing complete lists; Ex Libris and ProQuest provide partial lists (e.g., Ex Libris offers collection-level but not title-level lists).

Linking: All three support fair linking without provider bias. EBSCO and Ex Libris fully comply with allowing libraries to configure link targets and ordering. Ex Libris commits to neutrality, denying exclusive agreements and discrimination in ranking or linking. ProQuest partially complies, allowing library preferences while considering "best accessible link" to avoid inaccessible content.

Usage Reports: All three provide search totals, result clicks, click-throughs, access sources, and search terms, though report granularity varies. For monthly click-throughs, ProQuest can report by content provider but not by special collections. EBSCO's reports count multiple visits from the same IP or individual, and cannot fully separate monthly user counts, though it supports Google Analytics integration for alternative visitor metrics. For top 500 search terms, EBSCO partially supports this through Google Analytics integration rather than standard reports.

4.3 Libraries and ODI Recommendations

Next-generation discovery services have become the dominant model in academic libraries, offering superior speed and efficiency compared to federated search. ODI's initial 2012 survey showed 74% of 782 responding libraries already used discovery systems, with 17% planning adoption within 1-2 years. By end of 2011, 4,128 discovery services were already implemented.

Chinese libraries began adopting discovery systems after 2009. By September 2017, 52 libraries had implemented Primo, 54 had Summon, and 78 had EDS/Find+ (EDS's China-localized version), covering most major university and research libraries.

Libraries' roles and interests in discovery services are self-evident. The ODI Standing Committee issues guidance urging libraries to select discovery services that comply with ODI recommendations. At Ex Libris's 2017 North American user conference, co-chair Laura Morse called on user groups to advocate for transparency and ODI compliance, recommending libraries: (1) promote open access; (2) organize professional meetings with publishers and vendors; (3) track and participate in standards development; and (4) allocate funds wisely. Specific actions include analyzing gaps in abstracting/indexing coverage, visualizing these impacts, and training staff on ODI specifications.

While ODI has not yet been promoted in China's library community, Chinese libraries already evaluate discovery systems based on principles aligned with

ODI: coverage (especially Chinese resources), metadata source standardization and thickness, search mechanisms, data conversion, usage statistics, full-text access, system integration, and relevance ranking. ODI's introduction would provide methodological guidance for Chinese database standardization and discovery service implementation.

5. Summary and Outlook

Central index-based discovery services have significantly enhanced library resource integration and literature discovery, becoming the dominant model for academic libraries worldwide. Key issues—including metadata standards, fair linking, data formats, and usage statistics—are common challenges globally. ODI addresses practical difficulties by enhancing transparency, coordinating stakeholder interests, and providing solutions that advance discovery services.

However, many challenges remain: cross-industry collaboration mechanisms, APIs, abstracting/indexing resource integration, refined usage statistics, and relevance ranking algorithms. Forward-looking issues also require exploration, such as data mining, application integration, personalized recommendations, and knowledge discovery systems based on semantics and AI (e.g., Yewno's AI-based system currently in testing with Stanford University Libraries). Some are already in ODI's work plan; others have drawn industry attention. As discovery services evolve with new technologies and concepts, ODI will continue driving sustainable development and standardization of digital resources and services.

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Note: Figure translations are in progress. See original paper for figures.