



Addressing the Challenges with Organizational Identifiers and ISNI

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CONTENTS

Executive Summary	6
Overview	7
Why are Organizational Identifiers Important?.....	9
Use Cases for Organizational Identifiers	11
Organizations in the ISNI Database.....	13
Challenges in Identifying Organizations.....	14
Scenarios for Organizations in ISNI.....	15
Recommendations for the ISNI System and Database	19
Issues Revealed.....	22
Conclusion.....	24
Appendices	25
Appendix A: Dealing With an Organization's Many Name Changes	26
Appendix B: The Need to Flag Preferred Form of Name	27
Appendix C: ISNI Data Elements for Organizations.....	28
Appendix D: Organizational Hierarchy in ISNI	29
Appendix E: Organizational Restructuring	30
Appendix F: Organizational Acquisitions in ISNI.....	31
Appendix G: Organizational Mergers in ISNI	32
Appendix H: FAQ for Catalogers: How is ISNI Different from Authority Files?	33
Appendix I: Outreach Document for Academic Administrators	34
Appendix J: Research Ecosystem.....	37
Notes	38

FIGURES

Figure 1. Text Strings vs. Identifiers	10
Figure 2. Research Activities Information Workflows	11
Figure 3. ISNI Relationships	14
Figure 4. ISNI Relationships for Acquisitions and Mergers	17
Figure 5. Research Groups in ISNI	18
Figure 6. Consortium Relationships in ISNI	19

EXECUTIVE SUMMARY

Organizational affiliations of the creators of works are important to a variety of stakeholders, including academic administrators, funders, publishers, repository managers, software developers, rights agencies and individual researchers. Identifying and tracking these affiliations can be challenging, as organizations may be known by a variety of names and may have schools or research centers well-known on their own. An organizational identifier—a unique, persistent and public Uniform Resource Identifier (URI) associated with the organization that is resolvable globally over networks via specific protocols—provides the means to both find and identify an organization accurately and to define the relationships among its sub-units. This report presents new modeling of organizations that others can adapt for their own uses.

This report focuses on organizational identifiers from the perspective of academic institutions. Their ranks and reputation often determine their success in obtaining funding and attracting or retaining faculty. Identifiers provide the “glue”¹ for institutions and funder systems to support comparing and ranking the outputs of the research process; assessing the impact of grants between institutions and their funders; and tracking and collating publications between researchers and their publishers. The report outlines a number of scenarios where the International Standard Name Identifier (ISNI) can be used to disambiguate organizations, including real-world examples.

OVERVIEW

Identifying organizations presents special challenges. Organizations merge and split; they acquire or are acquired by other organizations; they change names and locations. They may be known by a variety of names over time even within one language. Establishing a unique and persistent identifier for each organization helps resolve the problems inherent in name ambiguity. Modeling the various relationships among organizations helps affiliate the creators of works with their parent organizations.

The International Organization for Standardization (ISO) has certified the International Standard Name Identifier² (ISNI); it covers the public identities of people and organizations across all fields of creative activity. ISNI acts as a bridge identifier across domains—academic institutions, libraries, archives, museums, trade sources, publishers, rights agencies, funding agencies, etc. It includes data elements and attributes that can be used to accurately represent an organization’s history, relationships and hierarchy. ISNI is the most widely used identifier for organizations and is disseminated through Wikidata (the central storage of structured data used in all Wikipedias), the Virtual International Authority File and other identifier systems such as ORCID (Open Researcher and Contributor ID).³

The 2014 OCLC report, *Registering Researchers in Authority Files*,⁴ summarized the work of an OCLC Research task group on approaches to providing authoritative researcher identifiers. The group determined that one of the key attributes distinguishing researchers with the same name is their institutional affiliation. In discussing the report, OCLC Research Library Partners metadata managers questioned how these institutional affiliations appear in the ISNI database. Many did not realize until they had searched the ISNI database that their organization already had an ISNI.

Fourteen people from institutions in four countries volunteered to serve on the new OCLC Research Library Partners “Representing Organizations in ISNI Task Group,” charged with

- evaluating the need for organizational identifiers to improve the flow of information across the research environment;
- assessing how effectively ISNI can address this need;
- advising the OCLC ISNI team in Leiden and the ISNI International Agency (ISNI-IA) on possible improvements in ISNI record quality, completeness and user interface; and
- recommending how to better engage the community.

This report outlines the case for organizational identifiers and documents the challenges in collecting and managing identifiers for organizations. The report defines twelve use cases for organizational identifiers that were developed to be consistent with the use cases presented by the Jisc CASRAI-UK Organisational Identifiers Working Group⁵. It provides a high-level summary of how organizational identifiers can be managed in ISNI and outlines a number of scenarios in which ISNI can be used to disambiguate organizations, including real-world examples.

The task group evaluated the current ISNI system and support materials from the viewpoint of how organizations are represented. It concluded that extending the existing data model and defining additional data values would improve the representation of organizations within the database. The task group's recommendations relate to:

- ISNI data model and defined values
- outputs from the SRU search API
- how data is displayed
- data collection and treatment
- support materials and documentation

Although the task group's recommendations are directed to those responsible for managing ISNI, the task group's work may benefit other audiences:

- Linked data implementers can benefit from the use cases and diagrams created by the task group to indicate the relationships between and among organizations as well as between individuals and their affiliated organizations. In a linked data environment, these relationships would be the same, even when identifiers other than ISNI are used. The task group found that ISNI had already defined most of the needed relationships (albeit few are currently used) and recommended adding a few others (see appendix C).
- Academic administrators eager to more accurately aggregate the scholarly output of their institutions can benefit from becoming an ISNI member. This report summarizes why organizational identifiers are important with specific use cases and examples using ISNI that may resonate with academic administrators' local contexts. The task group drafted an outreach document targeted to academic administrators, "Your organization on the Web: the ISNI approach," for the ISNI-IA to consider using as a basis to broaden its user community (see appendix I).
- Current ISNI members may consider editing their organization's ISNI records and taking advantage of the data elements already established based on the examples provided by the task group.

The task group uncovered some issues for which there are no easy or immediate answers. The ISNI database aggregates information from dozens of different sources in many domains. How an organization is represented is not solely up to the organization itself. Organizations can help ensure that they are authoritatively represented in ISNI by taking responsibility for maintaining current and accurate information in the database. For academic institutions, the level of granularity (e.g., including all schools, faculties or departments) will depend on the organization's needs. A list of these "issues revealed" is included at the end of this report.

Why are Organizational Identifiers Important?

Academic institutions are increasingly concerned about their ranks and reputation, which often determine their success in obtaining funding and retaining faculty.⁶ With the recent growth in scholarly publishing and the explosion in co-authorship, tracking which publications are associated with which organizations is harder than ever. Organizational identifiers offer a way to do so more easily and accurately. An organizational identifier can help avoid confusion arising from name changes, mergers and translations into other languages. An organizational identifier also associates an institution with abbreviated versions of its name, nicknames and conventional or official forms of name by which it also may be known. Identifiers are a crucial component to make linked data work, linking information published by a particular organization with information about that same organization published by other sources. Organizations could benefit from using an identifier to:

- Make it easier for researchers to affiliate properly with their organization
- Identify and collate research publications produced by researchers across an entire institution or within a school or department
- Enable aggregations of the scholarly output of all an institution's campuses, including those located in other countries
- Track grants awarded to an institution by funding agencies
- Discover with whom researchers at a particular institution are collaborating on a global scale
- Help disambiguate researchers with the same name
- Ensure that research produced by an organization is easily found on the Internet, which can enhance an institution's reputation and profile. (All three international university rankings issued annually⁷ use citations as a factor in determining the rankings and thus rely on correctly identifying the institutional affiliations of the authors.)

National authority files may include identifiers such as ISNI and give authors' relationships to organizations. The focus of authority files differs from identifiers, as explained in appendix H.

Organization names have a wide variety of forms when represented in different languages and writing systems. An identifier (such as those provided by the Library of Congress's id.loc.gov, International Standard Name Identifier, Virtual International Authority File and Wikidata) helps to overcome these differences, as illustrated in figure 1.

Text Strings	Identifiers
Bibliothèque nationale de France BnF National Library of France 法國國家圖書館 مكتبة فرنسا الوطنية Εθνική Βιβλιοθήκη της Γαλλίας הספרייה הלאומית של צרפת フランス国立図書館 프랑스 국립도서관 Национальная библиотека Франции French National Library	isni.org/isni/00000000123531945 http://id.loc.gov/authorities/names/no95028191 http://viaf.org/viaf/122051864 http://wikidata.org/entity/Q193563 http://data.bnf.fr/12381002 http://d-nb.info/gnd/1086259041 http://id.ndl.go.jp/auth/ndlna/00283813
Identifier: A unique, persistent and public URI associated with a digital object that is resolvable globally over networks via specific protocols and is unambiguous to use, find and identify the resource.	

