Institutional Identification: Identifying Organizations in the Information Supply Chain

A Recommended Practice of the
National Information Standards Organization

Prepared by the
Institutional Identifiers Working Group

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Foreword

About this Recommended Practice

The National Information Standards Organization (NISO) established the Institutional Identifier (I^2) Working Group in January 2008 to develop a robust, scalable, and interoperable standard for identifying a core entity in any information management or sharing transaction—the institution. The I^2 Working Group did extensive community needs assessment with the publishing, library, and repository use sectors.

Concurrent with this Working Group's efforts, the International Organization for Standardization (ISO) was developing a standard for a "name" identifier for public parties "involved throughout the media content industries in the creation, production, management, and content distribution chains." After reviewing the drafts of that standard (later published in March 2012 as ISO 27729, *Information and documentation – International standard name identifier (ISNI)*), the I^2 Working Group initiated discussions with the ISNI International Agency (ISNI-IA) about the potential of using the ISNI standard and the ISNI-IA's infrastructure for institutional identification, rather than publishing a separate standard for institutions.

Those discussions resulted in an agreement to use ISNI for institution identification. This document provides background on that collaboration decision and describes the recommended practices for using the ISNI for institutional identification.

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Section 1:
Introduction

1.1 Background

The Institutional Identifier (I^2) Working Group was established at the request of the information supplier community, which lacked a robust, global identifier strategy for the organizations with which they did business.

The Journal Supply Chain Efficiency Improvement Pilot (JSCEIP), conducted from 2006 through 2007, demonstrated the improved efficiencies of unambiguous identification of organizational entities in journal supply workflows. The project also found that implementation of an institutional identifier would require a commitment by all parties in the supply chain to use such an identifier—and that there were many more players involved than originally thought. Additional issues were raised related to the metadata that should be collected for the identifier and how the data would be maintained.

Since NISO has traditionally played a role in the promulgation of identifiers commonly used within the library and publishing communities, both nationally and internationally, members of the JSCEIP brought a proposal to NISO to develop an institutional identifier standard that could support a wide range of known and unknown digital information needs throughout the library and publishing environment. The proposal was approved by NISO's Business Information Committee and the Voting Members in January 2008 and a NISO Institutional Identifiers (I^2) Working Group was formed with the following charges:

1. Develop scenarios to represent the most compelling use cases for institutional identifiers that will engage all relevant stakeholders and identify their institutional identifier needs.

2. Develop a globally unique identifier string that is usable in the web environment, together with sufficient metadata to uniquely identify and relate the institution to its identifier.

3. Identify a strategy for the implementation of the institutional identifier, including identifying the hosting and technical needs, the legacy uses of institutional identifiers in the digital information space, and the identification of complementary initiatives that could be informed by, or interoperable with, the NISO I^2 identifier standard.

1.2 Community Needs Assessment

The I^2 investigation process was characterized by multi-faceted and broad-based needs assessment strategies intended to engage the digital information community in describing:

1. Issues with current ("legacy") identifiers

2. Requirements for an institutional identifier

3. Barriers to the adoption of an institutional identifier

4. Emerging or complementary identifier standards that should be considered in place of developing a new identifier standard and implementation strategy

The I^2 Working Group established subgroups to investigate these issues within three particular scenario areas:

- Electronic Resource Supply Chain

- Institutional Repositories

- Library Resource Management

(A fourth proposed scenario area of e-learning was determined to be a sub-area within each of the broad scenario areas, and was thus eliminated as a separate sub-group.) Over 300 constituents were engaged through surveys and consultations to identify requirements.

Respondents to surveys for institutional repositories and library resource management showed remarkable unanimity.

- Large percentages agreed that an institutional identifier was important, and a majority were likely, or somewhat likely, to request and use a globally unique institutional identifier.

- Most respondents were currently using one or more identifiers. Library resource management survey participants were primarily using workflow-specific identifiers, such as MARC codes for cataloging within OCLC or participating in ILL transactions. Respondents to the institutional repository survey generally assigned an identifier to themselves or their organizational participants and this was most frequently a CNRI Handle$^®$.

- Respondents to both surveys were less likely to update a registry after initial participation, so the need for fairly durable metadata, as well as the need to qualify some metadata by period of validity, is important.

- Survey respondents identified complementary identifier initiatives that should be considered, particularly ISIL (International Standard Identifier for Libraries and Related Organizations, ISO 15511), a unique identifier specific to libraries, and ISNI (International Standard Name Identifier, ISO 27729), which identifies public entities, both personal and corporate, across the entire media creation chain, from creation to final distribution. (Both the ISIL and ISNI standards were studied. ISIL was too narrow in scope to consider for an I^2 recommendation, but ISNI was deemed to have potential for meeting the requirements of the institutional identifier and was added to the I^2 agenda for further investigation.)

- Respondents in both surveys also identified the need for a data element that classified the institution by business sector, so this element was added to the draft metadata specification. Most elements in the draft metadata specification were deemed very or somewhat important with the exception of language of name, which was made optional as an attribute.

1.3 Requirements for the I^2

In the second phase of the NISO I^2 initiative, working group members participated in four activities: identifier requirements, use case scenario development, metadata schema development, and operational environment requirements, each of which is discussed further in this section.

The work of the I^2 Working Group was codified in a midterm review and distributed for comments in many venues, including the 2010 ALA Annual conference. The broad digital information community was invited to participate via survey and individual comments. The largest percentage of respondents was from the library community, although some members of the digital licensing community responded via personal comments. The draft metadata schema and the identifier structure and environment choices were ratified by a majority of respondents, including the decentralized registry

approach and the reuse of assigned identifiers in workflow specific registries, rather than a registry that tries to accommodate all current and potential digital information workflows.

1.3.1 Requirements for the Identifier Standard

The features listed in Table 1 were specified for the I^2 and validated through surveys and public comments. All were rated as "very important" or "somewhat important," with only the identifier opacity having an equally high score for "don't know/no opinion."

Table 1: Required attributes of an institutional identifier

I^2 Feature / Attribute	Description
Identify organizations	The I^2 will unambiguously identify institutions and organizations that operate within and around the information supply chain. I^2 will be used for identifying institutions and units of institutions.
Be opaque	The I^2 should be an opaque string of characters. Organizations change in structure and are merged and split. Identifiers for a given organization unit need to be persistent; therefore, the identifier should not contain semantics about the institution (e.g., the domain name of the organization).
Support the creation of a core metadata set that describes an institution sufficient for unambiguous identification	With an opaque identifier, additional metadata (in a registry) is needed to describe the institution being identified to facilitate its unambiguous identification. The core metadata will disambiguate the institution from related institutions (e.g., parent and sibling, former institution); will identify the institution by variant names or identifiers, such as the MARC institution code; and will provide category, location, and contact information suitable for obtaining further information about the institution.
Support registration of institutions in a decentralized manner	The identifier and the structure/environment within which it operates must be able to support multiple business scenarios operating independently and not relying on the registration of an institution by another entity before the identifier can be used.
Address community-specific registry needs	The business scenarios/registries that utilize the I^2 will be able to use the identifier to extend data about an institution. Community-specific applications may wish to leverage the identifier to extend the metadata to include things such as registered IP addresses, base URL for OpenURL resolver, and organization demographics such as FTE, tax exempt status, etc.
Allow URI(s) from third-party registries to be submitted and stored	Third-party registries (which have appropriate authorization) should have the ability to insert URIs in the central registry to facilitate discovery of extended information about an institution at that registry.

1.3.2 Use Case Scenario Development

The I^2 Working Group spent considerable time and effort in specifying representative use case scenarios for the I^2 identifier that demonstrate the value of the identifier and validate the decisions made in this recommended practice.

Using a fictitious NEARLI (Northeast Area Research Library Initiative) consortium, the following scenarios were illustrated:

- Scenario One: Library A wants to be a member of the NEARLI consortium.

- Scenario Two: Library A subscribes to an electronic journal.

- Scenario Three: Library A places ILL (interlibrary loan) requests with Library B.

- Scenario Four: Library A places an ILL request via the NEARLI consortium.

- Scenario Five: Library A places an ILL request for special circumstances.

- Scenario Six: A regional ETD (Electronic Theses and Dissertations) repository harvests metadata from a participant repository.

- Scenario Seven: A subscription content site supplies usage statistics to a library consortium.

- Scenario Eight: A subscription content site authenticates a user via a third party rights aggregator.

More details including illustrations for each of these scenarios are in Appendix A.

1.3.3 Requirements for the Core Metadata Set

Metadata requirements were developed iteratively with substantial community comment and validation. All metadata elements were selected to support the core user needs identified in the IFLA *Functional Requirements for Bibliographic Records (FRBR)* final report. The four core user needs for FRBR are FISO: *find, identify, select, obtain.* As defined for the use case of unambiguously identifying an organization, these user needs can be expressed as:

- **Find:** Successfully search the I^2 registry for an institutional record.

- **Identify:** Interpret the information supplied in the registry about an institution.

- **Select:** Identify the institution appropriate for a digital information workflow from among similar or related institutions.

- **Obtain:** Successfully reuse the I^2 identifier for a digital information workflow.

An I^2 metadata schema was designed to provide the minimum set of elements needed to uniquely and unambiguously identify an organization engaged in a digital information workflow. A draft metadata element set for the I^2, codified as an XML schema, was made available for comment (see Table 2). These were largely approved by community reviewers, although some changes were made in response to public comment.

Table 2: I² Metadata elements

Element Name	Definition	Usage	IFLA Core User Function
I²	String of characters serving to uniquely identify an institution.	Provides a globally unique identifier string that is usable in the web environment.	Identify, Obtain
alternateIdentifier	Alternative or supplementary identifier that identifies an institution.	Equivalent identifier used by another system, e.g., DUNS.	Identify
name	Primary or preferred name under which an institutional entity or organization operates.	Optional attributes identify the language and character set and optional subelements document the timeframe in which the name is used. In particular, the subelement usageDateFrom should be used if a variant name representing a previous or superseded name is supplied.	Find, Identify, Select
variantName	Other names (legal, common, former, etc.) by which an institution is known.	Optional attributes identify the type of variant name, language, and character set and optional subelements document the timeframe in which the name is used.	Find
type	Primary type or genre of the organization.	Primary role of the institution, based on mission or purpose. Should be specific to the institution being identified and not the parent institution (e.g., an academic library is a "library" and not a "university" or "college.")	Find, Identify
location	Complex data element consisting of elements for geographic location or place associated with an institution.	The location of the main address of the entity, particularly the address that supports digital workflows of the entity. If the organization has multiple locations and none are main locations, it should consider separately identifying each organization and linking them through the relatedOrganization element.	Identify, Select

Element Name	Definition	Usage	IFLA Core User Function
`relatedOrganization`	Complex element for any related organization that is important for either differentiating the organization being registered from other organizations or to uniquely identify the organization being registered. Subelements include the relationship with the organization being identified (e.g., parent or unit), as well as **name**, **I²**, or other identifier needed to identify the related organization.	Add related organizations that are meaningful to the I^2 context. This will include relationships of ownership (e.g., parent/unit relationship), affiliation, and membership, when this relationship plays an important role in the digital information supply chain.	Identify, Select
`registry`	Complex element identifying a registry that reuses the assigned I^2 for purposes of identification or to enable workflows in the digital information supply chain.	Add as needed to identify reuse of the identifier in workflow-specific registries.	Identify, Obtain
`contact`	Complex element for the party responsible for creating and maintaining the I^2 registry record.	Needed to assert authenticity and maintain currency of the I^2 registry record.	Obtain
`note`	Free-text note to provide clarification for any element in the I^2 registry record.	This should be used sparingly for any element value that needs explanation. Adding detail is discouraged. The note is intended to clarify ambiguity in any supplied metadata element.	Identify, Select
`dateCreated`	Date of registry record creation.	System supplied.	Obtain
`dateModified`	Date of registry record modification.	System supplied.	Obtain

These elements were determined after much consultation with the potential community of users, particularly through surveys where community members (libraries, publishers and distributors, repository managers, etc.) were asked to rate the importance of each metadata element on a scale of very important to not important. These elements were determined to be the critical elements for uniquely identifying an organization, where ambiguous identification is achieved both by providing sufficient information to identify the organization and by differentiating the organization from related organizations (e.g., a parent organization or a previous organization that was replaced by the identified organization). The data model for the identification of an organization emphasizes the two key roles for I^2 metadata for uniquely and unambiguously identifying organizations within the information supply chain.

This metadata was later harmonized with that of the ISNI standard to define the final set of elements (see 4.5.3 and 5.5).

The I^2 system itself is intended to provide a global solution to the problem of a proliferation of identifiers assigned to institutions, particularly within specific or proprietary workflows, such as the purchase of resources from a vendor who assigns an identifier to each organization. The metadata is designed specifically to address a vexing concern in the complex digital information space—that of identifying the appropriate organization for a specific workflow.

Consider the following scenarios:

1. The academic libraries in a state collaborate to establish a digital video portal to provide preservation and streaming services for commercial videos licensed by members of the portal. A video may be licensed by one member of the consortium or many, but only one copy is maintained and streamed, thus leveraging economies of scale for resource delivery. The vendor must identify one location (the consortium) for video delivery, but individual libraries for licensing.

2. A regional public library system manages the budget for all its constituent libraries. However, each library has a separate ordering department. A vendor will receive orders from each library and will deliver resources to the ordering library but must submit invoices to the central purchasing department.

3. A faculty member has authored a book with a publisher. As he prepares for retirement, he wants to make the book openly and permanently available in the institutional repository but he no longer has access to his original contract. The publisher has been acquired and subsumed by another publisher.