OCLC Research Representing Organizations in ISNI Task Group. 2016.

FIGURE 1. TEXT STRINGS VS. IDENTIFIERS

Identifiers are needed throughout the research ecosystem to improve the automated flow of information about research activities. One sample workflow starts with a researcher submitting a manuscript to a publisher on to the subsequent curation of the document and creation of its related metadata, and finally to analytics conducted to assess impact. Figure 2 illustrates possible workflows with this type of research activity through the use of an organizational ISNI. The data flows between an enterprise directory, a publishing system, metadata curation and an analytics system. Once a researcher's affiliated organization is assigned an ISNI identifier either by the institution itself (labeled D2), or by a publisher (labeled P6), this organizational identifier is captured in the publishing system's manuscript submission processes (labeled P1, P2 and P3). This links the ISNI identifier to both the author and the publication in the publication metadata, and it is included automatically within the existing flow of publication metadata to metadata curation and analytics (labeled P5, C1.3 and A1). Embedding the organizational ISNI into these workflows enables academic administrators to track and analyze both the intellectual contribution and the impact of their researchers' work more accurately, efficiently and comprehensively (labeled A1 and A2). The ISNI organizational identifiers can also simplify aggregating information by all authors associated with that institution—regardless of which college or department they may be in—to demonstrate the scholarly impact of the institution itself.

Figure 2 can be adapted to represent the generation and capture of ISNI organizational identifiers in other processes within the research life cycle. For example, "funding agency" could replace "publisher" and "grant management system" could replace "publishing system" to illustrate the data flow of ISNI organizational identifiers in the context of grant management.

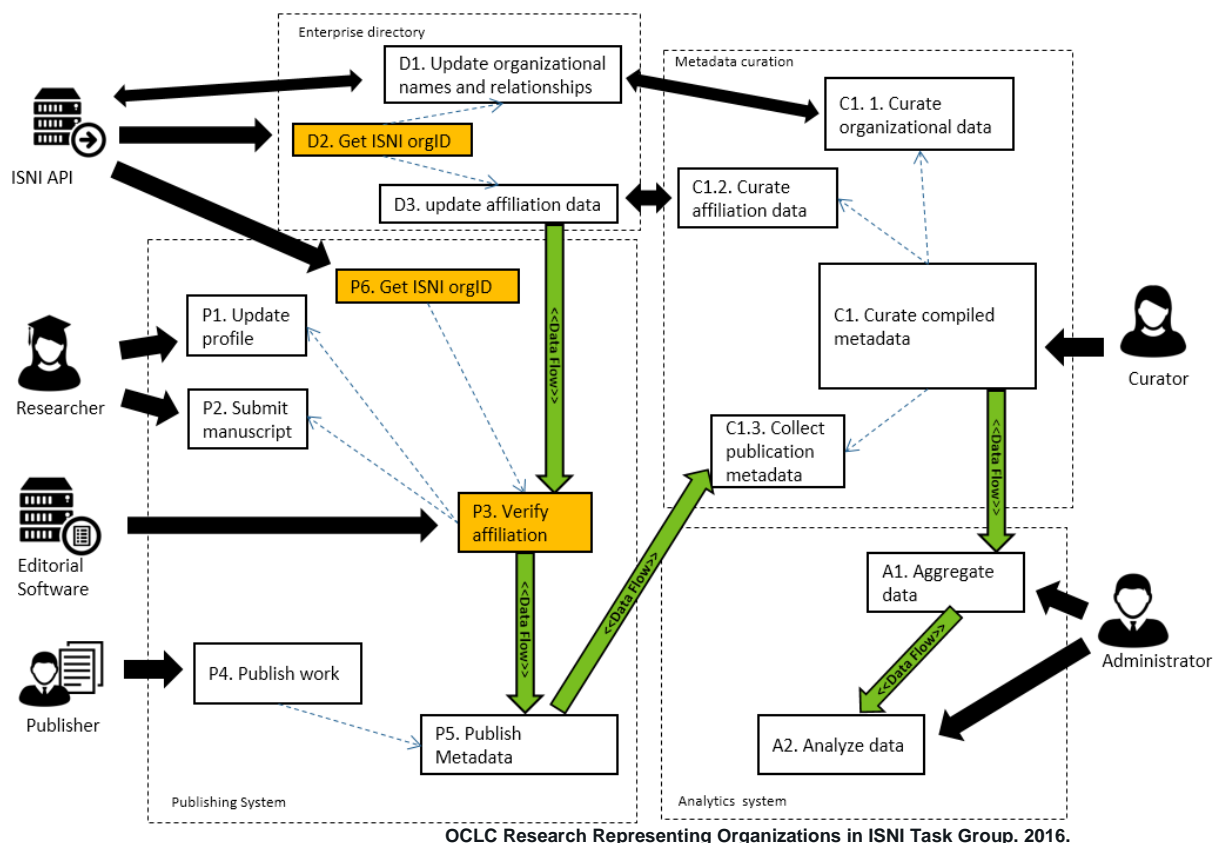


FIGURE 2. RESEARCH ACTIVITIES INFORMATION WORKFLOWS

The Jisc-CASRAI UK Organisational Identifiers Working Group looked at which organizational IDs should be implemented in the UK higher education sector. It evaluated available identifier services against a set of use cases and criteria including openness, technical and organizational support, and metadata quality, concluding:⁸

“The most desirable vision for the future would be for ISNI to emerge as a strong, sustainable and internationally well supported baseline or. . . ‘bridging’ ID. . .”

Use Cases for Organizational Identifiers

Use cases help define the requirements for organizational identifiers by different stakeholders. The use cases the task group developed, and that are outlined below, follow the format used by the Jisc CASRAI-UK Organisational Identifiers Working Group. The task group adopted several with minor modifications.

1. Organization administrator: diffuse accurate organization description

As an organization administrator, I need to publish the correct and accurate forms of name to be used when citing affiliation in publications, grant applications and other scholarly output. Consistent use of our preferred forms of names, together with institutional identifiers, will help optimize searching and retrieval from databases and search engines.

2. Funder and publisher: minimize conflicts of interest

As a funder or publisher preparing to find referees or reviewers, I need to be able to identify suitable people to minimize conflicts of interest (avoiding potential co-location at host institution).

3. Publisher: accurately identify researchers' affiliations in publications

As a publisher, I want to ensure that the authors of each article include their correct institutional affiliation so that results from applications that aggregate my publications are reliable for analysis at the organizational level to assess research performance and impact.

4. Funder: track published outputs

As a funder, collating outputs in end-of-research reports, I need to be able to track published outputs in order to understand our contribution and successful collaborations.

5. Academic administrator: aggregate the scholarly output of all my institution's researchers and selected subsets

As an academic administrator, I want to aggregate the scholarly output of all my institution's researchers in all departments and schools for both internal and external reporting. I want to ensure that my "high performers" have sufficient incentives to remain at my institution and not be enticed by a rival university. An accurate aggregation of my institution's scholarly output will increase our profile and potentially our international rank and reputation. I also want to include the output of researchers who are part of multi-institutional research groups. Within my institution, I want to do the same for selected schools and departments for similar reasons, including accreditation reviews.

6. Researcher: ensure that all my output is accurately attributed to me, regardless of which institutional affiliation I may have had at the time

As an academic who has moved from one university to another, I want my dossier to be comprehensive, accessible and include all my output produced while I was affiliated with each institution, including if the institution has since changed its name.

7. Researcher: track organizations across time

As a researcher, I need to preserve the historical integrity of organizational names at the time of data creation, collection or deposit (and other, specified times). Similarly, it is important to record and retain the links between these differing names, so that any user can see which data came from which organization, even if the organization name has changed.

8. Research group: include multiple organizations related to my proposal for funding

As a member of a research group that includes staff from multiple organizations and universities, I need to list multiple organizations related to my proposal in order to enable the target funder to uniquely identify previous employers and other funders, collaborators or industry partners, and beneficiaries.

9. Repository manager: populate the repository and manage automation

As a repository manager, I need to be able to uniquely identify my repository, including if its location or URL changes, and maintain the ownership and chain of custody for resources that may not belong to the organization or organizational unit hosting the repository. This will help automate ingesting of standardized metadata.

10. Metadata specialist: add identifiers to national authority records

As a metadata specialist, I need to quickly find an identifier for the organization represented in a national authority file so that I can add the identifier to the record and thus help diffuse its exposure on the semantic web.

11. Software developer: match organizations in a linked data environment

As a software developer, I need my application to retrieve “sameAs” relationships representing the same organization for a directory service that would enable users or machine applications to verify an identity and contact details.

12. Rights agency: manage rights for the correct organization

As a rights agency staff member, I need to know definitively which organization among similarly named entities holds the rights to a creative, intellectual or artistic work, and which specific unit within an organizational hierarchy holds the rights. I also need to know where the organization is based to determine which jurisdiction’s laws apply.

Organizations in the ISNI Database

ISNI, the globally recognized and adopted standard approved by ISO for the unique identification of the public identities of people and organizations across all fields of creative activity, meets the requirements described in the use cases above. Creative works such as art exhibitions, poems, books and dance performances do not often appear in third-party citation indexes, such as Web of Science⁹ and Elsevier’s Scopus¹⁰. ISNI amasses data from databases in multiple domains, serving multiple purposes, to compile metadata adequate for disambiguating identities.

ISNI is a non-profit, community-driven network with contributors representing a broad range of domains such as libraries, rights agencies and publishers. ISNI is managed and curated centrally and offers identifiers that are neutral and international in scope, independent of any single platform. Data collected from cross-domain contributing sources include identifiers contained in local systems. ISNI can serve as a hub to link local and global environments and act as a bridging identifier that connects outputs with their creators across the entire scholarly publishing ecosystem. ISNI’s organizational identifiers are already used to identify organizations within ORCID and are disseminated in Wikidata.

More than 500,000 organizations have public ISNI identifiers in the ISNI database.¹¹ The system is based on matching and linking data provided by the members’ network. OCLC maintains the central system for assignment and provides the lookup tool to search the ISNI database. The British Library and the Bibliothèque nationale de France provide quality assurance services and support for ISNI members in resolving disputes. Other national libraries are set to participate in this role for their own national identities. Workload is shared among the ISNI members, Registration Agencies, and the assignment system.

The task force's model for organizations builds on the existing ISNI data structure. Entities within ISNI can be linked by a number of defined attributes to express multiple relationships. They can be used to express hierarchy and historical relationships. These links may have date ranges and can be used for both display and retrieval. Such links are not only helpful in disambiguation, but also link agent, entity and activities from various sources. Examples of these relationships are shown in figure 3.

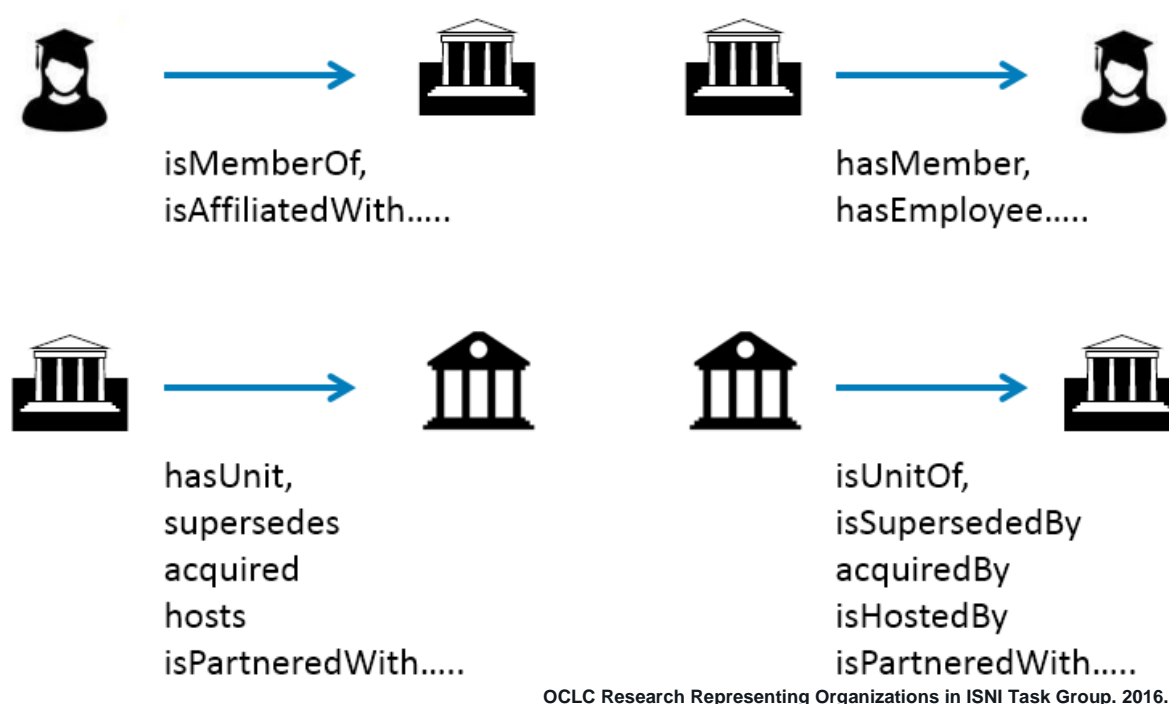


FIGURE 3. ISNI RELATIONSHIPS

Once an ISNI identifier is assigned to an organization and included in publications and other creative works, it can be propagated to other relevant systems. This will allow academic administrators to track the intellectual contribution and impact of their researchers more efficiently and comprehensively than by text matching on organization name alone.

Challenges in Identifying Organizations

Situations that make uniquely identifying an organization challenging include:

- Organizations that merge and split.
- Organizations that acquire, or are acquired by, other organizations.
- Organizations that include numerous sub-organizations such as departments or schools.
- Organizational hierarchies that change over time, and multiple hierarchies that exist simultaneously.
- Organizations that have branches in multiple locations or countries. These locations may also change names over time, adding to the complexity.
- Whether or not an organization's name change represents a new organization.

- Stakeholders that have different perspectives. For example, publishers tend to focus on representing units that subscribe or contribute to their publications, which can result in uneven representation of departments or schools within a university.

Some examples of these challenges are shown in the scenarios and examples given below.

These challenges raise questions both for the metadata model and for the workflow processes that will be needed to capture and maintain the data. This report makes several specific recommendations for relationships that need to be expressed in the model and makes a number of proposals related to workflow and data collection. The task force recognizes that ISNI workflows involve actions by a large number of stakeholders in different domains, and that a comprehensive discussion of these issues is beyond the scope of this report.

Scenarios for Organizations in ISNI

Name changes

An ISNI record may have multiple names associated with a given identifier. Organizations may change their names over time, and the names of an institution's component units may evolve as well. An ISNI record can bring all these variant forms together.

Although ISNI is primarily a “bridging identifier,” the plethora of names associated with an identifier can be confusing. Using date qualifiers can help users determine whether the organization they are looking for (perhaps under a previous name) is represented.

Example:

Vermont College of Arts, with date attributes, is illustrated in appendix A.

Preferred name

With dozens of sources contributing to the ISNI database, the name preferred by the organization itself is not apparent. ISNI links to other sources where this preferred form is clear, such as the LC/NACO authority file. The task group recommends that, when the preferred form is known, it should be flagged in the ISNI record display. This also allows for language qualifiers if the organization has preferred forms in different languages.

Example:

Ralph J. Bunche Center for African American Studies at UCLA illustrates alternate and related names obscuring the preferred form of name as shown in appendix B.

Organization hierarchy

Faculties or schools associated with a university are expressed with a “hasUnit” and “isUnitOf” relationship; departments within those faculties or schools may also be included with this “hasUnit” and “isUnitOf” relationship. Thus a department may be expressed as a unit of a school, which is in turn a unit of a university.

Example:

The UNSW Australia has ISNIs assigned to the schools within each of its faculties, as illustrated in appendix D.

Organizational restructuring

As organizations restructure it is important to record both the new and old structure to collate and relate personal affiliations and their publications from previous periods. Using ISNI relationship types, name attributes and date attributes, multiple temporal hierarchies can be represented. Structural changes can be varied and complex, as illustrated below.

Examples of university restructuring scenarios:

- Faculties merge into colleges, while the departments move unchanged.
- Departments are dissolved.
- Departments merge.
- New departments or faculties are created, or split from former departments or faculties.
- A research organization becomes a faculty or department.
- A research organization moves from one university to another.

When assigning identifiers for the purposes of dissemination, organizations need to consider the optimal level of granularity necessary to express affiliations as they are published in research works, research grants, publicity documents, etc. Schools, faculties and departments tend to change more frequently than the institution itself. The more granular the representation (and their relationships) the more maintenance will be required whenever an academic institution undergoes restructuring.

Example:

La Trobe University provides a current use case of an organization undergoing a major restructuring. Staff remain in their departments but their hierarchical structure changes. See appendix E.