The complexity in each scenario results from the participation of multiple organizations that are related to each other in some manner—either because of a collaboration that provides efficiencies in some parts of the digital resource workflow but complexity and ambiguity in others, or because an organization has ceased to exist in its previously known form. The I^2 metadata has to provide sufficient information to distinguish one organization from a related organization and to provide the required minimum of information to disambiguate the two.

The primary element for this disambiguation is the `relatedOrganization`, which identifies the relationship between the organization being identified and any related organizations and provides sufficient information to identify the related organization so that the user can compare both organizations and select the one most appropriate for the necessary workflow. Once the organization appropriate to the workflow is identified through the metadata, the I^2 will uniquely identify the organization to enable the workflow to proceed smoothly from that point forward.

One question that arises is what constitutes an organization in terms of the I^2. Are there legal or organizational requirements to constitute an "organization" in order to participate in the registry and obtain an identifier? The answer is that an organization is simply defined as any organization entity that needs to be uniquely identified in order to support a digital information workflow. The "accounts payable" department of a library may need and request an I^2 identifier if it needs to communicate directly with another entity in the digital information delivery chain, such as a publisher. Each organization identified with an I^2 identifier and metadata must be discrete from each related organization. This can be accomplished by creating a full I^2 registry entity, including the `relatedOrganization` element, to distinguish each related organization. If an entity is unable to supply the mandatory elements of the I^2 metadata, such as a unique name for the organizational entity, it should rethink whether it needs a separate identifier. However, the decision rests with the entity requesting the identifier.

The I^2 metadata schema should be expressed as an XML schema and as linked data (e.g., in Resource Description Framework semantic web standard with URI identifiers), to support both standardization and reuse.

1.3.4 I^2 Operational Environment Requirements

The operational environment must include a registry process that supports assignment, maintenance, and reuse of globally unique identifiers for organizations. The following are mandatory requirements for the operational environment:

- The identity of each organization must be unambiguous and clear, which requires metadata to identify the organization and to disambiguate it from other organizations.

- Identifiers must be easily assigned to organizations at point of need so that digital information workflows are not disadvantaged by the need to discover or assign I^2 identifiers.

- A user, defined as any entity with a need to participate in a digital information workflow, must be able to readily discover and reuse identifiers.

- The user must be able to trust that each unique organization has only one I^2 identifier, and this identifier must be readily discoverable.

- The organization identified with an I^2 identifier must authorize the assignment and reuse of the identifier, so that participants in an information workflow can trust the authenticity of the identifier.

- As an organization changes, or develop relationships, such as membership in a purchasing consortium, the metadata must be able to be easily updated to reflect such changes.

There is also no requirement that assignment or reuse of an I^2 identifier be free of cost, with the understanding that any cost must be reasonable as deemed by the targeted market of digital information organizations in order to ensure wide adoptability for the I^2 identifier.

The operational environment must be managed by one or more organizations that are known and trusted within the digital information environment, with policies and procedures that are transparent and accountable to the participating organizations.

1.4 Candidate I^2 Identifier Standards

It was the belief of the NISO I^2 Working Group and the expressed opinion of many reviewers of I^2 standard drafts that the I^2 process should look first to emerging standards that were further along in the development process rather than adding a new standard to a growing body of global identifiers.

Several existing identifier standards were recommended by reviewers, including ISNI (International Standard Name Identifier, ISO 27729), ISIL (International Standard Identifier for Libraries and Related Organizations, ISO 15511), MARC Code List for Organizations, SAN (Standard Address Number, ANSI/NISO Z39.43), and DUNS (Data Universal Numbering System). ISIL is specific to libraries and similar organizations and thus was too limited in scope, since any organizational entity participating in a digital information workflow must be accommodated. The remaining identifiers were examined with respect to core requirements for the I^2 identifier standard. A comparison of their attributes against the required I^2 feature attributes is shown in Table 3.

Table 3: Comparison of candidate I^2 identifier standards

I^2 Feature Attribute	ISNI	MARC	SAN	DUNS Number
Identify organizations	Yes	Yes	???	Yes
Be opaque	Yes	Yes	Yes	Yes
Support the creation of a core metadata set that describes an institution	Yes	No¹	No¹	No¹
Support registration of institutions in a decentralized manner	Yes	No	No	No
Address community-specific registry needs	Yes	Yes	Yes	Yes
Allow URI(s) from third-party registries to be submitted and stored	Yes	No¹	No¹	No¹

Only ISNI supported all the core requirements for the I^2 standard.

1.5 Collaboration with ISNI International Authority

1.5.1 Background on the International Standard Name Identifier (ISNI)

The International Standard Name Identifier (ISNI) was a standards development project within the International Organization for Standardization (ISO) whose purpose was the specification of a unique identifier for "the public identities of parties; that is, the identities used publicly by parties involved throughout the media content industries in the creation, production, management, and content distribution chains." The standard was approved for publication in July 2010, pending the formation of a registration authority to administer the assignment of identifiers and the system architecture needed to manage the registry of identifiers and associated metadata. The resulting ISNI International Agency (ISNI-IA) was a consortium with founding members:

- International Confederation of Societies of Authors and Composers (CISAC) <www.cisac.org>
- International Federation of Reproduction Rights Organisations (IFRRO) <www.ifrro.org>
- International Performers Database Association
- Bowker <www.bowker.com>
- OCLC, Inc. <www.oclc.org>

- Conference of European National Librarians (represented by the Bibliothèque Nationale de France <www.bnf.fr> and the British Library <www.bl.uk>)

The ISNI-IA will create and maintain an infrastructure including a centralized database of ISNI identifiers and metadata. A network of appointed ISNI Registration Agencies (RAGs) will utilize the infrastructure to assign identifiers and collect metadata.

Following the formation and approval by ISO of the ISNI-IA, the ISNI standard was published as ISO 27729 in March 2012.

1.5.2 Evaluation of ISNI for Institution Identification

A significant number of respondents recommended that the I^2 group look seriously at the emerging International Standard Name Identifier (ISNI) standard for fulfilling the requirements for the institutional identifier, rather than creating yet another identifier.

In August 2011, it was decided to focus the remainder of the I^2 work on a close examination of ISNI, looking for commonalities and divergences and determining whether ISNI could support the requirements and metadata that had been developed and validated through public participation and feedback. An I^2 subgroup determined that there were many convergences between the two. The primary divergences were in the metadata specification, which while largely congruent with the I^2 metadata.

While the development of the ISNI did not exclude organizations, the focus for the ISNI identifier was primarily on individuals, where identical names are not uncommon and individuals must be differentiated through their creations or creative work. ISNI accomplishes this through "class" which "defines the repertoire (such as Musical, Audio-Visual, Literary…)" [ISNI FAQ] as well as the title that references a creation within the repertoire.

I^2 was developed for a specific business model, to support the information supply chain, where organizations participate in workflows to deliver information from a supplier (publisher, distributor, content aggregator) to a licensing organization (consortium, library, etc.) Multiple organizations with multiple roles can engage in a single information supply transaction. The I^2 and its metadata were designed to enable complex workflows to occur seamlessly and transparently through the unambiguous identification of each organization engaged in a workflow step, from ordering, to licensing, to delivery.

The ISNI requirement that organizations be identified by classes and roles that are specific to the repertoire of creation, as well as the required related title of creation, were not a good fit for organizations engaged in the supply chain rather than the creation of information works. While classes and roles could be adapted with other vocabularies, the mandatory ISNI metadata requirement for identification of a resource associated with the identified entity was problematic. This latter requirement is very useful for individual creator names, where authors with the same or similar name can be differentiated by their work, but is often irrelevant for organizations that are not associated with a creative work and may not even have an organizational website. Think of the use scenario referenced previously where an identifier is requested for the purchasing department of a multi-branch library or consortium. There may be no website, public or private, associated with that organization.

The I^2 recommendation differed in two other key areas that were felt to be critical for harmonization between the two schemes: 1) date ranges to specify time periods when institutional names were valid, 2) documentation of relationships between institutions. Date ranges are critical to support historical identification of organizations that changed their names but not their essential identities, and thus do not require a new identifier but rather recognition of the historical development of the name over time. For example, OCLC began life as Ohio College Library Center, then became Online Computer

Library Center, but is now simply known by the acronym OCLC, where the initials no longer have meaning. Despite the name changes, the actual organization did not substantively change. In such a scenario, the organization would retain the same institutional identifier despite these changes, but the metadata would need to be updated. Such name changes needed to be distinguished from changes to the organizational identity, such as when two or more organizations merge into a new organization, which is documented in the `relatedOrganization` data element and would result in a new institutional identifier for the merged organization.

A final area of divergence was the use of the ISO 3166-1 standard for country codes as opposed to the use of the *MARC Code List for Countries*; the change of code list was accepted by ISNI.

1.5.3 Discussions with ISNI-IA

A paper was prepared on the potential of using the ISNI as the standard institutional identifier and used as a basis for discussions between the I[2] Working Group and the ISNI-IA about possible collaboration. A subgroup of the NISO I[2] Working Group—Oliver Pesch (I[2] WG co-chair), Jody DeRidder, and Janifer Gatenby (who served on both I[2] and ISNI Working Groups)—then approached ISNI about potential collaboration. As noted by DeRidder in an article for *Information Standards Quarterly*, "NISO I[2]'s interest [in the collaboration] is to ensure that ISNI becomes a viable standard that will be used for institutional identification and that the ISNI International Agency (ISNI IA) infrastructure and business model extend to the identification of institutions within the information supply chain. The benefit to ISNI is the extensive exploration of institutional identification needs performed by the I[2] Working Group and the development of a strong metadata profile for institutional identification to supplement ISNI's already solid identification of individuals."

At the time of the discussions, the progress of ISNI toward an international standard was significantly advanced and organizational buy-in, in terms of registration authorities to develop and maintain the ISNI registry environment, was strong. The ISNI International Agency was already formed, though not yet officially sanctioned by ISO.

ISNI-IA expressed interest in pursuing the proposed collaboration and metadata harmonization work ensued to address the issues described in 4.5.2. ISNI-IA also reorganized the hierarchy of some of the metadata elements to better support institutions. The I[2] group also formally requested modification of the requirement for the metadata requirement of an associated resource—that it be optional for institutions—and ISNI-IA agreed to accommodate this request. In addition, ISNI now requires the use of the ISO 3166-1 standard for country codes as opposed to the use of the MARC codes.

A requirement of the ISNI-IA was the identification of one or more organizations that would be willing to become an ISNI Registration Agency (RAG) specifically for the registration of ISNIs for institutions. The NISO I[2] WG identified some organizations who expressed willingness to serve as RAGs for ISNI to support digital information workflows involving organizations, and others may follow. This will provide practical avenues to implement ISNI to address the significant problems of ambiguous organization identification in the digital information workflow space.

The NISO I[2] Working Group has concluded that ISNI conforms to the requirements for an institutional identifier and recommends that ISNI be adopted for identification in the digital information workflow space. Although the I[2] requirements are specific to digital information workflows, the Working Group believes they have value and are readily adaptable to organizational identification in any environment that has a need to identify the organizational entities.

The remainder of this Recommended Practice describes how the ISNI should be utilized as the standard for Institutional Identification.

Section 2:
Institutional Identification Recommended Practices

2.1 Purpose of Institutional Identification

Institutions are critical entities in any web-based digital information transaction—from the placing of a subscription for an online resource to the borrowing of a book from a distant institution using a web-based interlibrary loan application. Institutions engaged in the digital information workflow space are often complex, with, for example, different units of an organization responsible for placing an order and receiving the purchased resource. Many organizations engaged in working with multiple institutions have developed identifiers to manage their workflows, with the result that an institution may be identified by many proprietary or single purpose identifiers.

As the digital information landscape grows increasingly crowded and customized, and as institutions achieve economies of scale through increased collaboration, the need to unambiguously identify organizations engaged in any aspect of information acquisition, supply, archiving, and discovery becomes a critical enabler for efficient and trustworthy information practices.

The use of the International Standard Name Identifier (ISNI) (ISO 27729) for institutional identification is recommended to achieve both of these goals.

2.2 Scope

This NISO Institutional Identification (I^2) recommendation is intended only to unambiguously and globally identify an **institution**. This involves differentiating it from related organizations (e.g., parents or units) or institutions with similar names or functions that might be confused with the institution being identified.

The International Standard Name Identifier (ISNI) standard has much broader identifier uses. This Recommended Practice addresses only the use of ISNI for institutional identification.

It is beyond the scope of the I^2 metadata described in this Recommended Practice to identify attributes of an institution that are needed to carry out a specific workflow. For example, the tax-exempt status of an institution is not provided in the I^2 metadata, even though this is important information for the resource ordering process. It is expected that workflow-specific registries, such as a registry maintained by a publications distribution firm, will maintain the information, or metadata, needed to advance their workflows, in addition to the Institutional Identifier (I^2) that identifies the institution.

2.3 Terms and Definitions

The following terms, as used in this recommended practice, have the meanings indicated.

Term	Definition
identifier	A unique string that identifies one and only one institution. It must be usable in the digital web environment.

Term	Definition
institution	Any institution that does business of any kind in the digital information environment and that may request and obtain an identifier.
	NOTE: An institution may be a subunit of another institution, such as the purchasing and licensing unit of a library, or a consortium that brings together many institutions, whether formally or informally. The institutional identifier is intended to be assigned whenever the need to identify the institution for a digital information transaction arises. There is no requirement for the institution to be a legally constituted entity, as long as it can be unambiguously differentiated from related or similar institutional entities.
International Standard Name Identifier ISNI	An identification of Public Identities of parties, that is, the identities used publicly by parties involved throughout the media content industries in the creation, production, management, and content distribution chains. [ISO 27729]
	NOTE: The ISNI system uniquely identifies Public Identities across multiple fields of creative activity. The ISNI provides a tool for disambiguating Public Identities that might otherwise be confused. ISNI is not intended to provide direct access to comprehensive information about a Public Identity but can provide links to other systems where such information is held.
metadata	The structured information collected about an institution that enables the user to identify the institution and to differentiate it from related or similar institutions.
	NOTE: The metadata is structured into a metadata schema and documented in a registry that provides requirements for populating each element in the metadata schema, as well as guidance on use. Metadata should be made available both as an XML schema and in an RDF linked data instance.
Registration Agency	An organization that provides services in support of the institutional identifier standard including registering institutions and assigning identifiers, obtaining and maintaining metadata about the institution, and providing look-up services for users seeking to identify an institution.
	NOTE: For this Recommended Practice, the Registration Agency is assumed to be one appointed by the ISNI International Agency.