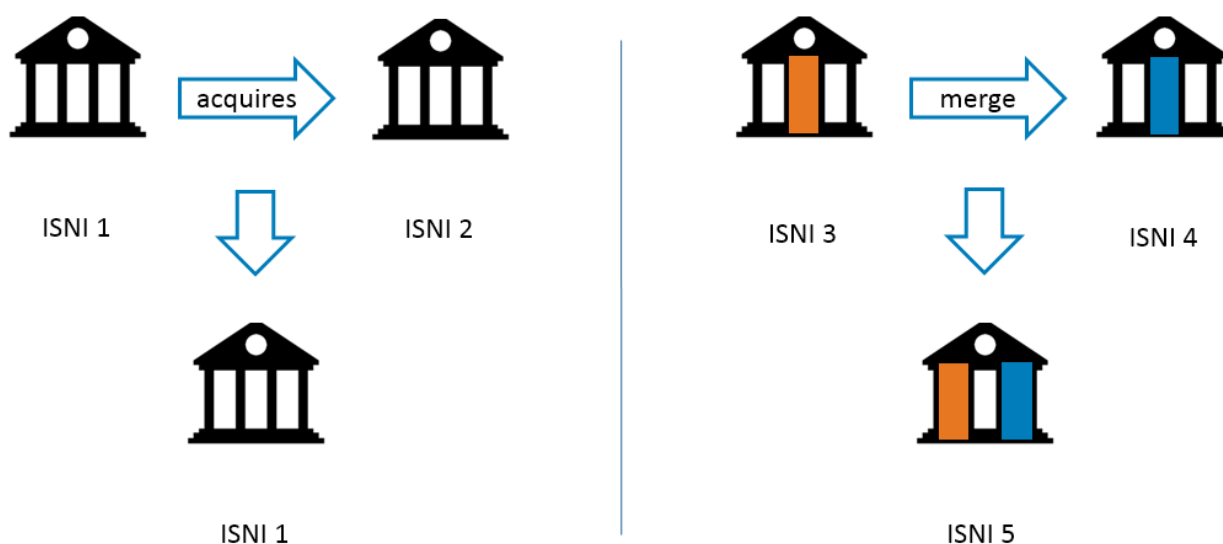
Acquisitions and mergers

An organization that acquires other organizations over time—but does not change its purpose—does not change its identity and therefore retains the same ISNI before and after each merge. In contrast, an organization may merge with another or be absorbed into another and the resulting organization adopts a new or augmented purpose—most often a new name and a new identity. In this case, a new ISNI is assigned to the resultant organization.

Examples:

OCLC is an example of an organization that has made many acquisitions over the years. See appendix F.

Libraries and Archives Canada resulted from merging the national library and the national archives. See appendix G.



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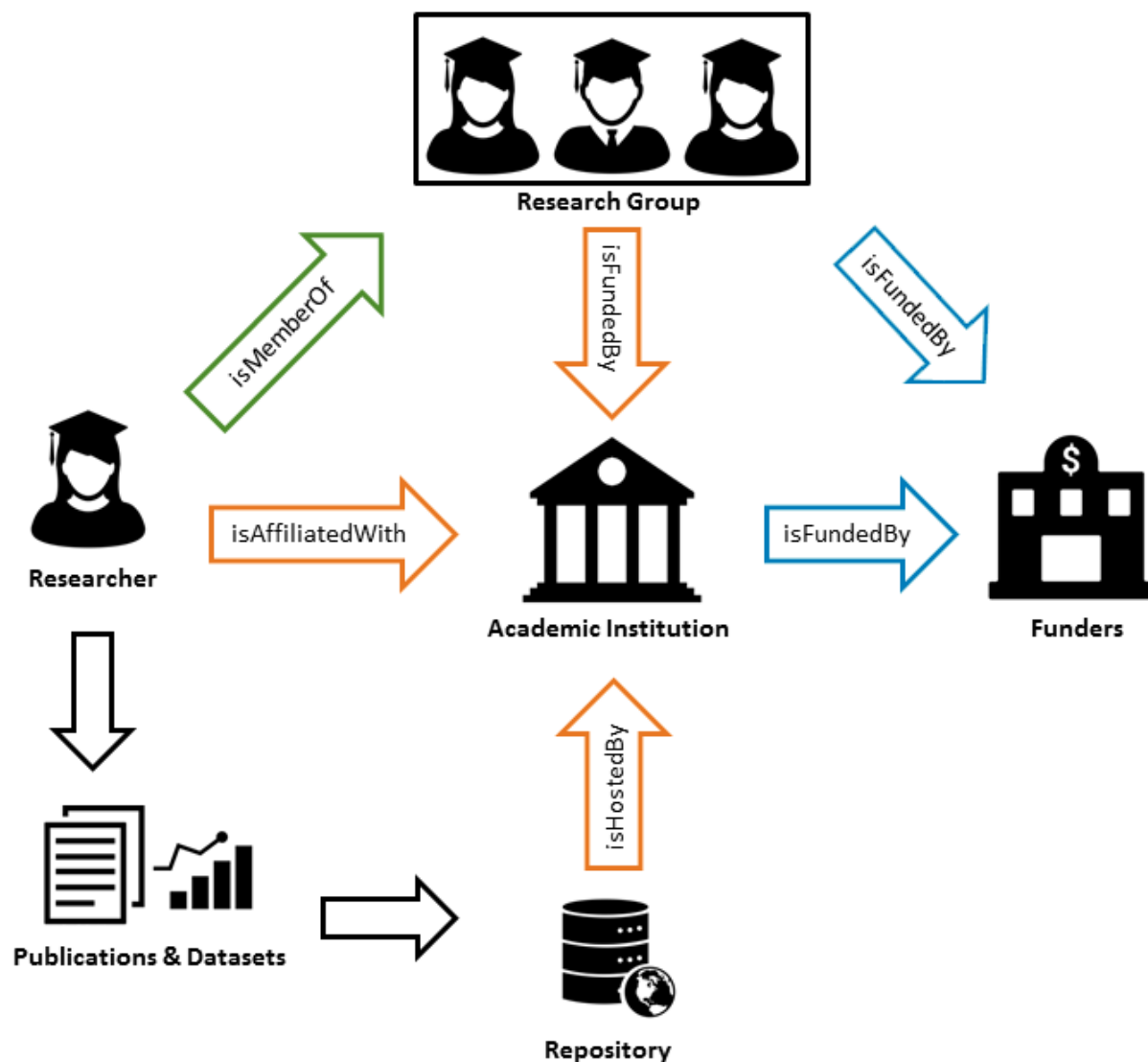
FIGURE 4. ISNI RELATIONSHIPS FOR ACQUISITIONS AND MERGERS

Research groups

The use case of research groups, with researchers affiliated with multiple organizations, is represented by the relationships shown in figure 5.

Example:

Netherlands Graduate School of Linguistics publishes a series of dissertations but its staff are employees of different Dutch universities.

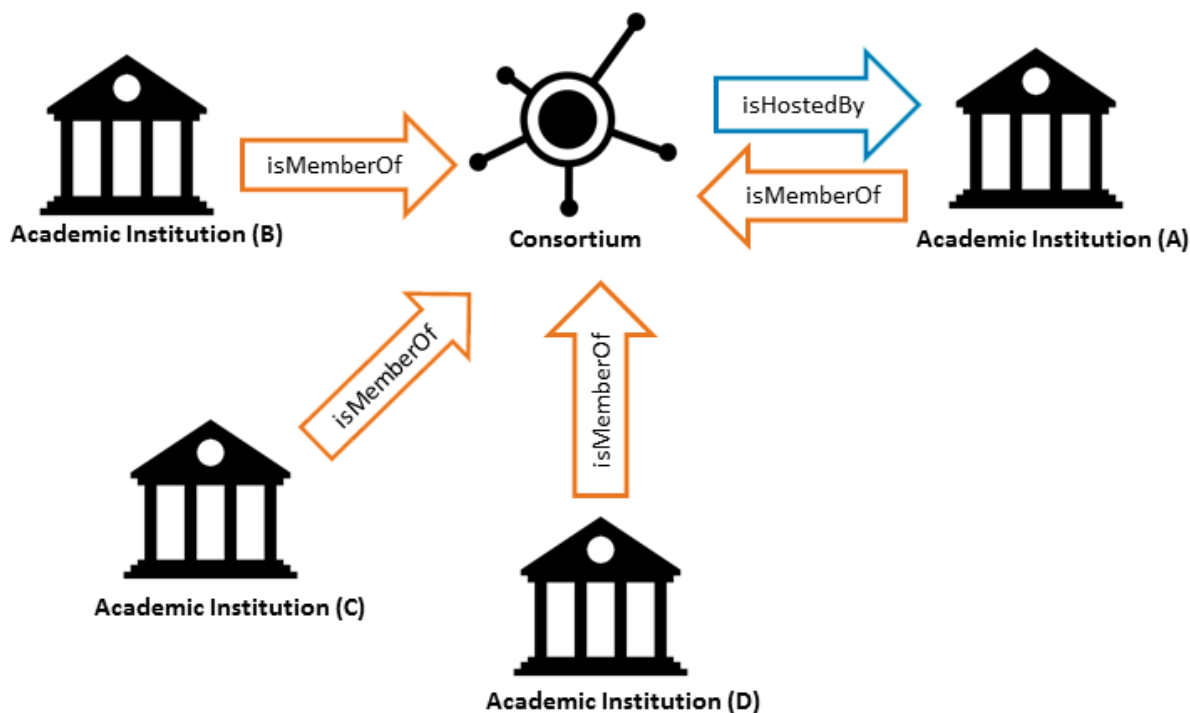


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FIGURE 5. RESEARCH GROUPS IN ISNI

Institutional Groups

The use case of institutional groups, with multiple institutions within an organization such as a consortium, is represented by the relationships shown in figure 6.