2.4 Requirements for the Operational Environment

ISNI's registration agency environment is well suited to operationalize any digital information workflow, as demonstrated by the scenarios in Appendix A. Organizations engaged in the information supply chain will need to request an ISNI from an ISNI RA and implement that identifier in all relevant workflows. This may require additional metadata elements to incorporate the ISNI identifier

or further definition of the value of a metadata element to support the ISNI identifier. For example, the ONIX-PL licensing schema could reference the use of ISNI for the `senderIdentifier` and the `addresseeIdentifier` for an ONIX-PL license message. An ISNI identifier may be used in place of a set name for unambiguously identifying the repository from which a set of metadata are harvested using the OAI-PMH (Open Archives Initiative-Protocol for Metadata Harvesting). This can eliminate the need for a `setSpec`, which identifies the set within a hierarchy.

2.5 ISNI Metadata Applied to Institutional Identification

It is recommended that all elements that map to the I^2 element set should be provided by any organization. In particular, organizations should include any legacy identifiers as alternate identifiers, such as the MARC Organization Code (in frequent use for Interlibrary Loan transactions) or identifiers assigned by vendors to customers in the information supply chain, since historical transactions may persist for a long time in business systems and workflows. An organization requesting an ISNI should map out its workflows, particularly the entities engaged in workflows, such as separate licensing for branch libraries or the need for a separate organization for a business office engaged in license management for a complex organization. Each entity that engages independently in information workflows should be identified as a related organization and, if feasible, should obtain a unique ISNI.

Appendix A:
Use Case Scenarios

This appendix illustrates the use case scenarios that the I^2 Working Group developed to demonstrate the value of the identifier and validate the decisions made in this recommended practice.

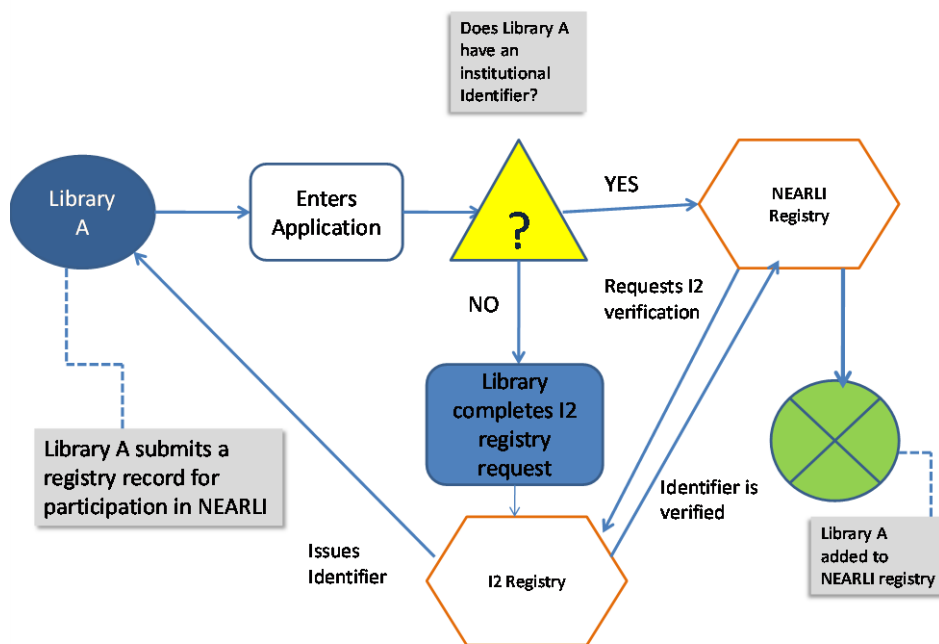## A.1 Scenario One: Library A wants to be a member of the NEARLI consortium

Figure 1: Workflow for scenario where Library A wants to be a member of the NEARLI consortium

In this scenario, Library A wants to participate in the NEARLI (Northeast Area Research Library Initiative) consortium. NEARLI uses I^2 identifiers because the identifiers are globally unique and can be used to support information transactions in multiple business sectors (resource licensing, interlibrary loan, etc.). Library A submits an application. The first step in the registration workflow is to enter an application to the I^2 registry. If the library already has an Institutional Identifier, it is added to the NEARLI registry once the I^2 registry verification is completed by NEARLI. If the library does not yet have an Institutional Identifier, it needs to complete an I^2 registry request. Once that is done and Library A has been assigned an Institutional Identifier, it can re-apply for NEARLI by re-applying.

A.2 Scenario Two: Library A subscribes to an electronic journal
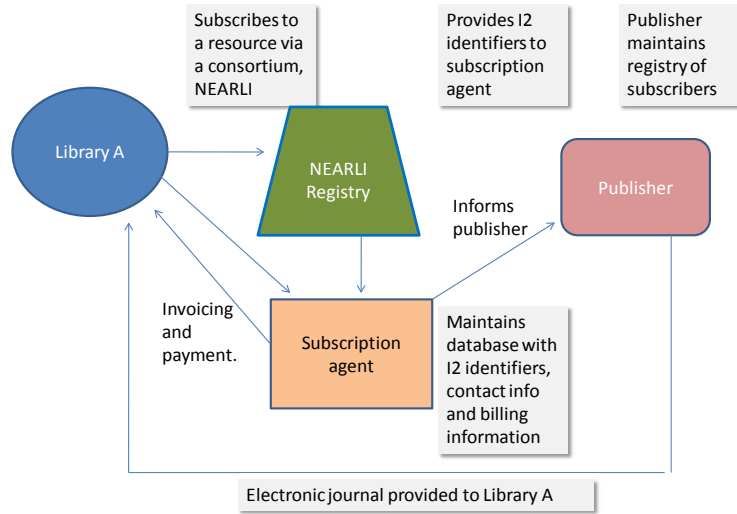
Figure 2: Workflow for scenario where Library A subscribes to an electronic journal

Library A belongs to the Northeast Research Library Initiative (NEARLI). Library A licenses a journal via NEARLI, who submits a licensing order to the subscription agent on behalf of subscribing members, each of whom is identified by an Institutional Identifier. The subscription agent maintains a customer registry with the additional information needed to manage subscriptions. The subscription agent invoices Library A and upon receipt of payment, sends the relevant information about Library A to the journal publisher, who provides the electronic journal to Library A.

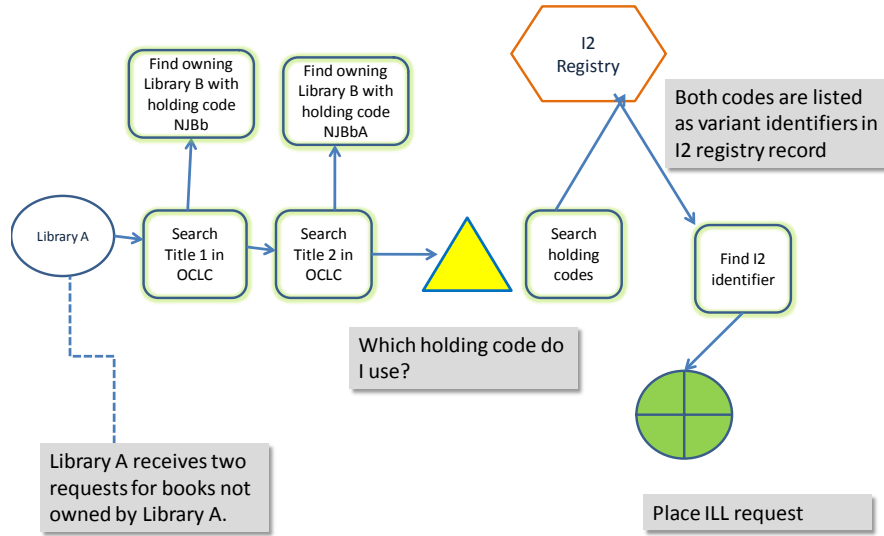## A.3 Scenario Three: Library A places ILL (interlibrary loan) requests with Library B

Figure 3: Workflow for scenario where Library A places ILL (interlibrary loan) requests with Library B

While placing two ILL requests through OCLC, Library A finds an issue with duplicate identifiers for what appears to be a single institution. The confusion is solved by searching the I^2 registry and discovering a unique, authoritative identifier for which both duplicate identifiers are identified as variants.

In this scenario Library A relies on NEARLI to search, identify, and fulfill the interlibrary loan request. The NEARLI ILL software relies upon the Institutional Identifier to uniquely identify institutions and to place ILL requests with institutions that are members of NEARLI or external to NEARLI, but which utilize the I^2 to identify institutions holding resources. Library A searches the NEARLI union catalog and identifies Library B as the holding library. Library B has an Institutional Identifier that is stored in the NEARLI registry. The NEARLI registry of institutions synchronizes nightly with the I^2 registry to ensure it is up to date with changes to institution records. The ILL application automatically checks the NEARLI institutional registry for any changes. Library B has an I^2 and the nightly synchronization identified no changes. The transaction proceeds normally.

A.4 Scenario Four: Library A places an ILL request via the NEARLI consortium
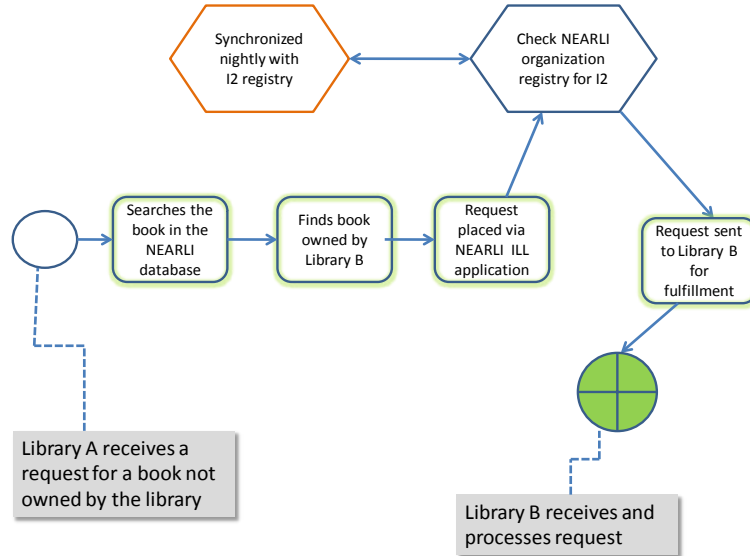

Figure 4: Workflow for scenario where Library A places an ILL request via the NEARLI consortium

In this scenario Library A relies on NEARLI to search, identify, and fulfill the interlibrary loan request. The NEARLI ILL software relies upon the Institutional Identifier to uniquely identify institutions and to place ILL requests with institutions that are members of NEARLI or external to NEARLI, but which utilize the I^2 to identify institutions holding resources. Library A searches the NEARLI union catalog and identifies Library B as the holding library. Library B has an institutional identifier, which is stored in the NEARLI database. The NEARLI registry of institutions synchronizes nightly with the I^2 registry to insure it is up to date with no changes to institution records. The ILL application automatically checks the NEARLI institutional registry for any changes. Library B has an I^2 and the nightly synchronization identified no changes. The transaction proceeds normally.

A.5 Scenario Five: Library A places an ILL request for special circumstances
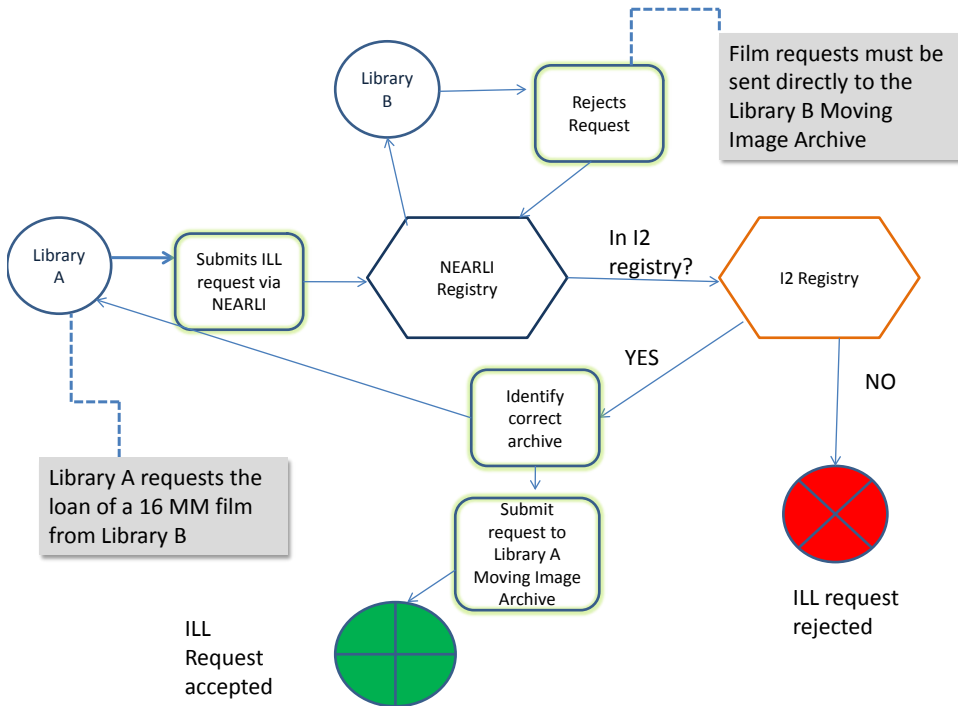