OCLC Research Representing Organizations in ISNI Task Group. 2016.

FIGURE 6. CONSORTIUM RELATIONSHIPS IN ISNI

Examples:

HathiTrust and the Inter-University Consortium for Political and Social Research (ICPSR) are two examples of consortia comprised of many member institutions and hosted by a specific institution, University of Michigan.¹²

Digital Preservation Network,¹³ a consortium of repositories, provides dark archiving services for its members so that it can restore the resources of a participating repository in the event of a catastrophe.

The Murray-Darling Freshwater Research Centre¹⁴ operates under its own board but also operates under a partnership arrangement between La Trobe University and CSIRO (formerly known as the Commonwealth Scientific and Industrial Research Organisation).

Recommendations for the ISNI System and Database

The Task Group evaluated the current ISNI system in terms of how easily a specific organization could be retrieved from the ISNI database, how an organization's structure, history and affiliations could be represented, and how easily the staff of an organization could create and enrich data using the system. The existing system and database offer all the necessary basic components, including online data input, data input via API, batch loading, online search, persistent URI and search via API. The public interface solicits corrections and enrichments via crowd sourcing and this input is monitored and verified by the ISNI Quality Team.

The task group assessed the system specifically from the viewpoint of the representation of organizations and concluded that extending the existing data model and defining additional data values would improve the representation of organizations within the database. The group also made recommendations concerning displaying and distributing data and what new documentation is needed. The task group itself produced drafts of some recommended documentation.

Area	Description
Data Model— Defined Values	Add Research project or research group as an organization type. (Implemented)
	Define new attributes for names and name variants, increasing the values for name use attributes. These should include preferred name, current preferred name, official form, legal form and common form. The use of the attributes is optional and repeatable so that it should be possible to include multiple attributes, e.g., “preferred French name version.”
	Allow the definition of relationship type for name variants.
	Add new relationship types: “isHostedBy”, “hosts” “acquired” and “acquiredBy” “isGovernedBy”, “governs” “isPartneredWith”
	Enhance data element definition to include standard names for URL labels, e.g., organization home page, Wikipedia.
	Revise data element values document for new defined values.
	Publish ISNI data element values as a machine readable ontology, defining new ISNI values as needed and re-using or aligning with existing ontologies where suitable values already exist. Publish on the isni.org website.
Search Output	The SRU search API currently delivers results coded in XML. The task group recommends extending the format options to include Turtle, n-triple, json-ld, RDF/XML and html.
	The SRU search API currently delivers a selection of data elements in the public version of the API and delivers all unrestricted data in the member version. We recommend that the ISNI search API should deliver all unrestricted data for organization identities in the public version. Similarly the public version of the user interface should display all unrestricted data for organization identities to encourage high-quality end user contribution. (The business case for ISNI membership is strong enough with access to provisional data, data enrichment and additional services.)
Data Display	Define a table that instructs the software in the selection of the name version for display in the short list.
	Review short display of organizations. Include location, locode, URL and parent organization, if available, instead of titles.
	The organization URL should always be part of the public display and should be included in the data available via the SRU enquiry API.

	Suppress shorter name forms from display.
Data Collection and Treatment	Indicate at the record level that the record has been verified by the institution itself and the date on which the record was verified, in the same way the system records verification by the ISNI Quality Team, possibly by extending the values in the confidence level. Confidence level and confidence level date indicate that the data has come from a source close or less close to the identity and its currency. Include confidence level and confidence level date in all public displays.
	Create a more specific input form for organizations to facilitate, in particular, entering attributes and relationships. For example, allow input of language of name as well as language of identity.
	Explore processes or workflows for keeping data current, in particular, person to organization affiliations and organization to organization levels and hierarchical structure.
	ISNI and LC/NACO differ in their treatment of name changes that are not associated with a change in the role and function of an organization. ISNI needs to determine a way to accommodate multiple VIAF/LC/NACO identifiers and records where only one ISNI is present and to define a clear workflow and relationship designators for interoperation.
Documentation	Create a document with guidelines for searching organizations in both the web interface and SRU enquiry API (See “Deliverables” at http://www.isni.org/content/oclc-research-partners-task-force-representing-organizations-isni).
	Create overviews of organizations use cases.
	Create a document on how to optimize an organization in ISNI (See “Deliverables” at http://www.isni.org/content/oclc-research-partners-task-force-representing-organizations-isni).
	Create FAQ on the ISNI website explaining how records can be enriched and linked.
	Create FAQ on the ISNI website explaining the relationship of ISNI and ORCID—pointing to the information under ISNI Community.
	Create FAQ on the ISNI website explaining ISNI for institutions versus ISNI for individuals.
	Create FAQ on the ISNI website explaining NACO/VIAF/ISNI update process.
	Create FAQ on the ISNI website outlining ISNI's policy on when there is a new identity and how ISNI treats one-to-many relationships.
Registration Services	Ensure that at least one Registration Agency provides a generally available ISNI application service for organizations not currently present in ISNI.
Outreach Document for Institutions	Encourage institutions to become members of ISNI or use the services of an ISNI Registration Agency. Create an outreach document (draft prepared by the task group is in appendix I).
Outreach Documentation for Publishers	Urge publishers who are ISNI members to produce an outreach document for publishers—our outreach document could serve as a possible model.

Issues Revealed

The task group identified a number of areas for further investigation during the course of their discussions.

Level of granularity needed

The ISNI system permits the inclusion of multiple hierarchies but neither the system nor the ISNI-IA dictates how much of a hierarchy needs to be included. Organizations have many different practices and these may not be consistently applied. For example, a university may consolidate all its researchers' publications at the university level for reporting to funding and assessment agencies, whereas the expression of affiliation in the published articles may be at the school or department level. Links among the different ISNI records of a hierarchical structure facilitate compilation where the whole structure is used. The organization itself can ensure that all ISNIs exist for the units required and can actively diffuse them. Organizations can manage their ISNIs either as a direct member or via an ISNI Registration Agency. Institutions can benefit from establishing correct data and identifiers for the institution and its units and communicating their policies for how the identifiers should be used. Since ISNI has multiple sources for identifiers other than the organization itself, some units in ISNI may be those that the organization does not require, but that others do (such as the accounting departments that publishers deal with).

Preferred name of an institution

An identifier is a means of collating all names and name variants and in many cases it obviates the need to indicate a preferred form of name. A preferred form may not be given, or the preferred form may differ according to the purpose for which it is being used or based on the audience. For example, multi-lingual organizations have multiple name forms and will not have one single preferred name. Nevertheless, many organizations wish to indicate a preferred form as a brand, such that ISNI could use the preferred form in its displays and in the diffusion of metadata associated with an ISNI. The task group recommends an option to indicate a preferred name (or more than one, along with other attributes such as date and language). It did not address how the ISNI system would determine who could enter a preferred name flag.

Reconciling name variants and related identities from different perspectives

The ISNI system accepts and aligns data from multiple sources and databases that serve different needs. Even among library authority files—which one would expect to be consistent—one record may include as a name variant the name of an entity that another source refers to as a separate, related named entity. Conflicts over which names represent entities and not name variants, although not significant numerically, are a big problem for ISNI when ingesting organization data. Such conflicts can cause the merger of identities that were previously, correctly separated. Examples of incorrect name variants that have been observed:

- departments or other subdivisions as name variants of the parent organization, such as a university library being recorded as a name variant of the university itself
- titles of journals published by an organization
- research grants or projects associated with a department or faculty

Detecting these incorrect name variants is a challenge to the ISNI system. Involving organizations directly in their representation in the ISNI database can reduce these types of errors.

The significance of this issue varies across different scenarios. Libraries and library collections are concerned with both current and historical organizations whereas most other domains are only concerned with the current form of organizations and regard historic name forms as name variants. Anglo–American library practice presumes that a change in name represents a change in identity, although this is not followed consistently by libraries in Europe and elsewhere. ISNI takes a stricter approach to assigning new identifiers. For ISNI to act correctly as a bridge identifier, it should allow for many-to-one and one-to-many relationships, especially to allow one ISNI to relate to multiple other identifiers, such as NACO identifiers. This is included in the task group’s recommendations.