Figure 5: Workflow for scenario where Library A places an ILL request for special circumstances

Library A submits an ILL request for a 16mm film to the owning library. 16mm films have special loan requirements and must be placed directly with the archive itself and not with the parent library. The ILL request is rejected with a note explaining the process. NEARLI is synchronized nightly with the I^2 registry and relationships between Library B and the archive are defined, so the ILL application can recognize that the item is actually owned by Library B's archive and send the request to the archive directly. There would be no need for Library A to resubmit the request or for Library B to get involved; the system would be almost fully automated. Conversely, the archive at Library B has no Institutional Identifier and cannot be readily discovered by an ILL automated process. The request will be rejected and Library A will need to do research to determine where to submit the ILL request.

A.6 Scenario 6: A regional ETD repository harvests metadata from a participant repository
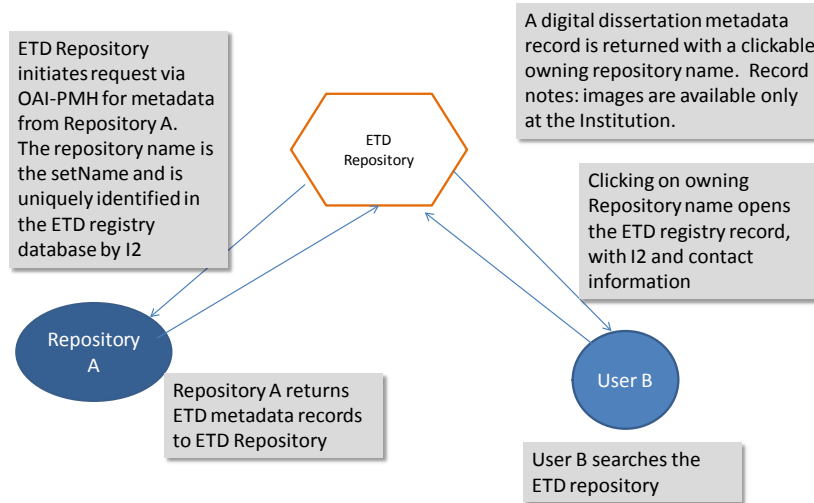

Figure 6: Workflow for scenario where a regional ETD repository harvests metadata from a participant repository

Repository A is a member of a regional ETD (Electronic Theses and Dissertations) repository. Every three months, the ETD repository harvests metadata from Repository A. The Repository A Institutional Identifier is used as an OAI-PMH Set Name since it is unique and can easily be resolved into a name for public record displays. User B searches the regional ETD repository and finds a Visual Arts dissertation that interests him. While the textual dissertation is available, a note indicates that extensive images are available only for viewing at the holding institution. Clicking on the repository name returns a representation of the institutional resource that identifies the repository, its owning institution, and contact information, including a website with the hours of operation for visiting the institution.

A.7 Scenario 7: The NEARLI Consortium requests usage statistics for the individual subscriptions of each library member
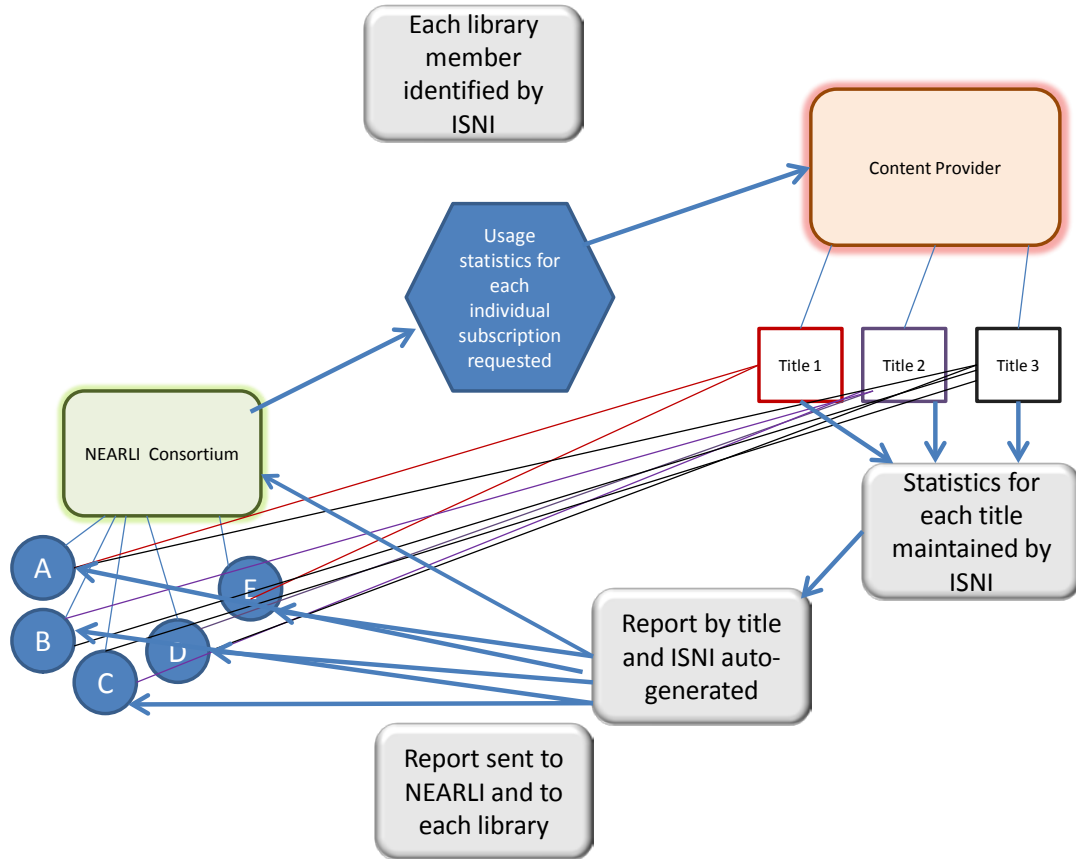

**Figure 7: Workflow where a content provider supplies usage statistics
for a complex consortial subscription package**

The NEARLI consortium manages consortially-negotiated subscriptions for all of its member libraries. Each library may order hundreds of titles from a content provider. Each year, before subscriptions are renewed, the NEARLI consortium organizes usage statistics reports for members to use to analyze their subscriptions from many different content providers. This can be a real ordeal, when the content provider confuses the Oakville Public Library with the Oakville Community College Library, or a content provider omits a title from a the usage statistics for a specific library. This content provider uses the ISNI to uniquely identify each subscribing institution for each title. NEARLI includes an ISNI index in its system and collects and maintains statistics by each ISNI. An automatic report generation is requested for each ISNI that searches all titles for subscriptions and statistics by ISNI. Reports—a combined report for the consortium and individual reports for each ISNI identified library—are quickly generated and are error free. In fact, the whole process is completely automated and reports can be generated at any time, now that errors have been eliminated through the use of a unique identifier.