Encouraging services to build on organizational ISNIs or crosswalking to them

The task group has produced a number of recommendations relating to the documentation on the ISNI website. These new documents and FAQ statements should encourage the use of the public search API (using SRU), and for organizational members of ISNI, the request API (using AtomPub). The group also produced a document “How to optimize the representation of an organization in ISNI.”¹⁵ Further possibilities, not included in the recommendations, include establishing a sandbox available to both members and non-members as well as forming developer forums.

Encouraging publishers to use organizational ISNIs

The success of using ISNIs to collate an institution’s scholarly output ultimately depends on the uptake of these identifiers by publishers. The task group drafted an outreach document targeted to academic administrators (appendix I). It recommends that a similar document be created by the ISNI-IA targeted to publishers and that the ISNI members who are publishers promote the adoption of ISNIs to their publisher colleagues.

Linked data issues

Much interest in ISNI comes from its potential role in a linked data environment. Addressing linked data implementation issues was outside the scope of this task group, but ISNI will face many of the same challenges that other data providers have grappled with. They include:

- ontology development and alignment, which raises questions about how far ISNI should reflect the way relationships such as hierarchy and affiliation are expressed in other authorities
- the development of a business model and reuse policies that can successfully balance openness with sustainability
- understanding the workflows in which ISNI needs to participate, and building the services and technical infrastructure that will support them

For linked data implementers to incorporate ISNI identifiers, ISNI will need to publish its ontology, support inbound queries and provide appropriate serialization of data. These challenges reflect many of the issues raised elsewhere in this report, but the solutions should be pursued with linked data implementation scenarios in mind.

CONCLUSION

The organizational relationship modeling conducted by the task group can be adapted by other identifier systems and applied in a linked data environment, fund and research information management systems, as well as within the library domain. The task force focused on these relationships in ISNI because it has been established already as an international, global identifier for organizations as well as for people.

Organizations are encouraged to review how they are represented in the ISNI database (isni.org/search) and identify the units that they wish to be represented and disseminated. Institutions may consider using the services of a Registration Agency¹⁶ or maintaining the records themselves by becoming an ISNI member. Each organization is the most reliable source for determining the hierarchy and level of granularity to be represented in the ISNI database according to local requirements. More involvement by organizations will improve the coverage and accuracy of the ISNI database for all potential users of ISNI organizational identifiers. The organizational data already in the ISNI database would be more easily understood and processed if sources took more advantage of the available data elements.

The outreach document for academic administrators, “Your organization on the Web: the ISNI approach” (appendix I), outlines the benefits of becoming an ISNI member. By becoming an ISNI member, an organization can contribute to addressing the challenges identified by this report.

APPENDICES

APPENDIX A: DEALING WITH AN ORGANIZATION'S MANY NAME CHANGES

Adding date attributes in the ISNI record allows the indication of previous names. Although the focus of the institution has changed over the years from theology to fine arts, the Vermont College of Fine Arts considers itself to be one identity. Therefore, ISNIs have not been assigned to former names. The recommendation to accommodate one-to-many relationships will allow, for example, multiple library authority records for name changes to relate to one ISNI correctly.



ISNI 0000 0000 8540 0791

	Dates	ISNI
Vermont College of Fine Arts	2008-	0000 0000 8540 0791
<i>Name variants</i>		
VCFA		
<i>Supersedes</i>		
Vermont College of Union Institute and University	2001-2008	
Vermont College of Norwich University	1972-2001	
Vermont College	1958-1972	
Vermont Junior College	1941-1958	
Montpelier Seminary	1894-1941	
Vermont Methodist Seminary	1870-1894	
Vermont Conference Seminary	1865-1870	
Springfield Wesleyan Seminary	1846-1865	
Newbury Theological Institute	1841-1846	
Newbury Seminary	1834-1841	

APPENDIX B: THE NEED TO FLAG PREFERRED FORM OF NAME

Below is the current ISNI display of the Ralph J. Bunche Center for African American Studies at UCLA.

BUNCHE
Ralph J. Bunche Center for African American Studies at UCLA

ISNI: 0000 0001 2289 2474

Name: Center for Afro-American Studies Los Angeles, Calif
University of California, Los Angeles Center for Afro-American Studies
University of California Los Angeles Ralph J Bunche Center for African American Studies

Name variant ← Should not be related names but name variants

Location / Nationality: United States
United States California Los Angeles

Creation class: Language material

Creation role: originator

Related names: Ralph J. Bunche Center for African American Studies Los Angeles, Calif (see also from)
University of California Berkeley, Calif Los Angeles Campus (see also from)
University of California, Los Angeles Afro-American Studies Center (see also from)
University of California, Los Angeles Center for African American Studies (see also from)

Titles

Notes:

Sources: VIAF DNB LC NLA RERO
BNF
RING

Need to flag as Preferred name

ISNI data is amassed from multiple sources, in this case from the German, French and Australian national libraries, the Library of Congress, a Swiss university library network and from Ringgold, a commercial vendor. Each source has different practices for defining a principal name, name variant and related name. This case illustrates the need for the institution itself to flag the preferred name and to normalize the collected data. The source of each line of data is visible under the ISNI system's tab, "Sources Data."

APPENDIX C: ISNI DATA ELEMENTS FOR ORGANIZATIONS

Excerpt from http://www.isni.org/filedepot_download/140/451.

Organization to Organization

NISO I2 values:

IsMemberOf

hasMember

isUnitOf

hasUnit

acquired*

acquired by

isSupersededBy

supersedes

isAffiliatedWith (e.g., an institution, a band)

isGovernedBy

Governs

isHostedBy

Hosts

isPartneredWith

isRelatedTo

see also from

formerName

laterName

no relation

* Recommended additions are shown in green text

APPENDIX D: ORGANIZATIONAL HIERARCHY IN ISNI

Each of the faculties of the UNSW Australia shown below has both a “isUnitOf” relationship with the university and multiple “hasUnit” relationships with each of the schools listed below it. The University, each faculty and each school has its own ISNI.



UNSW
AUSTRALIA

ISNI: 0000 0004 4902 0432

Hierarchy	ISNI
Faculty of Engineering	0000 0004 0377 1345
School of Chemical Engineering	0000 0004 0490 8665
School of Civil and Environmental Engineering	0000 0004 0459 8265
Water Research Laboratory	0000 0001 2166 068X
School of Computer Science and Engineering	0000 0004 0469 1224
School of Mining Engineering	0000 0004 0474 6176
Photovoltaic & Renewable Energy Engineering	0000 0004 4909 1337
Faculty of Law	0000 0004 0383 6647
Gilbert and Tobin Centre of Public Law	0000 0004 0541 9759
Network for Interdisciplinary Studies of Law	0000 0004 0589 9270
Faculty of Medicine	0000 0004 0614 9009
Australian Institute of Health Innovation	0000 0004 0466 8606
Centre for Health Informatics	0000 0004 0466 8868
Children's Cancer Institute	0000 0004 0613 2629
Clinical School Prince of Wales Hospital	0000 0004 0496 2055
Black Dog Institute	0000 0001 0640 7766
Clinical School South West Sydney Area Health	0000 0004 0587 6466
Clinical School St George Hospital	0000 0004 0587 7282
Clinical School St Vincents Hospital	0000 0004 1796 8798
National Drug and Alcohol Research Centre	0000 0004 0379 0669
Rural Clinical School	0000 0004 0634 7590
School of Medical Sciences	0000 0004 0626 1738
School of Psychiatry	0000 0004 0471 3710
School of Public Health and Community Medicine	0000 0004 0478 3022
School of Women's and Children's Health	0000 0004 0477 0803
UNSW Faculty of Science	0000 0004 0611 7840
Biological, Earth and Environmental Sciences	0000 0004 0446 8567
Biotechnology and Biomolecular Sciences	0000 0004 0611 7912
Centre for Marine Bio-Innovation	0000 0004 0509 1298
Institute of Environmental Studies	0000 0004 0444 1153

APPENDIX E: ORGANIZATIONAL RESTRUCTURING

La Trobe University provides a current use case of an organization undergoing a major restructuring. The staff stay where they are but their affiliations change around them. In this case, the departments and research centers that were a “UnitOf” a faculty are now a “UnitOf” a new college. Each of the five faculties has a “isSupersededBy” relationship with the new College.