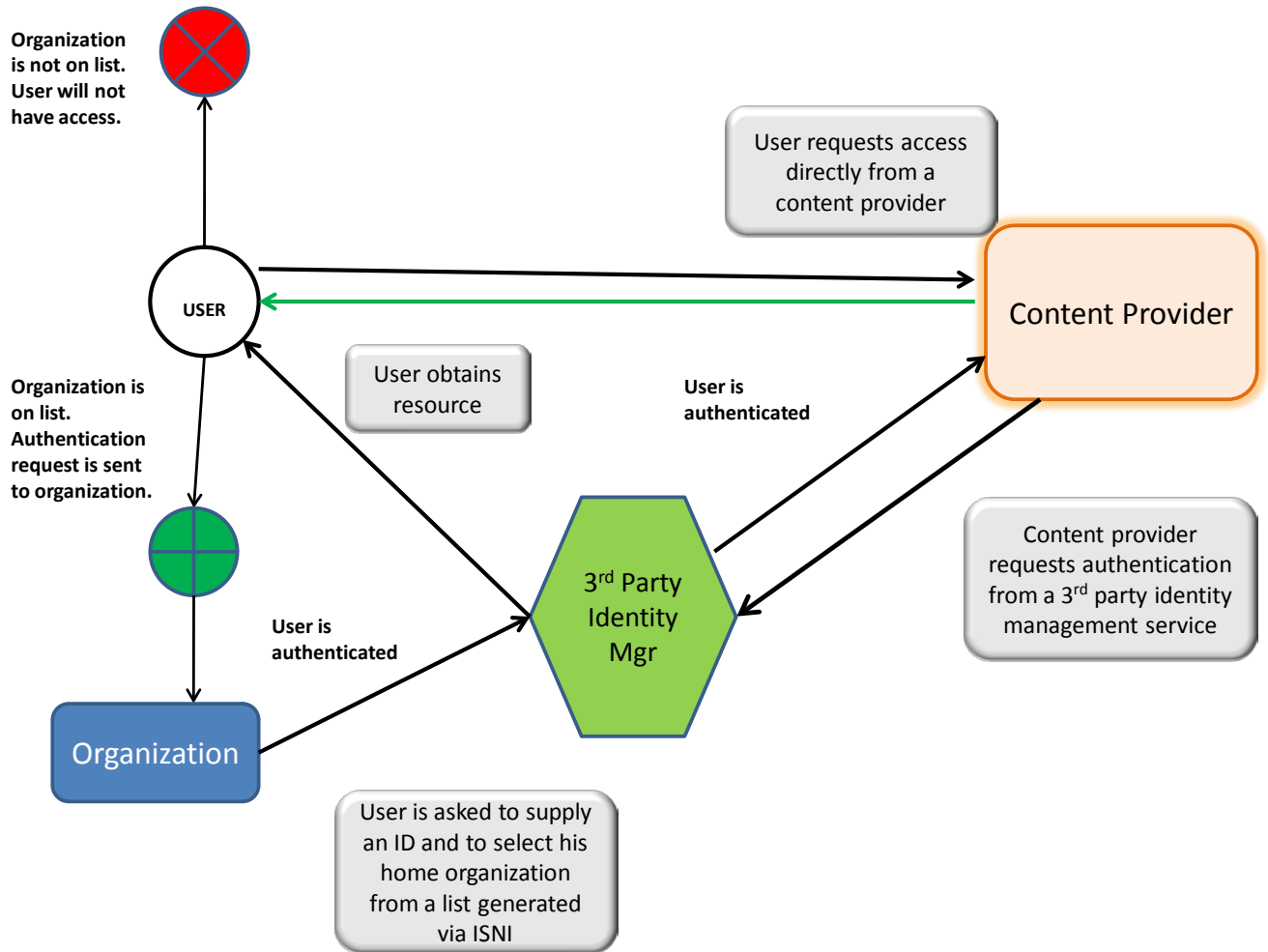## A.8 Scenario 8: ISNI supports third party identity management

Figure 8: Workflow for scenario where ISNI supports third party identity management

Identity Management is a crucial workflow for licensed resources. An individual user must be a member of an organization in order to access resources from a content provider. Identifying the organization that licensed the resource is critical for providing anytime, anywhere access to the members of the organization. This content provider authenticates users via a third-party identity manager using Shibboleth, an open source authentication and authorization service. The user requests a resource. The content provider refers the request to the third party identity manager. The user is asked to supply his ID (unique identification/password) and to select from a drop-down menu of organizations to find the one of which he is a member. The names are generated from the **name** element of the ISNI metadata. If the user finds his organization, he submits his password and it is sent to the organization. The use of ISNI enables complex scenarios such as resources licensed by a university and those licensed by the medical school of that university. Each part of the institution has its own ISNI so there is no confusion about which organization the user belongs to.

Appendix B:
NISO I² Metadata Element Set Mapped to ISNI Metadata Elements

This table identifies the divergences between the ISNI elements and the I² element mapping. The full ISNI schema is copyrighted and proprietary to the ISNI specification and must be obtained from ISNI. It cannot be reproduced in its entirety in this recommended practice. The mapping provided below is informational, intended to demonstrate that ISNI can accommodate the requirements for robust and unambiguous identification of organizations as defined in the I² core element set.

ISNI Element	Requested Change	Reasoning	I² Element mapping
`resource`	Optional instead of Mandatory for corporate entities.	A requesting agency may be registering many institutions with ISNI; it's an undue burden to expect this agency to have information on publications for all these institutions.	None
`identityInformation: countriesAssociated: countryCode`	Use ISO 3166-1 instead of MARC codes.	ISO standard does not require MARC knowledge.	`location: country`
`identityInformation: countriesAssociated: regionOrStateCode`	Use ISO 3166-2 instead of MARC codes.	ISO standard does not require MARC knowledge	`Location: stateOrRegion`

`identityInformation: nameVariant: institutionalName: nameUsage`	Include **deprecatedName** in controlled vocabulary along with:
	`nickname`
	`transliteratedName`
	commonName
	acronym
	`legalName`
	`variantName`
		Sometimes a name change is superficial and only incidental.	`variantName` `attribute type`

`identityInformation: identity: institution: institutionalName: nameUsage`	Remove this element, as it is not needed and only creates confusion.	Previous names often reflect major changes in an organization. Better addressed through the `isRelated` element.	None

`isRelated: relationType`	Include `formerInstitution` in controlled vocabulary along with:
	`isMemberOf`
	HasMember
	`isUnitOf`
	hasUnit
	`isSupersededBy`
	supersedes
	`isAffiliatedWith`
	`isRelatedTo`
			`variantName` type="Former Name"
			and
			`relatedOrganization: relationship`

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