ISNI: 0000 0001 2342 0938

Faculty of Business, Economics and Law (superseded)		College of Arts, Social Sciences and Commerce ISNI 0000 0004 0380 9083
La Trobe Business School	4 departments	
School of Economics		
Research Centres	8 research centres	
Faculty of Education (superseded)		
Outdoor and Environmental Education		
Faculty of Humanities and Social Sciences (superseded)		
School of Humanities	3 departments, 5 centres	
School of Social Sciences and Communication	3 departments, 2 centres	
Faculty of Science, Technology and Engineering (superseded)		College of Science, Health and Engineering ISNI 0000 0004 0648 9193
School of Engineering and Mathematical Sciences	3 departments, 1 centre	
School of Life Sciences	3 departments, 1 centre	
School of Molecular Sciences	3 departments	
Faculty of Humanities and Social Sciences (superseded)		
School of Allied Health	8 departments	
School of Cancer Medicine		
School of Psychology and Public Health	7 departments	
School of Nursing and Midwifery	2 departments, 2 centres	
La Trobe Rural Health School	7 departments	

APPENDIX F: ORGANIZATIONAL ACQUISITIONS IN ISNI

OCLC is an example of an organization that has made numerous acquisitions over the years. OCLC's primary mission did not change, however, and so OCLC retains a single ISNI. Each acquired organization merits its own ISNI with a link to the OCLC ISNI as a related name with a relationship type of "acquiredBy." Similarly, the OCLC record has links to the organizations it acquired. The figure below shows some of the acquisitions that would be included in the OCLC record, with some of the individual ISNIs assigned.



ISNI: 0000 0001 1482 1326

	Name Variants	Dates	ISNI
	Ohio College Libraries Center	1967-1989	0000 0001 1482 1326
	Online Computer Library Center	1989-	
	OCLC Incorporated	1989-	

Acquisitions*	Name Variants	Acquisition Date	ISNI
Western Library Network	WLN	1999	0000 0001 1703 5400
CAPCON	OCLC Eastern	2003	0000 0001 0443 2618
Fretwell Downing	FDI	2005	0000 0004 0637 162X
Research Libraries Group	RLG	2006	0000 0004 1366 8771
Openly Informatics Inc		2006	0000 0004 0588 1257
PICA BV	OCLC PICA, OCLC EMEA	2007	0000 0001 2154 374X
Bond GmbH & Co. KG		2011	0000 0004 0480 5455

* Relationship type "acquired" with link to acquired organization

APPENDIX G: ORGANIZATIONAL MERGERS IN ISNI

Library and Archives Canada is an example of two distinct organizations (each with its own ISNI) merging into a new organization with a new ISNI. Each of the previous organizations—the National Library of Canada and the National Archives of Canada—has a “isSupersededBy” relationship with Library and Archives Canada.



Library and Archives
Canada

Bibliothèque et Archives
Canada

	Dates	ISNI
Library and Archives Canada	2004 -	0000 0001 0656 4163
<i>Name variants</i>		
BAC		
LAC		
Canada bibliothèque et archives		
Supersedes		
National Library of Canada	1953-2004	0000 0001 1955 2292
<i>Name variants</i>		
BNC		
NLC		
National Archives of Canada	1987-2004	0000 0001 2171 9063
<i>Name variants</i>		
Archives nationales du Canada		
Public Archives of Canada	1912-1987	0000 0001 2110 646X
<i>Name variants</i>		
Archives publiques Canada		

APPENDIX H: FAQ FOR CATALOGERS: HOW IS ISNI DIFFERENT FROM AUTHORITY FILES?

By Stephen Hearn, University of Minnesota

ISNI's concept of entities differs from library name authority files' concept of entities, deriving mainly from the different tasks which each set of practices addresses. Both systems represent a modeling of entities, but the entities they model are not identical.

ISNI's goal is to provide a set of identifiers that can be used to unambiguously associate a creator or organization with another entity or a work to ensure accurate association, attribution and rights management information. ISNI therefore has a more global focus and is more inclined to privilege continuity over fine distinctions when contemplating organizational entity names.

ISNI provides a unique identifier—not a single unique preferred form of name. The ISNI record for an organization can gather several names by which an organization has been known under a single identifier. All the names become access points, and no single name form is authorized for use.

Library name authority files are intended to support access to names associated with cataloged objects. Thus, library authority files have a more granular orientation toward describing particular documents and deriving name access points that closely reflect the forms found on those documents as an aid to more specific retrieval. This inclines library name authority files to make more distinctions in describing the history of an organization that has used a succession of two or more forms of name, even when the organization has arguably remained "the same" despite those changes.

Library name authority files provide authorized name access points for use in catalogs describing particular documents. When "the same" organization has been known by a succession of different names, name authority files represent the organization's history as a succession of entities with earlier/later links connecting the different names for these entities.

These differences between ISNI and library name authority conceptualizations of organizations as entities makes mapping ISNI identifiers to name authority records challenging. A single ISNI may map to more than one established personal or organizational name authority. Expressing these relationships will benefit from articulated terminology for relationships along the lines of International Standard ISO 25964-2: Information and Documentation—Thesauri and Interoperability with Other Vocabularies—Part 2: Interoperability with Other Vocabularies.¹⁷ Given the differences in underlying conceptualizations, the default for expressing such relationships is likely not simple equivalence. Although an ISNI and a name authority record might appear to describe the same entity based on the data presented in each record, ISNI potentially has a broader scope than the name authority record. For this reason, the entities they represent are conceptually not the same, even though they may appear to be so.

APPENDIX I: OUTREACH DOCUMENT FOR ACADEMIC ADMINISTRATORS

Your organization on the Web: The ISNI approach

Scenario

A prominent university is about to embark on a fundraising campaign. They want to highlight their growth and prominence as a research institution. The university invites two analytics firms to identify their key research publication impact areas. Both analytics firms identify six key research areas where the university has had an impact. However, one firm has identified much stronger impact; their data reveal that the university is the innovation leader in two research areas in terms of publications and grants received. When the analytic firm is asked why their impact statistics are significantly higher than the other firm, the company replied,

“There’s really no magic about it. We work with publishers and have developed our own algorithms to ensure that each institution affiliated with a grant or a publication has a unique identifier by using ISNI, the emerging industry standard. Your university name is close to another prominent university and you share an acronym with yet another university. Many of your researchers list one of your research centers as their affiliation but don’t mention the university’s name. Without a way to uniquely identify your institution, at the same time connecting it with its faculties, departments and centers, its full impact can’t be determined.”

The administrator signed the contract with the more successful analytics firm but was left wondering, “In what other areas are we being discounted because search engines confuse us with other universities?” He asked the analytics rep, “So my institution already has an ISNI? Where can I learn more about this?”

Why does my organization need an identifier?*

With the ongoing growth in scholarly publishing and the explosion in co-authorship, tracking which publications are associated with which organizations is harder than ever before. An organizational identifier can reduce confusion resulting from name changes, mergers and name variants including names translated into other languages. An organizational identifier uniquely identifies your institution, regardless of the abbreviations or nicknames by which it also may be known. Organizations can benefit from using an organizational identifier to:

- make it easier for your researchers to affiliate properly with your organization
- identify and collate research publications produced by researchers across your entire institution or within a school or department
- enable aggregations of the scholarly output of all your institution’s campuses, including those located in other countries

* A digital identifier is a unique, persistent and public URI associated with a digital object and resolvable globally over networks via specific protocols that is unambiguous to use, find and designate the resource. Identifiers are crucial to expose and embed objects in the Semantic Web and to link them to other information about the same objects.

- track grants awarded to your institution by funding agencies more efficiently
- discover with whom your researchers are collaborating on a global scale
- help disambiguate your researchers from researchers with the same names at other institutions
- ensure that scholarly output produced by your organization is easily found on the Internet, which can enhance your institution's reputation and profile

Why ISNI?

ISNI is the globally recognized and adopted international standard approved by ISO (International Organization for Standardization) for the unique identification of the public identities of people and organizations across all fields of creative activity, including researchers, inventors, writers, artists, visual creators, performers, producers, publishers, academic and other types of organizations, aggregators and more. ISNI is managed and curated centrally and offers identifiers that are neutral and international in scope, independent of any single platform. ISNI serves as a hub, linking local and global environments and acting as a bridging identifier that connects outputs with their creators across the entire scholarly publishing ecosystem.

ISNI is a non-profit, community-driven network with contributors representing a broad range of domains such as libraries, rights agencies and publishers. ISNI's organizational identifiers are disseminated in widely used resources such as Wikipedia and ORCID where researchers are able to use ISNIs to register their institution affiliations.

Does my organization already have an ISNI?

ISNI has leveraged the work of its data contributors such as library collections and trade databases that uniquely identify organizations in information resources. If books or articles have been written by or about an organization, chances are the organization already has an ISNI. The ISNI database has already assigned ISNIs for more than 500,000 organizations. You can start leveraging the power of a globally unique identifier to maximize organizational efficiency and impact by starting to use your ISNI right away.

To check, go to isni.org/search and search for your organization.

Become a member of ISNI

By becoming a member of ISNI you can ensure that your organization and each of its component units has an ISNI Organizational Identifier that is accurate and up-to-date. As a member you can:

- Update your organization information in the ISNI database to ensure its accuracy.
 - Edit and correct information yourself.
 - Signify errors about your institution to other ISNI data contributors.
 - Represent how your organization structure has changed over time, ensuring that publications with affiliations to former units are also identified and counted in your institution's output.
- Have ISNI identifiers assigned to all your researchers, with their affiliations, in a batch process.

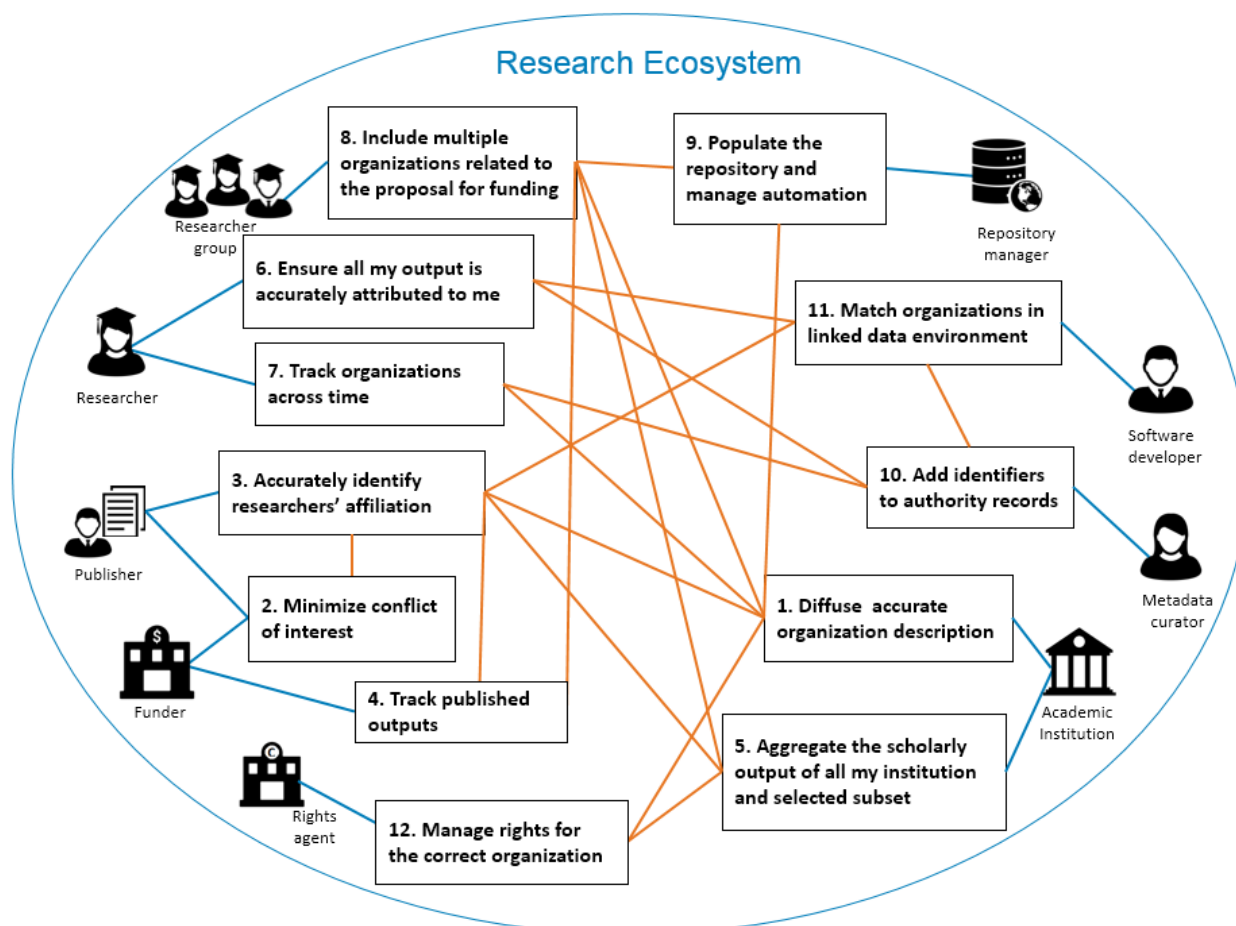
- Use a single authoritative source for managing organizational data within your local systems.
- Receive statistical reports on the multiple organizational affiliations of your researchers and authoritative data sources that are referencing your researchers.
- Take advantage of the information in millions of work-in-progress records in the database that are still not publicly available.

For more information, see <http://www.isni.org/content/isni-community>.

APPENDIX J: RESEARCH ECOSYSTEM

By Jing Wang, Johns Hopkins University

The twelve organizational identifier use cases are mapped to their respective stakeholders and their connections with other use cases. Together, the inter-connections comprise part of a research ecosystem, where various systems co-exist in a mutually beneficial relationship. Within the research ecosystem, a well-maintained organizational identifier is the responsibility of everyone and benefits everyone.



OCLC Research Representing Organizations in ISNI Task Group. 2016.

NOTES

1. Daniel Hook, Symplectic LTD (Digital Science), referred to identifiers as “glue” when he presented “A Research Information Management System Perspective” in the 13 November 2014 OCLC Research Webinar, Registering Researchers in Authority Files. Slides at: <http://www.oclc.org/content/dam/research/presentations/smith-yoshimura/registering-researchers-webinar.pptx>.
2. ISO 27729. See <http://isni.org/> for more information.
3. For more information, see <http://orcid.org/content/about-orcid>.
4. Smith-Yoshimura, Karen, Micah Altman, Michael Conlon, Ana Lupe Cristán, Laura Dawson, Joanne Dunham, Thom Hickey, Daniel Hook, Wolfram Horstmann, Andrew MacEwan, Philip Schreur, Laura Smart, Melanie Wacker, and Saskia Woutersen. 2014. *Registering Researchers in Authority Files*. Dublin, Ohio: OCLC Research. <http://www.oclc.org/content/dam/research/publications/library/2014/oclcresearch-registering-researchers-2014.pdf>.
5. CASRAI (The Consortia Advancing Standards in Research Administration Information) is an international non-profit dedicated to reducing the administrative burden on researchers and improving business intelligence capacity of research institutions and funders. The Jisc CASRAI-UK Organisational Identifiers Working Group’s charter is described at <http://jiscasraipilot.jiscinvolve.org/wp/working-groups/org-id/> (Archived at <https://perma.cc/D66Y-MRXT>).
6. The OCLC Research Library Partnership convened a meeting in June 2015 on the theme “Rep, Rank & Role.” Jim Michalko posted a summary of this meeting on the OCLC Research *hangingtogether.org* blog, “University Reputation And Ranking—Another Way Europe is not like US.” <http://hangingtogether.org/?p=5212>.
7. The *Times Higher Education* World University Rankings. <https://www.timeshighereducation.com/world-university-rankings>; QS Top Universities. <http://www.topuniversities.com/university-rankings>; and the Center for World-Class Universities at Shanghai Jiao Tong University’s Academic Ranking of World Universities. <http://www.shanghairanking.com/>.
8. Ferguson, Nicky, Richard Moore, and Seb Schmoller. 2015. *Review of Selected Organisational IDs and Development of Use Cases for the Jisc CASRAI-UK Organisational Identifiers Working Group*. p. 19. UK: Jisc and CASRAI UK. <http://repository.jisc.ac.uk/5853/1/Review-of-orgIDs-usecases-clax.pdf>.
9. See <http://thomsonreuters.com/en/products-services/scholarly-scientific-research/scholarly-search-and-discovery/web-of-science.html>.
10. See <https://www.elsevier.com/solutions/scopus>.
11. See <http://isni.org/search>.
12. See <http://home.isr.umich.edu/>.
13. See <http://dpn.org/>.
14. See <https://www.mdfrc.org.au/>.

15. See “Deliverables” in “OCLC Research Partners Task Force on Representing Organizations in ISNI.” <http://www.isni.org/content/oclc-research-partners-task-force-representing-organizations-isni>.
16. A list of ISNI Registration Agencies is on the ISNI website at: <http://www.isni.org/content/isni-registration-agencies>.
17. International Standard ISO 25964-2: Information and Documentation—Thesauri and Interoperability with Other Vocabularies—Part 2: Interoperability with Other Vocabularies: http://www.iso.org/iso/catalogue_detail.htm?csnumber=53658.



For more information about our work on representing organizations in ISNI, please visit:
www.oclc.org/research/themes/research-collections/isni-organizations.html



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